

**Edited
Book**

Impact of Recent Technological Advances in Education

▶ **Dr. A. K.Tiwari**

▶ **Dr. Prafulla Vyas**

▶ **Dr. Yogita Jiwane**



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*Edited E-Book
On*

Impact of Recent Technological Advances in Education

Editors

Dr. A.K. Tiwari

Principal Disha College Raipur

Dr. Prafulla Vyas

Assistant Professor Science

Dr. Yogita Jiwane

Assistant Professor Education

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Preface

Education has always been at the core of human progress and development serving as the bedrock upon which societies flourish. Throughout history, the methods and tools used for teaching and learning have evolved, reflecting the changing needs and capabilities of each generation. However, in recent years, the pace of technological advancement has been unprecedented, reshaping nearly every aspect of our lives and altering the landscape of education in profound ways.

As we stand on the threshold of a new era, this book aims to explore the transformative “**Impact of recent Technological advances in Education**” in this book, we delve in to the multifaceted effects to technology on various educational domains, from traditional classroom setting to distance learning environments, we aims to provide educators, policymakers, students and stakeholders with a comprehensive understanding of how technology has reshaped and continues to shape the educational landscape.

The Chapter in this book data mining clustering technique, impact of ict,stem career pathway, emergence of AI in new education system, multidisciplinary approach in computer Science, emergence of virtual and augmented reality, multidisciplinary education for gender equity, and importance of awareness of direct tax, new trends in the elements of cost, Multidisciplinary Education in different perspective and Predicting student’s academic performance using deep learning, creating holistic learning experiences.

We hope that this book serves as a guiding light, inspiring educators and learners alike to embrace innovation responsibly and cultivate an educational environment that nurtures curiosity, critical thinking and lifelong learning.

Together, let us embark on this journey of exploring the impact of recent technological advances on education, and let us strive to shape an inclusive and forward thinking educational ecosystem for the generations to come.

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Chapter 1

An Optimized Data Mining Clustering Technique over Student's Academic Performance Based on Fuzzy Variance

Dr. Anil Kumar Tiwari¹, Dr Shikha Verma Kashyap²

¹Principal, Disha College, Raipur(CG)

²Director AAFT University Raipur

Abstract - This paper proposes a new Data Mining Clustering Technique over the crisp data set of student's academic performances and then its interpretation by MATLAB. Its analysis over the fuzzy set is also presented. Hence, the optimized decision algorithm over the variance of Arithmetic-Fuzzy Variance is illustrated for the linguistic and numeric outcomes.

Key Words: Data Mining Technique, Crisp Set, Fuzzy Set, Optimization, Arithmetic-Fuzzy Variance.

Introduction: Let a set of n -data points in the space R^d , k is any integer. Then the objective is defined as "obtain k -points set in R^d ". It calls centre point and hence, minimize the distance from each point to its nearest. Several application has been existing since 1979, when Hartign et.al. [3] designed an algorithm. It was the first K -means clustering algorithm. After a decade, White [11] presented another clustering overview in the platform of Artificial Neural Network. It is analyzed in the perspective of statistics. In 1993, Jang [4] proposed an adaptive network based fuzzy inference system in the domain of physical environment. Gau et.al. [2] discovered a new set theory as Vague Sets in the same year. Law [5] used fuzzy numbers for grading the educational system, in the year 1996. In the same year, Possey et.al. [8] drafted a student model, which is based on the Neural Network.

2006, become the year of real application of K -means clustering in students academic performances. It was a case study of pharmacy students. Its result and affect gave by Sansgiry [9]. Oyelade et.al. [7] presented an application of K -means clustering algorithm for prediction of the performances of the students, in the year 2010. Next year, Mankad et.al. [6] displayed an educational case study based on the genetic fuzzy algorithm. Next year, an improved academic performance system came in the existence. Defence University's data warehousing and data mining were the key operators of this system. In the same year, Choudhary et.al. developed a model based on soft computing for academic performances of teachers. It is also based on fuzzy logic. Upadhyaya [10] shown a result on fuzzy logic based evaluation of student's academic performances.



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In this paper, an optimized fuzzy K-means clustering algorithm presents for the evaluation of students academic performances. We analyzed K-means, Fuzzy and Optimization Theory in the context to each other and classified the common structure.

The Intelligence is one of the qualities of any student, which becomes the key factor in the academic performances. Intelligence is one of the class or cluster. If we classify any class, then the intelligence plays an important role for grouping the class. It order is also an important phase of study. It can be studied as, either poor, average, intelligence or Intelligence, average, poor or, average, poor, intelligence or poor, intelligence, average or average, intelligence, poor or intelligence, poor, average. These can be formed as the elements of set but its conclusion always distinct with each other. For example, intelligence means score lies in the interval of 80-100, average means. Score lies in the interval of 60-80 and 40-60 for the poor. Suppose a student scores 40 marks in the quarterly examination, 60 marks in the half yearly examination and 90 marks in annual examination. Our conclusion will be as “his academic performance is improving”. In other example, a student scored 90, 60, and 40 in the quarterly, half yearly and annual examination respectively. Then, definitely the conclusion will not as earlier. For this, we can say, the academic performance of student is reducing. The rate of learning is distinct in both the cases. Hence, one objective is determining that the class homogeneity and academic performances can be functioned. The involvement of the linguistic variable, fuzzy logic interacts with this by the common application.

Finally, this paper process a new structure of fuzzy K-means and its application is presented as the algorithm for the efficient evaluation of students academic performances.

1. **K-means Clustering:** Let, there are n data points in a set in a dimensional space R^d and k is an integer. Then finding k -points set in R^d , is the objective of any K-means clustering. Its k -points are called centers. The minimizing the mean squared distance from each data point to the closest centre.

Let $X = \{x_1, x_2, \dots, x_d\}$ denote a random vector from the given k -distributions. Let μ be a mean point, such that $\mu \in R^d$. Let the co-variance matrix be Σ for the given distribution of the order $d \times d$, is presented by,

$$\Sigma = E((X - \mu)(X - \mu)^T)$$

Let $Tr(\Sigma)$ be the sum of diagonal elements.

Hence, the dispersion will be, $\sigma = \sqrt{Tr(\Sigma)}$

Let, in the i -th cluster distribution, $\mu^{(i)}$ be a mean and $\sigma^{(i)}$ be a dispersion.

Thus,

$$r_{\min} = \frac{1}{2} \min |\mu^{(i)} - \mu^{(j)}|,$$

And

$$\sigma_{\max} = \max_i \sigma^{(i)}.$$

In well-structured clusters, r_{\min} is large than σ_{\max} .

Then, the cluster structure of the point distribution be,



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$$\rho = \frac{r_{\min}}{\sigma_{\max}}$$

Next section interacts with the existed methods. These are modern decision techniques and efficient. The three noteworthy methods are given. First is K-means, Fuzzy C-means is the second and Fuzzy mean is another.

2. **Existed Methods:** There are various method for the similar objectives. It can be classified into quantitative and qualitative. Our objective is to find the decision in linguistic and numerical both, thus the following existed method is essential to read:

2.1. K-means Clustering Method: In section 2, it is defined, this section, it will be presented in operational way.

Let X be set and $\{A_i\}$, where $i = 1, 2, \dots, C$ be a family set. Its partition will be represented as,

$$\begin{aligned} \bigcup_{i=1}^C A_i &= X, \\ A_i \cap A_j &= \phi; \forall i \neq j, \\ \phi &\subset A_i \subset X; \forall i, \end{aligned}$$

Where, $X = \{x_1, \dots, x_n\}$ is a data sample and C is the number of clusters.

For C ; $2 \leq C < n$; $C = n$.

Hence, the objective function be,

$$J(U, v) = \sum_{k=1}^n \sum_{i=1}^C \chi_{ik} (d_{ik})^2,$$

Where, U is the partition matrix, v is a vector of cluster centre and d_{ik} a Euclidean distance measure between x_k and v_i , it is represented as,

$$d_{ik} = d(x_k - v_i) = \|x_k - v_i\| = \sqrt{\sum_{j=1}^m (x_{kj} - v_{ij})^2}$$

2.2. **Fuzzy C-means Clustering Method:** Its fuzzy based C-means clustering method for the multiple clusters. Its objective function will be,

$$J(U, V) = \sum_{i=1}^k \sum_{x_k \in X} (\mu_{C_i}(x_k))^m \|x_k - v_i\|^2$$

Where, U is a fuzzy position and m is a weight.

For the local minimum, the objective function becomes;



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$$\mu_{C_i}(x) = \frac{1}{\sum_{j=1}^k \left(\frac{\|x - v_i\|^2}{\|x - v_j\|^2} \right)^{\frac{1}{m-1}}}; 1 \leq i \leq k, x \in X$$

$$r_i = \frac{\sum_{x \in X} (\mu_{C_i}(x))^m x}{\sum_{x \in X} (\mu_{C_i}(x))^m}; 1 \leq i \leq k,$$

$$\sum_{i=1}^C \|r_i^{previous} - v_i\| \leq \varepsilon.$$

2.3. **Fuzzy Mean:** As arithmetic mean, fuzzy arithmetic mean is the generalized form the first. Let a multiple be $(x, \mu(x), [0,1], l_1, l_2)$, where l_1, l_2 the two linguistic variables are. Then the Fuzzy Arithmetic Mean can be represented as consequence matrix in below::

$$\bar{f} = \begin{bmatrix} f_1 & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & f_n \end{bmatrix},$$

Where f_1, \dots, f_n are the grading?

Trace of the fuzzy mean is equal to the sum of the diagonal element, i.e. $Tr(\bar{f})$.

Below, we propose a new method, which deals with the decision of numerical and linguistic both. Its explained by the sample data of a student, but it can be generalized for n variables.

3. **Proposed Method:** In below, an observation of a student's academic performance is presented:

Test	I	II	III	IV
Marks (100)	20	50	80	?

There are the following natural questions:

- What will be the marks in Test IV?
- The average of marks is constant (50) from Test I to III and from III to I also, but what about the performance of student is improving or reducing?

This case study is mentioned earlier in this paper, but in this section, it will be analyzed. For searching the answer of these questions, the following methodology is essential:

The classical set theory and modern fuzzy logic applied on the above observation as below:

Test	I	II	III	IV
Marks (100)	20	50	80	?
Crisp Set	0	0	1	?
Fuzzy Set	0	0.5	1	?



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The objective of given the above table is, “for identify the intelligent student”. If the student scored more than or equal to 80 marks then it referred as “an intelligent student”, thus crisp and fuzzy are existed here.

Let a data set (Crisp Set) of the marks of student be $X = \{x_1, \dots, x_n\}$ and another data set (Fuzzy Set) of the marks of student be $F = \{(x_1, \mu_A(x_1)), \dots, (x_n, \mu_A(x_n))\}$. The arithmetic mean of the crisp set and fuzzy set be \bar{x} and \bar{f} respectively. The simulated marks of the student be x_m . It can be presented mathematically as,

$$\begin{aligned} x_m &= f(\bar{x} \pm a); a \in R. \\ \text{either, } x_m &= f(\bar{x} + a) \\ \text{or, } x_m &= f(\bar{x} - a). \end{aligned}$$

Similarly for the fuzzy set,

$$\begin{aligned} x_m &= f(\bar{f} \pm a); a \in R. \\ \text{either, } x_m &= f(\bar{f} + a) \\ \text{or, } x_m &= f(\bar{f} - a). \end{aligned}$$

A mapping a is defined from \bar{x} to \bar{f} as, $a : \bar{x} \rightarrow \bar{f}$, or, $\bar{f} = a(\bar{x})$ and its variance be v_x, v_f .

Hence, x_m can be optimized as,

$$x_m = \max(v_x \cup v_f, \mu_{x_m}(v_x \cup v_f)),$$

s.t.,

$$v_x = \frac{\sum (d\bar{x})^2}{N}; \text{Population}$$

Or,

$$v_x = \frac{\sum (d\bar{x})^2}{N-1}; \text{Sample}$$

&

$$v_f = \frac{\sum (d\bar{f})^2}{N}; \text{Population}$$

Or,

$$v_f = \frac{\sum (d\bar{f})^2}{N-1}; \text{Sample}$$

&

Error : either, $v_x, v_f \rightarrow <$,

or, $v_x, v_f \rightarrow >$.



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The fuzzy grading is defined as follows:

Marks	Grading
0	0.0
1	0.1
2	0.2
3	0.3
4	0.4
5	0.5
6	0.6
7	0.7
8	0.8
9	0.9
10	1.0

The fuzzy If-Then rule is presented below:

If the numeric value is	Then the linguistic value will be
0	Very Very Poor
1	Very Poor
2-3	Poor
4	Average
5	Moderate
6	Good
7	Very Good
8	Very Very Good
9	Excellent
10	Outstanding

This will be applied in the illustration of the proposed algorithm in this paper.

Its algorithm is presented in below section.

4. Algorithm:

4.1. Input Set X :

S.No.	Student's Name	t_1	t_n
1	s_1								
.	.								
.	.								
.	.								
.	.								
n	s_n								



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4.2. Input Set F :

S.No.	Student's Name	$(t_1, \mu(t_1))$	$(t_n, \mu(t_n))$
1	s_1								
.	.								
.	.								
.	.								
.	.								
.	.								
n	s_n								

4.3. Compute \bar{x}, \bar{f} .

4.4. Optimized by,

$$x_m = \max(v_x \cup v_f, \mu_{x_m}(v_x \cup v_f)),$$

s.t.,

$$v_x = \frac{\sum (d\bar{x}_n)^2}{N}; \text{Population}$$

Or,

$$v_x = \frac{\sum (d\bar{x}_n)^2}{N-1}; \text{Sample}$$

&

$$v_f = \frac{\sum (\mu d\bar{x}_n)^2}{N}; \text{Population}$$

Or,

$$v_f = \frac{\sum (\mu d\bar{x}_n)^2}{N-1}; \text{Sample}$$

Where, ND and LD for Numeric and Linguistic Decisions respectively.

&

$$\text{Error} : |ND - LD| \neq 0.$$

4.5. Output:

4.5.1. Numeric Decision:

$$x_m = f(\bar{x} \pm a); a \in R.$$

$$\text{either, } x_m = f(\bar{x} + a)$$

$$\text{or, } x_m = f(\bar{x} - a).$$

4.5.2. Linguistic Decision:



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$$x_m = f(\bar{f} \pm a); a \in R.$$

$$\text{either, } x_m = f(\bar{f} + a)$$

$$\text{or, } x_m = f(\bar{f} - a).$$

Illustration is given below, which interacts with the above mentioned example.

5. Example:

5.1. Input Crisp Set X :

S.No.	Student's Name	$x_1(10)$	.	.	.	.	.	.	$x_{10}(10)$
1	s_1								
.	.								
.	.								
.	.								
.	.								
n	s_n								

5.2. Input Fuzzy Set F :

S.No.	Student's Name	$(x_1, \mu(x_1))$	.	.	.	.	.	.	$(x_{10}, \mu(x_{10}))$
1	s_1								
.	.								
.	.								
.	.								
.	.								
.	.								
n	s_n								

5.3. Computation:

5.3.1. Computation Table for Crisp Data Set:

S.No.	Student's Name	$x_1(10)$	$x_2(10)$	$x_3(10)$	$\sum x_3$	$\bar{x}_3 = \frac{\sum x_3}{3}$	$d\bar{x}_3 = \bar{x} - \bar{\bar{x}}$	$(d\bar{x}_3)^2$
1	s_1	2	3	6	11	3.6	-0.46	0.21
2	s_2	5	10	6	21	7.0	2.94	8.64
3	s_3	1	0	4	5	1.6	-2.46	6.05
.	.					$\bar{\bar{x}}_3 = 4.06$	0.02	14.90



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5.3.1.1. Computation of v_x :

$$\begin{aligned}
 v_x &= \frac{\sum (d\bar{x}_3)^2}{N}; \text{Population} \\
 &= \frac{14.90}{3} \\
 &= 4.96
 \end{aligned}$$

5.3.2. Computation Table for Fuzzy Data Set:

S.No	Student's Name	$(x_1, \mu(x_1))$	$(x_2, \mu(x_2))$	$(x_3, \mu(x_3))$	$\sum \mu x_3$	$\mu \bar{x}_3 = \frac{\sum t_3}{3}$	$\mu d\bar{x}_3 = \mu \bar{x} - \mu \bar{\bar{x}}$	$(\mu d\bar{x}_3)^2$
1	s_1	(2, 0.2)	(3, 0.3)	(6, 0.6)	1.1	0.3	0.0	0.00
2	s_2	(5, 0.5)	(10, 1)	(6, 0.6)	2.1	0.7	0.4	0.16
3	s_3	(1, 0.1)	(0, 0)	(4, 0.4)	0.5	0.1	-0.2	0.04
	.					$\mu \bar{\bar{x}}_3 = 0.3$	0.2	0.20

5.3.2.1. Computation of v_f :

$$\begin{aligned}
 v_f &= \frac{\sum (\mu d\bar{x}_3)^2}{N}; \text{Population} \\
 &= \frac{0.20}{3} \\
 &= 0.06
 \end{aligned}$$

5.4. Optimized by,

$$\begin{aligned}
 x_m &= \max(v_x \cup v_f, \mu_{x_m}(v_x \cup v_f)) \\
 &= \max(4.96 \cup 0.06, \mu(4.96 \cup 0.06)) \\
 &= \max(0.4 \cup 0.06, \mu(0.4 \cup 0.06)) \\
 &= \max(0.4 \cup 0.0, \mu(0.4 \cup 0.0)) \\
 &= 0.4 \\
 &= 4 \\
 \text{s.t.,} \\
 v_x &: 4.96 > 4 \\
 &\& \\
 v_f &: 0.06 < 0.4 \\
 &\& \\
 &\text{Error.}
 \end{aligned}$$

5.5. Output:

5.5.1. Numeric Decision (ND):



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$$\begin{aligned} & \bar{x}_3 + 4 \\ & = 4.06 + 4 \\ & = 8.06 \\ & 8 \end{aligned}$$

5.5.2. Linguistic Decision (LD):

$$\begin{aligned} & \mu_{\bar{x}_3} + 0.4 \\ & = 0.3 + 0.4 \\ & = 0.7 \\ & = 7 \\ & \text{Very – Good} \end{aligned}$$

5.5.3. Error Computation:

$$\begin{aligned} \text{Error} &= \frac{|ND - LD|}{10} \times 100 \\ &= \frac{|8 - 7|}{10} \times 100 \\ &= 10\% \end{aligned}$$

5.5.4. Error Analysis: Section 5.5.3. shows some error, the reason of this is only of that the selection of values are approximated but not exact. If these values are taken as same as then there will be no error.

6. Conclusion: Individually, statistical means used as the common tool in general decision theory. Fuzzy mean is the newly launched method. Its application is presented in this paper for the better decision than existed. The study of the academic performance of students is equivalent to the study of discrete function of arithmetic and fuzzy means. Both is taken simultaneously is still challenging, but the paper is become the first step toward this under the error estimation.

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Impact of ICT in Education

Dr. Prafulla Vyas¹, Mr. Rishi Manik Das²

¹Assistant Professor Disha College Raipur

²Assistant Professor AAFT University Raipur

Abstract

Information and communication technologies (ICT) are extremely influencing every discipline under the sun including Education. It is affecting every aspect of education from teaching-learning to assessment and evaluation. It improves the effectiveness of education. It aids literacy movements. It enhances scope of education by facilitating mobile learning and inclusive education. It facilitates research and scholarly communication. Impact of ICT and its potential for the education field is manifold. It positively affects all the stakeholders of the education field. The current papers discuss the same along with the various challenges posed by ICT. The challenges include economical issues, educational and technical factors. Appropriate content, Design and workability of ICT also play a crucial role in adoption of ICT in the education field. The paper delineates in brief the challenges and probable solutions.

Key Ward: Information Technology, Communication, Inclusive Education

Introduction

UNESCO Report has rightly stated that the demand for higher education cannot be met in the developed and developing world without distance or virtual modes of learning which is facilitated by Information and Communication Technologies (ICT). The impact of ICT on trainers, learners, researchers and the entire learned society is tremendous. It is changing the contours of the education delivery system in the world by enhancing access to information for all. It also ensures effective and inclusive education. ICT supports the concept of open learning where the thrust is upon enhanced student access and the development of student autonomy.

Roles of ICT in Education

ICT can play varied roles in developing an effective learning environment. It acts as a teacher and explains core content concepts and addresses misconceptions. It acts as a stimulant and fosters analytical thinking and interdisciplinary studies. It networks a learner with the peers and experts and develops collaborative atmosphere. It plays the role of a guide and mentor by providing tailor made instructions to meet individual needs. Online learning facilitates learning through digital mode. With the help of multimedia, it enhances effectiveness of teaching-learning and hence proves crucial for early learners, slow learners and differently abled learners. Modern ICT tools not only deliver the content but also replicate formal learning experience via virtual learning. The intention of virtual classrooms is to extend the structure and services that accompany formal education programs from the campus to learners.

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ICT also addresses the need of mobile learning. It offers independent space and flexibility that comes from working away from the learning institute or tutor. It makes education accessible to all, irrespective of geographical barriers or resource constraints. Learners from remote areas, working people who want to learn further and update their knowledge and differently-abled students who find travelling an issue of concern - benefit from the mobile learning mode. As per Scott Motlik's technical evaluation report on "*Mobile Learning in Developing Nations*"; by comparison, mobile phone technology is widespread, easy to use, and familiar to learners and instructors. An exploratory study of unsupervised mobile learning in rural India conducted by Anuj Kumar and his colleagues showed a reasonable level of academic learning and motivation among rural children who were voluntarily engaged in mobile learning.

Information & Communication Technology

Information & Communication Technology (ICT) is a vast and ever-evolving field that encompasses various technologies and tools used to manage process, communicate, and exchange information. It plays a pivotal role in modern society, influencing almost every aspect of our lives, from how we work and learn to how we interact with others and entertain ourselves. ICT has transformed the world, revolutionizing industries, economies, and communication channels, bringing both opportunities and challenges.

Key Components of ICT:

- **Hardware:** ICT relies on a wide range of hardware devices, including computers, servers, networking equipment (routers, switches, etc.), mobile devices (smartphones, tablets), and other peripheral devices like printers and scanners. The continuous advancement in hardware technology has led to increased processing power, storage capacities, and miniaturization, enabling the development of more powerful and compact devices.
- **Software:** Software forms the backbone of ICT systems. It includes operating systems, applications, programming languages, databases, and various other tools that allow users to perform tasks efficiently. From productivity software like word processors and spreadsheets to complex enterprise resource planning (ERP) systems, the software is critical for managing and analyzing data and enhancing productivity across different domains.
- **Networks:** ICT heavily relies on communication networks to facilitate the exchange of information between devices and users. Local Area Networks (LANs) connect devices within a limited geographical area, while Wide Area Networks (WANs) connect devices across larger distances, often spanning cities or even continents. The internet, a global network of networks, is a prime example of how ICT enables worldwide communication and access to information.
- **Internet and World Wide Web:** The Internet has been a game-changer in the field of ICT. It has connected people from all corners of the world, transformed business models, and become an enormous repository of information. The World Wide Web (WWW) has made accessing and sharing information seamless, with web browsers acting as gateways to a vast array of websites and online services.

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Impact of ICT on Society:

- **Communication:** ICT has revolutionized communication, enabling real-time interactions between individuals and groups through emails, instant messaging, video conferencing, and social media platforms. It has bridged geographical barriers, allowing people to connect, collaborate, and share knowledge irrespective of their location.
- **Education:** ICT has transformed the way education is delivered and accessed. Online learning platforms, educational apps, and virtual classrooms provide flexible learning opportunities for students of all ages, making education more accessible and inclusive.
- **Business and Economy:** ICT has reshaped business processes, automating tasks, and streamlining operations. E-commerce has expanded the reach of businesses, allowing them to sell products and services globally. Big data analytics and artificial intelligence have enabled data-driven decision-making, leading to improved efficiency and innovation.
- **Healthcare:** ICT has made significant contributions to the healthcare industry, from electronic health records and telemedicine to medical imaging and remote patient monitoring. These technologies have enhanced healthcare delivery, diagnosis, and treatment, ultimately improving patient outcomes.
- **Entertainment:** ICT has transformed the entertainment industry through digital media, streaming services, online gaming, and social media platforms. It has changed the way we consume content and interact with entertainment.

Impact of ICT on Education

The impact of Information & Communication Technology (ICT) on education has been revolutionary, transforming the way knowledge is imparted, accessed, and processed. It has become an integral part of modern educational systems, benefiting students, teachers, and educational institutions in numerous ways. Here are some of the significant impacts of ICT on education:

1. **Access to Information and Resources:** ICT has revolutionized the way students access information. Previously, students heavily relied on textbooks and libraries for learning materials. Today, with the internet and digital resources, a vast amount of information is available at students' fingertips. They can access educational websites, online libraries, research papers, and multimedia content, enriching their understanding of subjects beyond what is covered in textbooks. This democratization of information has leveled the playing field, enabling students from different backgrounds and locations to access the same knowledge resources.
2. **Personalized and Flexible Learning:** ICT allows for personalized learning experiences tailored to individual student needs and learning styles. Educational software and learning management systems (LMS) collect data on students' performance, progress, and preferences. Based on this data, adaptive learning systems can generate customized learning pathways for each student. Some students may require additional challenges, while others need more support in specific areas. ICT helps deliver content at the right pace, matching the individual needs of each student.

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Additionally, online learning platforms and educational apps offer flexibility in scheduling and pacing. Students can learn at their own convenience, allowing them to balance their studies with other commitments. Asynchronous learning options provide opportunities for students to engage with the material when it suits them best.

3. **Interactive and Engaging Teaching Methods:** Traditional lectures and textbooks can sometimes be dry and challenging for students to grasp complex concepts. ICT has introduced interactive and engaging teaching methods that capture students' attention and foster a deeper understanding of the subject matter. Multimedia presentations, videos, animations, and simulations bring abstract concepts to life, making learning more enjoyable and memorable. Virtual reality (VR) and augmented reality (AR) applications provide immersive learning experiences, enabling students to explore historical sites, scientific phenomena, and more. Gamification in education is another example of how ICT makes learning fun and engaging. By incorporating game elements, such as points, badges, and rewards, educational software motivates students to progress and achieve their learning goals.
4. **Collaboration and Global Connections:** ICT has transformed how students collaborate and interact with one another. Virtual classrooms and online discussion forums create opportunities for students from different regions, cultures, and backgrounds to collaborate on projects, share ideas, and learn from one another. This global interconnectedness fosters cultural understanding and appreciation, promoting a sense of global citizenship. Moreover, video conferencing tools enable virtual guest lectures and educational exchanges, connecting classrooms across the world. Students can communicate with experts, practitioners, and educators beyond their local community, enriching their learning experience with diverse perspectives.
5. **Teacher Professional Development:** ICT has opened up various avenues for teacher professional development. Online courses, webinars, and educational platforms provide teachers with continuous learning opportunities. They can update their knowledge in specific subject areas, acquire new pedagogical skills, and explore innovative teaching methodologies. Professional learning communities online allow teachers to collaborate with colleagues and share best practices, promoting a culture of continuous improvement in education.
6. **Efficient Assessment and Feedback:** Traditional assessment methods, such as pen-and-paper exams, can be time-consuming and labor-intensive for teachers. ICT has streamlined the assessment process, making it more efficient and effective. Online quizzes and exams can be automatically graded, providing instant feedback to students. Learning analytics and data-driven insights allow teachers to identify learning gaps and adjust their teaching strategies accordingly. This data-driven approach helps ensure that students receive the support they need to succeed academically.
7. **Inclusive Education:** ICT plays a pivotal role in promoting inclusive education, ensuring that all students, regardless of their abilities or disabilities, have equal access to learning opportunities. Assistive technologies, such as screen readers for the visually impaired and speech recognition software for those with motor impairments, help students with special

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needs participate fully in educational activities. Digital content can be made accessible through various formats, catering to diverse learning requirements and preferences.

- 8. Cost-Effectiveness and Sustainability:** The adoption of ICT in education has the potential to be cost-effective and environmentally sustainable. Digital resources, such as e-books and online materials, reduce the need for printed textbooks and handouts, resulting in cost savings for both students and educational institutions. Virtual classrooms and online learning platforms minimize the need for physical infrastructure, such as classrooms and lecture halls. This cost-effectiveness can benefit both well-established educational institutions and those in resource-constrained settings. Additionally, the reduced reliance on printed materials contributes to environmental conservation, reducing paper consumption and its associated ecological impact.

Conclusion

The impact of ICT on education has been transformative, reshaping the learning landscape and empowering students and educators with innovative tools and resources. By facilitating access to information, promoting personalized learning, and fostering collaboration and global connections, ICT has enriched the educational experience for learners worldwide. Moreover, the integration of interactive teaching methods, efficient assessment tools, and inclusive practices has made education more engaging, effective, and accessible to all. As technology continues to advance, the potential for ICT to revolutionize education further is boundless, offering new opportunities for learners to thrive in the dynamic and interconnected world of the 21st century.

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Beyond Subject Boundaries: Creating Holistic Learning Experiences

Mrs. Seema Pathak¹, Mr. Santosh Swarnakar²

¹Assistant Professor, Disha College, Raipur

²Assistant Professor AFT University Raipur

Introduction

In traditional education systems, subjects are often taught in isolation, leading to fragmented learning experiences for students. However, there is a growing recognition that knowledge is interconnected and that learning should reflect this interconnectedness. Holistic learning experiences transcend subject boundaries and provide students with a more comprehensive and integrated understanding of the world. This chapter explores the concept of creating holistic learning experiences that integrate knowledge, skills, and perspectives from multiple subjects. By going beyond subject boundaries, educators can provide students with a more comprehensive and interconnected understanding of the world.

The Limitations of Subject-Based Learning

1.1 Siloed Learning

In subject-based education, learning is compartmentalized into individual subjects, with little connection or integration between them. This siloed approach can lead to fragmented knowledge and a lack of understanding of how different subjects relate to one another.

1.2 Narrow Perspective

Subject-based education often emphasizes specialized knowledge within a specific discipline, neglecting the broader context and interdisciplinary connections. This narrow perspective limits students' ability to see the big picture and understand the interconnectedness of various fields of study.

1.3 Disengagement and Lack of Relevance

When students fail to see the relevance of what they are learning to their lives and the world around them, they can become disengaged and lose interest in their studies. The rigid subject boundaries often fail to address the real-world problems and challenges that students are likely to encounter.

The Concept of Holistic Learning Experiences

2.1 Integration of Subjects

Holistic learning experiences involve integrating different subjects, breaking down the barriers between disciplines, and encouraging interdisciplinary exploration. By connecting knowledge and skills from various fields, students develop a more comprehensive understanding of the world and its complexities.



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2.2 Real-World Relevance

Holistic learning experiences emphasize the practical application of knowledge and skills in real-world contexts. This approach helps students see the relevance of their education and how it can be used to solve complex problems and make a positive impact on society.

2.3 Critical Thinking and Problem-Solving

By integrating subjects, students are exposed to a wider range of perspectives, which enhances critical thinking and problem-solving abilities. They learn to approach challenges from different angles, draw connections between seemingly unrelated concepts, and develop creative solutions.

2.4 Interdisciplinary Collaboration

Holistic learning experiences promote collaboration among students and teachers from different disciplines. Through collaborative projects, students learn to appreciate diverse viewpoints, communicate effectively, and leverage collective intelligence to tackle complex problems.

The Need for Holistic Learning

3.1. Interconnectedness of Knowledge

The world is complex and interconnected, with subjects overlapping and influencing each other. Fragmented learning fails to reflect this interconnectedness, limiting students' understanding.

3.2. Developing Critical Thinking Skills

Holistic learning encourages students to think critically and make connections across disciplines. It promotes higher-order thinking skills and fosters a more profound understanding of concepts.

3.3. Preparing Students for Real-World Challenges

Real-world problems often require multidisciplinary approaches. Holistic learning equips students with the skills to tackle complex, interdisciplinary challenges.

Strategies for Creating Holistic Learning Experiences

4.1 Integrated Curriculum Design

One of the fundamental strategies for creating holistic learning experiences is the integration of subjects in the curriculum. Instead of teaching subjects in isolation, educators can design interdisciplinary units or projects that combine multiple subjects to explore a central theme or real-world problem. For example, a project on sustainable development could involve elements of science, social studies, mathematics, and language arts. This integrated approach helps students see the interconnectedness of different subjects and promotes a more comprehensive understanding of complex issues.

4.2 Project-Based Learning

Project-based learning (PBL) is an effective method for fostering holistic learning. Through projects, students engage in authentic, real-world tasks that require them to apply knowledge and skills from various subjects. PBL encourages collaboration, critical thinking, creativity, and problem-solving skills. For example, a project



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that involves designing and building a functioning model of a sustainable community would integrate concepts from multiple disciplines such as science, technology, engineering, mathematics, and social sciences.

4.3 Experiential and Authentic Learning

Experiential and authentic learning experiences provide students with opportunities to apply knowledge and skills in real-world contexts. Field trips, internships, service-learning projects, and simulations enable students to engage with authentic problems and challenges. By immersing themselves in these experiences, students can make connections between theoretical concepts and their practical applications, fostering a holistic understanding of the subject matter.

4.4 Technology Integration

Technology can play a crucial role in creating holistic learning experiences. Digital tools, online resources, and interactive platforms enable students to access a vast array of information from different subjects. Virtual reality, augmented reality, and simulations provide immersive experiences that bridge the gap between theory and practice. Technology also facilitates collaboration and communication, allowing students to connect with experts, peers, and resources beyond the physical classroom.

4.5 Inquiry-Based Learning

Inquiry-based learning encourages students to ask questions, investigate, and explore topics of interest. By posing their inquiries, students become active participants in their learning process. Educators can facilitate interdisciplinary inquiry by encouraging students to explore connections between different subjects and guiding them towards relevant resources and methods. Inquiry-based learning promotes critical thinking, problem-solving, and a holistic understanding of complex topics.

4.6 Reflection and Metacognition

Reflection and metacognition are essential components of holistic learning. Students need opportunities to reflect on their learning experiences, make connections between different subjects, and evaluate their own thinking processes. Journaling, self-assessment, group discussions, and portfolios are effective tools for fostering metacognitive skills. By engaging in reflective practices, students develop a deeper understanding of the connections between subjects and enhance their ability to transfer knowledge and skills across different contexts.

4.7 Teacher Collaboration and Professional Development

Creating holistic learning experiences requires collaboration among educators from different disciplines. Teachers can collaborate to design interdisciplinary projects, share resources, and exchange pedagogical strategies. Professional development opportunities focused on interdisciplinary teaching and learning can equip educators with the necessary skills and knowledge to create and facilitate holistic learning experiences effectively.

Assessing Holistic Learning

5.1. Authentic Assessments



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Move away from traditional, subject-specific assessments towards more authentic assessment methods. Assess students' ability to apply knowledge and skills across disciplines. Use performance-based assessments, portfolios, presentations, and real-world problem-solving tasks.

5.2. Rubrics and Criteria

Develop rubrics and criteria that reflect the interdisciplinary nature of the learning experiences. Provide clear expectations for evaluating students' ability to make connections across subjects. Assess both the process and the final product of interdisciplinary work.

Strategies for Implementing Holistic Learning Experiences

6.1 Curriculum Design

Curriculum design should incorporate interdisciplinary units and projects that connect subjects and emphasize real-world applications. Teachers can collaborate to identify opportunities for integration and develop curriculum frameworks that encourage holistic learning experiences.

6.2 Professional Development

Teachers need training and support to implement holistic learning experiences effectively. Professional development programs can provide opportunities for educators to learn about interdisciplinary teaching methods, explore collaborative strategies, and share best practices.

6.3 Assessment and Evaluation

Assessment methods should align with holistic learning experiences, focusing on students' ability to apply knowledge and skills across subjects. Performance-based assessments, portfolios, and interdisciplinary projects can provide a more comprehensive picture of student learning and growth.

6.4 Partnerships and Resources

Collaboration with external organizations, experts, and resources can enrich holistic learning experiences. Schools can establish partnerships with universities, businesses, and community organizations to provide students with access to real-world expertise and authentic learning opportunities.

Benefits of Holistic Learning Experiences

7.1 Deep Understanding

Integrating subjects allows students to develop a deeper understanding of complex topics. They can explore connections, analyze relationships, and gain insights that would be missed in a fragmented approach. This holistic understanding promotes lifelong learning and a broader intellectual capacity.

7.2 Enhanced Problem-Solving Skills

By engaging in interdisciplinary projects, students learn to approach problems from multiple angles. They acquire the skills needed to think critically, consider different perspectives, and apply a variety of strategies to find innovative solutions.

7.3 Increased Engagement and Motivation



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Holistic learning experiences foster student engagement and motivation by making education more relevant and meaningful. When students see the practical application of what they are learning and the impact it can have, they become more motivated to explore and deepen their knowledge.

7.4 Preparation for the Real World

The world outside of school is inherently interdisciplinary, requiring individuals to navigate complex systems and solve multifaceted problems. Holistic learning experiences prepare students for this reality by developing their adaptability, interdisciplinary thinking, and collaboration skills.

Challenges and Considerations:

8.1 Curriculum Alignment: Aligning different subjects and curricula can be complex. Educators need to identify common learning objectives and establish a shared understanding of how different subjects can complement one another.

8.2 Professional Development: Teachers may require professional development opportunities to develop the skills and knowledge necessary for implementing holistic learning experiences. Training and collaboration among educators can support their growth in designing and delivering interdisciplinary instruction.

8.3 Resource Allocation: Integrating multiple subjects may require additional resources, such as materials, technology, and collaboration spaces. Schools should allocate resources to support holistic learning initiatives.

Conclusion:

By creating holistic learning experiences that go beyond subject boundaries, educators can provide students with a more interconnected, relevant, and comprehensive education. Holistic learning fosters critical thinking, creativity, and problem-solving skills, preparing students to navigate a complex and interconnected world. Through interdisciplinary projects, thematic units, and collaborative planning, educators can help students develop a holistic understanding of the world and become lifelong learners who can make meaningful contributions to society.



Predicting Student's Academic Performance Using Deep Learning

Mrs. Rekha Singh¹, Dr. Omprakash Chandrakar², Mr. Somnath Sahoo³

¹Assistant Professor, Disha College Raipur

²Associate Professor, UkaTarsadia University, Bardoli, Gujarat, India

³Assistant Professor AFT University Raipur

Abstract:- Predicting the student's performance becomes more challenging due to the availability of large volume of data in educational domain. Several researchers predicted the student's performance using machine learning techniques but failed to get reasonably accurate predictions. This study attempts to predict student's performance using deep learning techniques. Deep learning is one step ahead of machine learning which contains many cascaded layers for feature extraction. The output of one layer serves as input of second layer. Deep learning includes multiple layers for predicting performance that are hidden layer, relu layer, pooling layer, activation layer and batch normalization layer. Set of optimal parameter is extracted using information gain and then it is given to the three layers to build student's performance prediction model. 1 line result.

Keywords:- Batch normalization, CNN, Deep Learning, Hidden layer, Machine learning, predicting student's performance.

Introduction:-

There are many factors such as past academic results, meeting with teacher, student's involvement in studies, behaviour, campus residence (the physical environment), health condition, communication skill, family background, etc which affect predicting the student's performance.[1]The main challenge for educational system is to deeply analyse student's strength, weakness and uniqueness for further development as nowadays students are involving in many activities rather than study. Predicting student's performance in advance, help students and their teacher to keep the track of student's progress. It also helpful to academic planner in university to enhance their decision making process. Also advantageous for the students to choose their field of interest before being enrolled to a specific course [2].Example to explain above statement, suppose a student fails in c language in first semester as well as in c++ language in second semester then using this data it can be predict that this student will fail in java in advance, so for improve result student can do work hard.

Literature Review:-

In Yehuala experiment student success and failure prediction is predicted by using the data mining techniques in which the pattern is discover and extract useful information from the student data like student's family background, personal information, history of student, health condition, etc. The techniques used for this are decision tree, neural network, Bayesian network and almost 75 – 80 % result. [2]

In a paper by Kabakchiev, a experiment is carried in which different classifiers like j48, naïve Bayes, k-nearest neighbour for classification are used for prediction on different classes like bad,



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average, good, very good, excellent and weighted of university sample data. All classifiers perform with accuracies around 60-75% for five different classes. Among all classifier, the decision tree classifier (J48) and rule learner (JRip) are most reliable as they perform with highest accuracy for all classes expect excellent class and Bayes classifiers perform with less accuracy for all classes than other classifiers.[7]

According to Paulo Cortez et al., the prediction of secondary student grades of two core classes (Mathematics and Portuguese) by using past school grades (first and second periods), demographic, social and other school related data. Three different DM goals (i.e. binary/5- level classification and regression) and four DM methods, i.e. Decision Trees (DT), Random Forests (RF), Neural Networks (NN) and Support Vector Machines (SVM) for improve the quality of education and enhance school resource management. In the experiment it is reveal that the obtained result by using all parameters including first and second period grades is best but the result is worst when no grade of student is used or known. Also the prediction performance decrease by using only first period grade. [6]

Research Methodology:

We found that no researcher has reported any study regarding prediction of student's academic performance using deep learning techniques. So we choose to apply deep learning using the CNN layer that produce much better results in comparison to data mining techniques. During literature study we found for student's performance prediction. Basically deep learning is implemented with the help of deep networks which is neural network with multiple hidden layers.

Deep Learning: Deep learning is the class of machine learning algorithm which has following features:

It has many cascaded layers for feature extraction. The output of one layer serves as input of second layer. Higher level features are derived from lower level features to form hierarchical representation. The layers used in the deep learning are the hidden layers of the artificial neural network. One more advantage of deep learning is that the layers select best features. Neural networks are trained using the gradient back-propagation method. It is like updating the weight of a layer as the derivative of previous layer. Layers are the representation of lower to higher level concepts [3]. Deep learning is implemented through neural networks. Motivation behind neural network is the biological neuron. Basically deep learning is implemented by the help of deep networks and deep networks are nothing but the neural networks with multiple hidden layers.

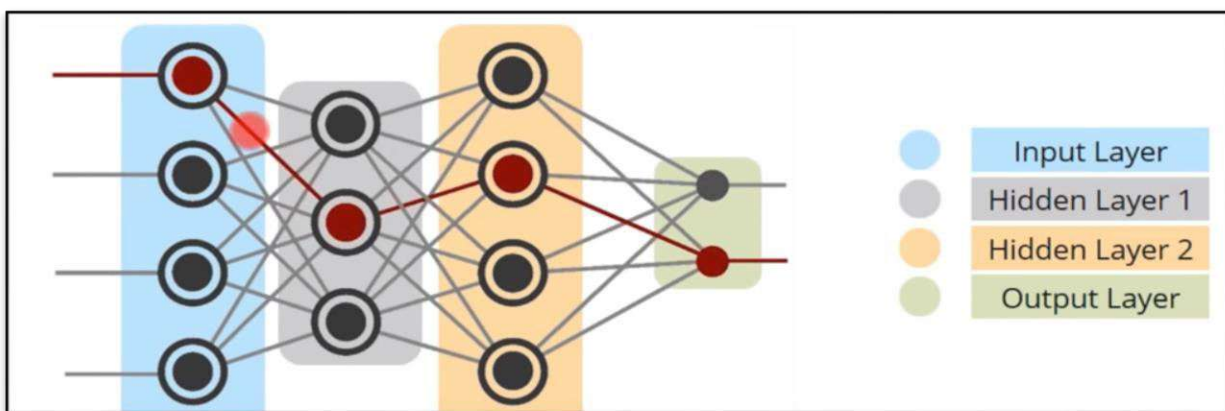


Figure 1: Neural Network [11]



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In the network, there are many hidden layers along with input and output layer. Every nodes in layers are interconnected to each other so output of one layer become input of another layer. At every layer the input get filter and classified by applying some functions in intent to get desire output. There is no such aspect like hidden layers in machine learning, so we used deep learning.

Experimental Setup and Result:

Objective:

The objective of this study is to predict student’s performance based on some parameters like school, travel time, study time, failures, paid extra classes, free time, internet, past academic result and so on using deep learning techniques.

Dataset description:

We carried out this experiment of predicting the student’s performance by using “student performance Dataset”, which is created by Paulo Cortez and Alice Silva in Department Of Information System in Portugal [6]. We have use the dataset of Portuguese language course student that consist of 649 instances. This dataset is taken from University of California Irvine (UCI) machine learning repository.

The dataset consist of student’s information on 33 parameters as listed below:

Attribute	Description (Domain)
Sex	: student’s sex (binary: female or male)
Age	: student’s age (numeric: from 15 to 22)
school	:student’s school (binary: Gabriel Pereira or Mousinho da Silveira)
address	:student’s home address type (binary: urban or rural)
Pstatus	:parent’s cohabitation status (binary: living together or apart)
Medu	:mother’s education (numeric: from 0 to 4a)
Mjob	:mother’s job (nominal)
Fedu	:father’s education (numeric: from 0 to 4a)
Fjob	:father’s job (nominal)
guardian	:student’s guardian (nominal: mother, father or other)
famsize	:family size (binary: ≤ 3 or > 3)
famrel	:quality of family relationships (numeric: from 1 – very bad to 5 excellent)
reason	:reason to choose this school (nominal: close to home, school reputation, course preference or other)
traveltime	:home to school travel time (numeric: 1 – < 15 min., 2 – 15 to 30 min., 3 – 30 min. to 1 hour or 4 – > 1 hour)
Studytime	:weekly study time (numeric: 1 – < 2 hours, 2 – 2 to 5 hours, 3 – 5 to 10 hours or 4 – > 10 hours)
failures	:number of failures in past class (numeric: n if $1 \leq n < 3$, else 4)
schoolsup	:extra educational school support (binary: yes or no)
famsup	:family educational support (binary: yes or no)
activities	:extra-curricular activities (binary: yes or no)
paidclass	:extra paid classes (binary: yes or no)
internet	:Internet access at home (binary: yes or no)



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- nursery :attended nursery school (binary: yes or no)
 - higher :wants to take higher education (binary: yes or no)
 - romantic :with a romantic relationship (binary: yes or no)
 - freetime :free time after school (numeric: from 1 – very low to 5 – very high)
 - goout :going out with friends (numeric: from 1 – very low to 5 – very high)
 - Walc :weekend alcohol consumption (numeric: from 1 – very low to 5 very high)
 - Dalc :workday alcohol consumption (numeric: from 1 – very low to 5 veryhigh)
 - health :current health status (numeric: from 1 – very bad to 5 – very good)
 - absences :number of school absences (numeric: from 0 to 93)
 - G1 :first period grade (numeric: from 0 to 20)
 - G2 :second period grade (numeric: from 0 to 20)
 - G3 :final grade (numeric: from 0 to 20)
- Note:-A : 0 – none, 1 – primary education (4th grade), 2 – 5th to 9th grade, 3 – secondary education or 4 – higher education.
- B: teacher, health care related, civil services (e.g. administrative or police), at home or other[6].

Feature selection:

Optimal set of parameters obtained by applying information gain based feature selection algorithm using the ‘InfoGain Attribute Eval Attribute Evaluator’ in “WEKA”. Out of 33 parameters present in the original dataset, we found an optimal set of 11 parameters for predicting student’s performance. They are as follows: school, travel time, study time, past failures, paid extra classes, nursery, higher, family relation, going out with friends, first period grade, second period grade, and final grade.

Apart from this, we randomly selected 11 parameters to compare the effectiveness of our feature selection method. The randomly selected parameters are as follows: sex, age, mother job, father job, travel time, Internet, weekend alcohol consumption, health, absences, first period grade, second period grade, and final grade.

In our experiment, we used CNN network layers for prediction and k-fold cross for validation of dataBased on confusion matrix wecalculateprediction model evaluationparameters.They are as follows:

sensitivity, specificity, accuracy.[5][9]

$$\text{Sensitivity} = \frac{TP}{(FN + TP)}$$

$$\text{Specificity} = \frac{TN}{(TN + FP)}$$

$$\text{Accuracy} = \frac{(TP + TN)}{\text{total}}$$

We carried out the experiment by creating three datasets where ratio of training and testing data are 80-20, 50-50 and 20-80.Also the data fields are categorized in three manners using varied set of parameters. They are as follows: First is “All 33 parameter of dataset”, second is “Optimal set of 11 parameter obtained by applying information gain algorithm using ‘WEKA’”and third is “Randomly selected 11 parameter”.



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Experiment Design:-

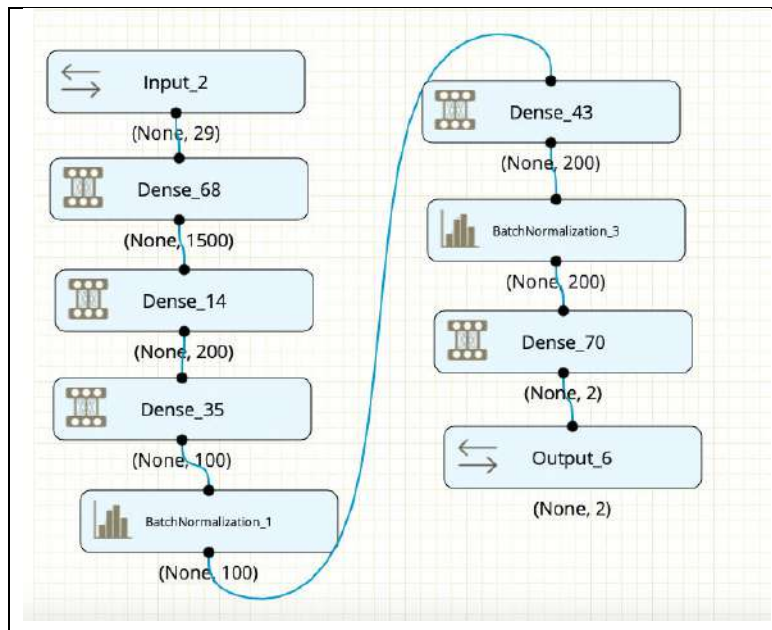


Figure 3: Student prediction model

In this experiment, we have built model to predict the performance of students by using deep learning studio[8][10]. Deep learning studio is a software tool which is used to create deep learning model using AI. It is a GUI based software so it's interesting and user-friendly. Just some clicks and drag and drop to build the project or run an experiment.

The prediction model include one input layer, six dense layers with Reactivation layer and varied output dimension, one batch normalization layers and one output layer.

Input layer is used represents a particular input port in the network.

Dense layer is a linear operation in which every input is connected to every output by a weight.

Batch normalization is a technique for improving the speed, performance, and stability of artificial neural networks.

Output layer is used represents a particular output port in the network.

Effect of experiment method:-

The primary objective of this experiment is to predict the performance of the students effectively. The following table shows confusion matrix measurement and the description of each measure.

Measurements	Description
Experiment Number	Number of given experiments
Number of instance	Experiment instance types
Number of fields	Describe the taken fields
Sensitivity	Measurement of the proportion of actual positive cases
Specificity	Measurement of the proportion of actual negative cases
Accuracy	Ratio of sum TP and TN divided by the total number of instance.

Table 1: Description table



Experiment Number	Number Of Instance	Sensitivity	Specificity	Accuracy
1	80% training data - 20% validation data(Using All 33 parameter)	97%	45%	78%
2	80% training data - 20% validation data (Using Optimal set of 11 parameter)	98%	33%	74%
3	80% training data - 20% validation data (Random 11 parameter)	98%	57%	84%
4	50% training data - 50% validation data (Using All 33 parameter)	96%	53%	84%
5	50% training data - 50% validation data (Using Optimal set of 11 parameter)	89%	81%	86%
6	50% training data - 50% validation data (Random 11 parameter)	98%	37%	73%
7	20% training data - 80% validation data (Using All 33 parameter)	92%	63%	87%
8	20% training data - 80% validation data (Using Optimal set of 11 parameter)	89%	76%	85%
9	20% training data - 80% validation data (Random 11 parameter)	97%	41%	79%

Table 2: Comparison Table Of experiment

Experiment using all 33 parameter:

Experiment Number	Number Of Instance	Sensitivity	Specificity	Accuracy
1	80% training data - 20% validation data	97%	45%	78%
4	50% training data - 50% validation data	96%	53%	84%
7	20% training data - 80% validation data	92%	63%	87%

Table 3: All data use as a parameter table



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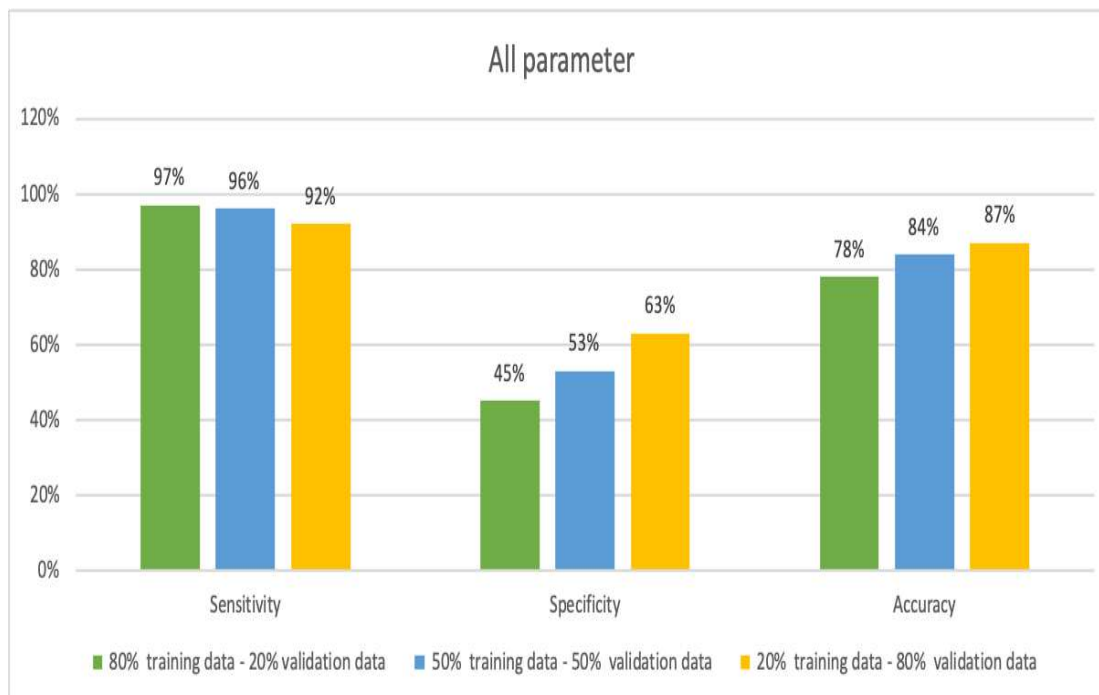


Figure 3: Using all parameter

Table 3 depict the result experiment number 1, 4& 7. We used all parameter in three manners. In experiment number 1, we used all data as 80% data for training phase and 20% data are for validation phase and achieve result as follow sensitivity is 97%, specificity is 45% accuracy is 78%. In experiment number 4, we used all data as 50% data for training phase and 50% data are for validation phase and achieve result as follow sensitivity is 96%, specificity is 53% accuracy is 84%. In experiment number 7, we used all data as 20% data for training phase and 80% data are for validation phase and achieve result as follow sensitivity is 92%, specificity is 63% accuracy is 87%.

1. Experiment using Optimal set of 11 parameter:

Experiment Number	Number Of Instance	Sensitivity	Specificity	Accuracy
2	80% training data - 20% validation data	98%	33%	74%
5	50% training data - 50% validation data	89%	81%	86%
8	20% training data - 80% validation data	89%	76%	85%

Table 4: Optimal set schedule by feature selecting algorithm table



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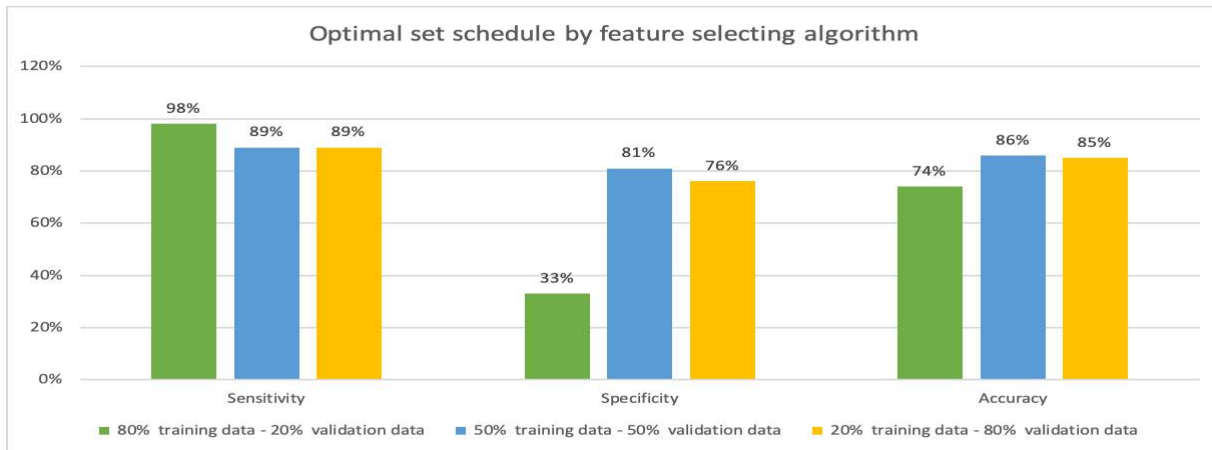


Figure: 4 Optimal set of parameters selected by feature selecting algorithm

Table 4 depict the result experiment number 2, 5& 8. We used Optimal set of parameter selected by feature selecting algorithm in three manners.

In experiment number 2, we used all data as 80% data for training phase and 20% data are for validation phase and achieve result as follow sensitivity is 98%, specificity is 33% accuracy is 74%.

In experiment number 5, we used all data as 50% data for training phase and 50% data are for validation phase and achieve result as follow sensitivity is 89%, specificity is 81% accuracy is 86%.

In experiment number 8, we used all data as 20% data for training phase and 80% data are for validation phase and achieve result as follow sensitivity is 89%, specificity is 76% accuracy is 85%.

2. Experiment using randomly selected 11 parameter:

Experiment Number	Number Of Instance	Sensitivity	Specificity	Accuracy
3	80% training data - 20% validation data	98%	57%	84%
6	50% training data - 50% validation data	98%	37%	73%
9	20% training data - 80% validation data	97%	41%	79%

Table 5: Random selected 11 parameter

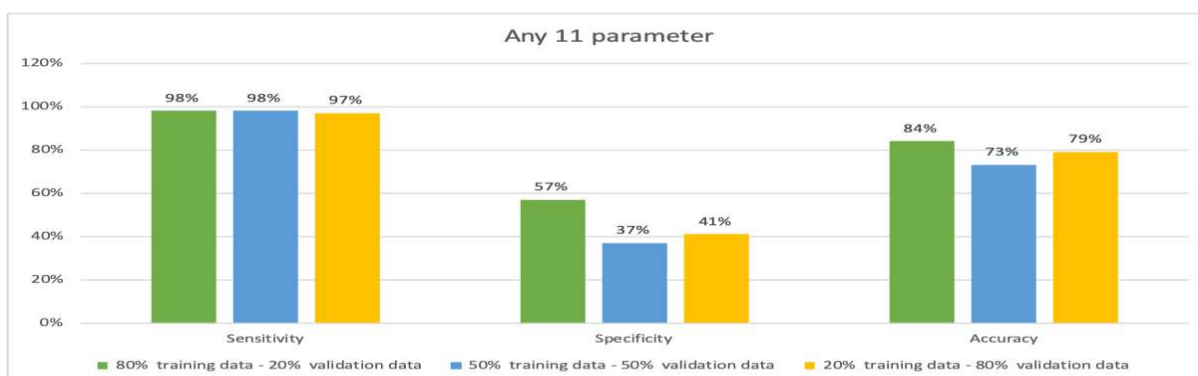


Figure 5: Randomly selected 11 parameter



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Table 5 depict the experiment number 3, 6&9result. We used randomly selected 11 parameter in three manners.

In experiment number 3, we used all data as 80% data for training phase and 20% data for validation phase and achieve result as follow sensitivity is 98%, specificity is 57% accuracy is 84%.

In experiment number 6, we used all data as 50% data for training phase and 50% data for validation phase and achieve result as follow sensitivity is 98%, specificity is 37% accuracy is 73%.

In experiment number 9, we used data as 20% data for training phase and 80% data for validation phase and achieved result are as follow sensitivity is 97%, specificity is 41%, accuracy is 79%.

3. Experiment to compare the split of 80-20 data:

Experiment Number	Number Of Parameter	Sensitivity	Specificity	Accuracy
1	All 33 parameters	97%	45%	78%
2	Optimal set of 11 parameter selected by feature selecting algorithm	98%	33%	74%
3	Randomly selected 11 parameters	98%	57%	84%

Table 6: All data where 80% data for training and 20% data for validation table

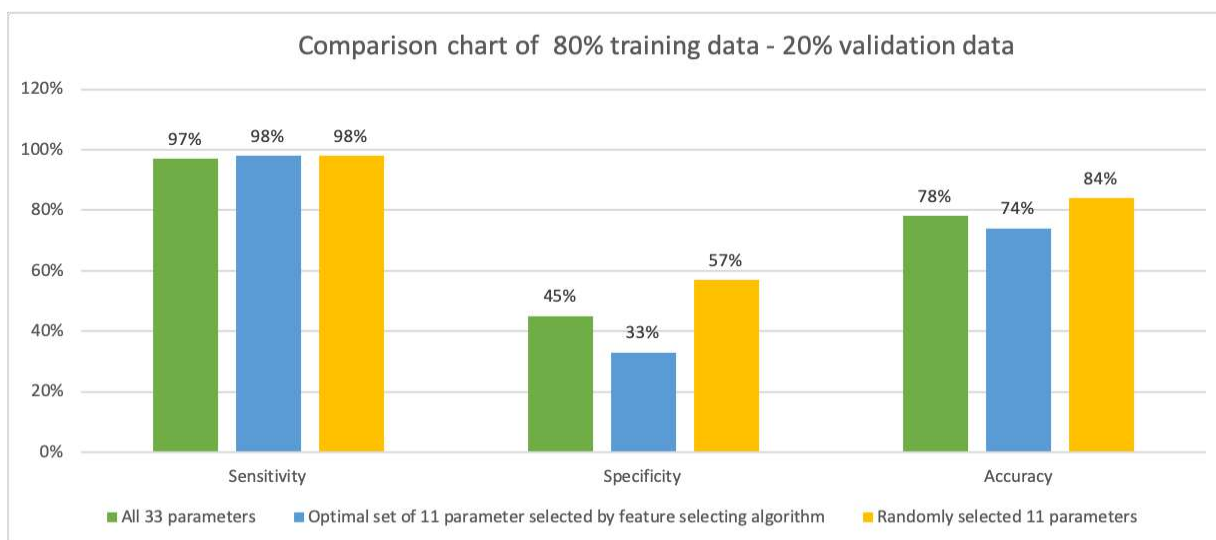


Figure 6: Comparison chart of 80% training - 20% validation data

Table 6 depict the experiment number 1, 2 & 3 where we use 80% data for training and 20% data for validation phase in three manners.

In the experiment number 1, we use all parameters for experiment and got result as follow: 97% sensitivity, 45% specificity and 78% accuracy.

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In the experiment number 2, we got average result by using optimal set of 11 parameter selected by feature selecting algorithm such as sensitivity is 98%, specificity is 33% and accuracy is 74%.

In experiment number 3, we got 98% sensitivity, 57% specificity and 84% accuracy by using randomly selected 11 parameter.

Result Analysis:-

As per the experimental results, we observe that we got better prediction accuracy when we used the dataset containing 80% training – 20% validation data and also by using optimal set of 11 parameter selected by feature selecting algorithm we achieve almost same result as it obtained by using all 33 parameter.

Conclusion:-

Student success and failure prediction is used to help students and their teacher to keep track of student's performance. It is one of the most important factors for student's further development. This paper includes methods that can be used to predict the performance of students. That is CNN Convolution Neural Network which helped in forming the algorithm. We predicted performance doing experiments that includes all parameter and Optimal set schedule by feature selecting algorithm. From our experiments we found that by using minimum valid parameters we can even get exact result that we get using all the parameters. The result obtained from the experiments have shown the potential applicability of CNN layers to classify the student's performance as failure/success. So we can predict student's performance using minimum valid parameter instead of all parameter.

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- [11] https://www.youtube.com/watch?v=umGJ30-15_A&t=1010s



Entrepreneurship and Innovation: Fostering Growth, Creativity, and Opportunity in the Business Landscape

Mrs. A. Pooja Narayan¹, Mr. Manish Singh Sisodiya²

¹Assistant Professor Disha College Raipur

²Assistant Professor AAFT University Raipur

Introduction

Entrepreneurship and innovation are two critical pillars that drive growth, creativity, and opportunity in the business landscape. They empower individuals and organizations to create value, adapt to change, and navigate the complexities of the modern business world. In this chapter, we delve into the fundamental concepts, principles, and practices of entrepreneurship and innovation. We explore their interconnectedness, highlighting their roles in fostering growth, igniting creativity, and unlocking opportunities. By understanding and harnessing the power of entrepreneurship and innovation, individuals and organizations can drive sustainable success and contribute to a thriving business ecosystem.

Understanding Entrepreneurship: Entrepreneurship encompasses a mindset, skills, and actions that enable individuals to identify and pursue opportunities, create value, and navigate the challenges of starting and growing ventures. It involves recognizing market gaps, identifying customer needs, and developing innovative solutions. Successful entrepreneurs possess certain characteristics such as resilience, creativity, and a propensity for risk-taking. They leverage their skills to identify opportunities, assess risks, allocate resources effectively, and create value for their stakeholders. Understanding the intricacies of entrepreneurship provides a foundation for individuals to embark on their entrepreneurial journey.

Driving Innovation: Innovation is the catalyst that propels entrepreneurship forward. It involves the creation, adoption, and implementation of new ideas, processes, products, or business models that generate value and lead to a competitive advantage. Innovation can take various forms, including product innovation, process innovation, and business model innovation. It requires a combination of creativity, market analysis, customer-centricity, and collaboration. Successful innovators embrace a culture of experimentation, continuously seek feedback, and iterate their offerings to meet evolving customer needs. Innovation is essential for staying ahead in a rapidly changing business landscape, and it enables entrepreneurs to disrupt industries, solve complex problems, and seize new opportunities.

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Examples of organizations that have successfully implemented innovative strategies to achieve remarkable outcomes.

1. **Apple Inc.:** Apple Inc. is a prime example of a company that has consistently driven innovation to transform industries. Through products such as the iPhone, iPad, and Apple Watch, Apple revolutionized the consumer electronics market. Their commitment to innovation, sleek design, and user-friendly interfaces have set industry standards and created a loyal customer base.
2. **Tesla Inc.:** Tesla, led by Elon Musk, is at the forefront of driving innovation in the automotive industry. They have pioneered electric vehicles (EVs) and advanced autonomous driving technology. By combining cutting-edge design, sustainable energy solutions, and software integration, Tesla has disrupted the traditional automotive landscape and reshaped consumer expectations.
3. **Airbnb:** Airbnb disrupted the hospitality industry by introducing a new business model that allows individuals to rent out their properties to travelers. By leveraging the power of the sharing economy and embracing digital platforms, Airbnb created a global marketplace that offers unique accommodation options and personalized experiences.
4. **Netflix:** Netflix revolutionized the entertainment industry by introducing streaming services that allowed users to access a vast library of movies and TV shows anytime, anywhere. By leveraging technology and data analytics, Netflix disrupted traditional cable TV models and created a new era of on-demand entertainment.
5. **Google:** Google, a pioneer in internet search technology, continually drives innovation through its diverse product offerings. From its search engine to cloud computing, artificial intelligence, and self-driving cars (Waymo), Google consistently pushes boundaries and explores new frontiers in technology.
6. **Amazon:** Amazon has continuously driven innovation in e-commerce, logistics, and customer experience. Their introduction of one-click ordering, prime membership, and same-day delivery services has transformed the way people shop online. Additionally, Amazon's foray into smart home devices with Alexa and the development of Amazon Web Services (AWS) have further solidified its reputation as an innovation powerhouse.

These examples illustrate how driving innovation can lead to disruptive breakthroughs and redefine industries. By fostering a culture of innovation, embracing emerging technologies, and staying attuned to customer needs, organizations can create unique value propositions, gain a competitive edge, and adapt to changing market dynamics. The key lies in encouraging a mindset that embraces creativity, experimentation, and calculated risk-taking. By driving innovation, organizations can shape their own destiny, create new opportunities, and build a sustainable future in the ever-evolving business landscape.

Entrepreneurial Strategies and Frameworks: To navigate the entrepreneurial journey, individuals and organizations rely on effective strategies and frameworks that provide structure and guidance. The Lean Startup methodology, for example, emphasizes rapid experimentation, customer feedback, and iterative development to validate ideas and build viable businesses. Design Thinking focuses on

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understanding customer needs, generating creative solutions, and prototyping to drive innovation. Effectuation encourages entrepreneurs to leverage their existing resources, form partnerships, and adapt to uncertainty. These strategies and frameworks help entrepreneurs refine their ideas, identify market fit, and mitigate risks, increasing their chances of success.

Corporate Entrepreneurship and Intrapreneurship: Entrepreneurship is not limited to startups; it can also thrive within established organizations. Corporate entrepreneurship and intrapreneurship involve fostering an entrepreneurial mindset, encouraging innovation, and empowering employees to drive entrepreneurial initiatives within the organizational context. This approach enables organizations to stay agile, adapt to market changes, and explore new growth opportunities. Entrepreneurs act as change agents, identifying areas for improvement, developing innovative projects, and driving organizational innovation. Nurturing a culture that encourages risk-taking, rewards creativity, and supports entrepreneurial endeavors is essential for fostering an entrepreneurial ecosystem within organizations.

Leadership in Entrepreneurship and Innovation: Effective leadership is instrumental in driving entrepreneurship and innovation. Entrepreneurial leaders possess certain qualities such as vision, resilience, and the ability to inspire and motivate teams. They foster a culture that encourages creativity, risk-taking, and collaboration. They also play a pivotal role in creating an environment that supports experimentation, provides resources, and manages the inherent risks associated with entrepreneurship. Leadership in entrepreneurship and innovation involves guiding teams, making strategic decisions, and navigating the complexities of the business landscape to create a conducive environment for entrepreneurial success.

Entrepreneurial Ecosystems and Global Perspectives: Entrepreneurship thrives within dynamic entrepreneurial ecosystems. These ecosystems comprise various elements such as access to capital, supportive government policies, incubators and accelerators, mentorship networks, and a vibrant entrepreneurial community. These components provide the necessary infrastructure, resources, and support for entrepreneurs to succeed. Furthermore, entrepreneurship is a global phenomenon influenced by cultural, social, and economic factors. Understanding the global perspectives of entrepreneurship allows entrepreneurs to adapt their strategies, leverage diverse markets, and collaborate across borders to drive innovation and growth.

Conclusion: Entrepreneurship and innovation are vital for fostering growth, igniting creativity, and unlocking opportunities in the business landscape. By embracing the principles, strategies, and practices of entrepreneurship and innovation, individuals and organizations can navigate the complexities of the modern business world, create value for stakeholders, and contribute to a thriving entrepreneurial ecosystem. Whether through launching new ventures, driving innovation within established organizations, or fostering an entrepreneurial culture, the power of entrepreneurship and innovation is transformative. By harnessing these forces, individuals and organizations can shape a better future, drive sustainable growth, and make a lasting impact in the business landscape.



Eco Literacy: Educating For Tomorrow

Dr. Saumya Tiwari¹, Dr. Shiv Gopal²

¹Assistant Professor, Education Disha College, Raipur (C.G.)

²Assistant Professor AAFT University Raipur

Abstract -Right from the evolution of a cell till the evolution of human society; evolution has proceeded for billions of years by using the same pattern of relation. From the lower level to higher level these patterns of relation have become more and more elaborate, but they are always variation on the same basic themes i.e. Autopoiesis (self-making).

Supporting this autopoietic nature and complex non-linear pattern of organization of the human social network we intend to introduce *SYSTEMS THINKING* with respect to the understanding and sustainability of social organization.

Eco literacy or Ecological thinking incorporates the basic systems thinking with realization of sustainability with its six basic principles of organization namely Network, cycles, solar energy, partnership, diversity and dynamic balance that ecosystems have. In our present work we advocate for the incorporation of Eco literacy as an important part of education at all levels- From primary and secondary schools to college in order to build and nurture sustainable communities that are designed in such a way that their ways of life, businesses, economies, physical structures and technologies do not interfere with nature's inherent ability to sustain life.

First we should understand its six basic principle.

Network: We find living systems nesting within other living system at all scales of nature. The boundaries are not boundaries of separation but boundaries of identity through which all living system communicate with each other and share their resources.

Cycles: All living matter feed on continuous flow of matter and energy from there environment to stay alive, and all living organism continuously produce waste. However an ecosystem produces no net waste, as waste of one species becomes food for the other thus matter cycles continually throughout the network of the ecosystem.

Solar Energy: It is transformed in to chemical energy by the photosynthesis of the green plants, which is further used in driving the ecological cycles.

Partnerships: The exchange of energy and resources in an ecosystem are sustainable by pervasive cooperation, partnership and networking.



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Diversity: The Ecosystem achieves stability and resilience through the richness and complexity of their ecological network. The greater the diversity more resilient they will be.

Dynamic balance: The ecosystem is flexible, ever fluctuating network. Its flexibility is a consequence of multiple feedback loops that keep the system in a state of dynamic balance.

The Pedagogy

The concept of sustainability in social systems was introduced in early 1980s by Lester Brown who defined a sustainable society, as one that is able to satisfy its need without diminishing the chance of future generation². Based on this principle of sustainability and the concept of ecology mentioned above the pedagogy can be categorized into two. First is the concept of ecoliteracy, which can be incorporated into the primary and secondary level of school education and the second is the concept of Eco design which can be implemented into the present technological and management curriculums.

Eco literacy, the first step on the road of sustainability involves putting the understanding of life at very center, an experience of learning at the real world (growing food, exploring a watershed, restoring a wetland etc.) that overcomes our alienation from nature and rekindles a sense of place. The curriculum shall teach the children the fundamental fact of life that one species' waste is another species food and the matter cycles continually through the network. The second step is to move towards eco design which includes applying our ecological knowledge to the fundamental redesign of our technologies and social institution, so as to bridge the current gap between human design and the ecologically sustainable systems of nature.

The principle of Eco design is 'waste equals food' the ecosystem is cyclical, in the sense ecosystem produces no overall waste whereas our present industrial system are linear they take the natural resource transform it into product and waste. The product in turn produces more waste through the hands of consumer.

Harmony between man and environment is the essence of healthy life and growth. N.T.P.C. being the leading organization under the ministry in the area of power generation, has been taken various measures for mitigation of environment pollution due to power generation ash is the main solid waste which is put into use for various products and services. NTPC has adapted eco friendly policy guidelines on ash utilization. NTPC uses only ash based bricks and fly ash Portland pozzolana cement (FAPPC) in most of its construction activities. Demonstration projects are taken up in areas of agriculture, building materials etc.

"Waste equal food" should be adopted by the industries and materials manufactured and waste generated by industries in the process must eventually provide nourishment for something for new. In such a sustainable industrial system the total outflow of each organization – its product and waste – would be perceived and treated as resources cycling through the system. The crux of both



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ecoliteracy and ecodesign is to make our education system not on what we can extract from nature but on what we can learn from here¹.

Institute working for Ecoliteracy

The list of URL for the institute working for the cause of sustainability through Ecolieracy and Ecodesign is mentioned below for the readers interested in searching more pertaining to these concepts.

www.ecoliteracy.org Centre for ecoliteracy at Berkeley

www.secondnature.org an educational institute in Boston that collaborates with numerous colleges and universities to make education for sustainability an integral part of campus life.

www.rmi.org The rock mountain institute serves as the update information on a wide variety of ecodesign projects.

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STEAM Career Pathways and Future Opportunities

Dr. Yogita Jiwane¹, Dr. Chandan Singh²

¹Assistant Professor Disha College Raipur

²Assistant Professor AAFT University Raipur

ABSTRACT

The fields of Science, Technology, Engineering, Arts, and Mathematics (STEAM) offer a wide range of career pathways and present numerous future opportunities. This abstract explores the diverse range of professions within STEAM, highlighting the growing demand for skilled individuals in these areas. It discusses the importance of STEAM education in fostering innovation, problem-solving skills, and critical thinking abilities, which are vital in the modern workforce. also emphasizes the interdisciplinary nature of STEAM, showcasing how professionals in these fields collaborate to tackle complex challenges. Furthermore, it touches upon the rapid advancements in technology and the impact they have on career prospects within the STEAM domains. The significance of lifelong learning and adaptability to navigate the ever-evolving landscape of STEAM careers, encouraging individuals to pursue these paths and seize the future opportunities they present.

Keyword: STEAM Education, Career Pathway, Lifelong Learning, Innovation

Introduction:

In an era marked by rapid technological advancements and innovation, the importance of STEAM (Science, Technology, Engineering, Arts, and Mathematics) education in preparing students for future careers cannot be overstated. This chapter delves into the diverse career pathways available within the STEAM fields and explores the exciting future opportunities that await students with a strong STEAM foundation. Steam education, also known as STEM education with an added focus on the arts, refers to an educational approach that integrates science, technology, engineering, arts, and mathematics into a cohesive learning framework. The acronym "STEM" originally stood for Science, Technology, Engineering, and Mathematics, but "A" was later added to emphasize the importance of arts and creativity in the learning process. The integration of these disciplines aims to provide students with a well-rounded education that prepares them for the challenges of the modern world.

In a steam education program, students are encouraged to explore real-world problems, think critically, collaborate with peers, and apply their knowledge to find innovative solutions. By combining these different subject areas, students can develop a range of skills such as problem-solving, creativity, critical thinking, communication, and teamwork.

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The core principles of steam education are:

- 1. Interdisciplinary Approach:** Steam education breaks down traditional subject barriers and encourages the integration of knowledge and skills from different disciplines. This approach helps students understand the interconnectedness of various fields and promotes holistic learning.
- 2. Hands-on Learning:** Steam education emphasizes experiential learning, where students actively engage in projects, experiments, and activities. Hands-on experiences enable students to apply theoretical concepts to practical situations, fostering a deeper understanding of the subject matter.
- 3. Project-Based Learning:** Students in steam education often work on projects that involve identifying real-world problems, designing solutions, and creating prototypes. This approach promotes critical thinking, problem-solving, and innovation, as students learn through active engagement and collaboration.
- 4. Creativity and Innovation:** The inclusion of arts in steam education places a strong emphasis on creativity and innovation. Students are encouraged to think outside the box, explore multiple solutions, and express their ideas through various artistic mediums.
- 5. Collaboration and Communication:** Steam education promotes teamwork, collaboration, and effective communication skills. Students often work in groups to solve complex problems, exchange ideas, and present their findings, fostering social and interpersonal skills.

Steam education aims to prepare students for future careers that require a combination of technical knowledge, analytical thinking, and creativity. It also nurtures a curiosity for learning and encourages students to become lifelong learners who can adapt to a rapidly changing world driven by technology and innovation.

Importance of Steam Education in preparing students for future Career

The importance of STEAM (Science, Technology, Engineering, Arts, and Mathematics) education in preparing students for future careers cannot be overstated. Here are some key reasons why STEAM education is crucial in equipping students with the skills and knowledge necessary for the evolving job market:



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1. Fostering Critical Thinking and Problem-Solving Skills:

STEAM education promotes critical thinking and problem-solving skills, which are essential for success in any career. Students learn to analyze complex problems, break them down into manageable parts, and apply logical and creative thinking to find innovative solutions.

2. Developing Technological Literacy:

In today's digital age, technology is pervasive in almost every industry. STEAM education provides students with the foundational knowledge and skills to understand and utilize technology effectively. This includes coding, programming, data analysis, and digital literacy, enabling them to navigate and adapt to emerging technologies.

3. Cultivating Creativity and Innovation:

The integration of Arts in STEAM education nurtures creativity, imagination, and innovation. By combining artistic expression with scientific inquiry and problem-solving, students are encouraged to think outside the box, explore multiple perspectives, and develop original ideas. These skills are highly valued in creative industries and are increasingly sought after in other sectors as well.

4. Encouraging Collaboration and Interdisciplinary Thinking:

STEAM education emphasizes collaboration and interdisciplinary thinking, mirroring the real-world work environment. Students learn to work effectively in teams, leveraging diverse perspectives and expertise from different disciplines. This fosters communication skills, adaptability, and the ability to tackle complex, multifaceted problems.

5. Meeting the Demands of the Job Market:

The job market is continuously evolving, with a growing demand for professionals who possess strong STEM and analytical skills. STEAM education equips students with a solid foundation in these areas, making them well-prepared for a wide range of careers across industries such as healthcare, engineering, technology, design, and environmental sciences.

6. Nurturing Lifelong Learning and Adaptability:

STEAM education encourages a growth mindset, promoting lifelong learning and adaptability. Students develop a curiosity-driven approach, becoming self-directed learners who can continuously acquire new knowledge, update their skills, and stay abreast of emerging trends and technologies throughout their careers.

7. Addressing Global Challenges:

Many of the world's most pressing challenges, such as climate change, sustainable development, and healthcare disparities, require multidisciplinary approaches. STEAM education prepares students to tackle these complex issues by integrating scientific understanding, technological advancements, artistic perspectives, and ethical considerations.

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STEAM education plays a vital role in preparing students for future careers by fostering critical thinking, technological literacy, creativity, collaboration, and adaptability. By equipping students with these essential skills, STEAM education empowers them to navigate an ever-changing job market, contribute to innovation, and make a positive impact on society.

Emerging STEAM Career Pathways

1. Exploring Diverse STEAM Career Pathways:

Engineering Careers:

- Civil Engineering: Designing and constructing infrastructure projects, such as bridges, roads, and buildings.
- Mechanical Engineering: Developing and designing machinery, tools, and mechanical systems.
- Biomedical Engineering: Creating medical devices and technologies to improve healthcare outcomes.

Technology Careers:

- Software Development: Creating computer programs, applications, and software solutions.
- Data Analysis and Analytics: Analyzing and interpreting large datasets to extract meaningful insights.
- Cyber security: Protecting digital systems and networks from cyber threats.

Science Careers:

- Biology: Conducting research in areas such as genetics, biotechnology, and pharmaceuticals.
- Chemistry: Exploring chemical reactions, materials, and their applications in various industries.
- Environmental Science: Studying the impact of human activities on the environment and developing sustainable practices.

2. Art and Design Career Pathways:

Visual Arts Careers:

- Painting and Sculpture: Creating artworks using various mediums and techniques.
- Illustration and Graphic Design: Communicating ideas visually through illustrations and graphic design.
- Animation and Visual Effects: Bringing characters and stories to life through animation and visual effects.



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Performing Arts Careers:

- Music: Composing, performing, and producing music across various genres.
- Theater and Dance: Acting, directing, choreographing, and staging theatrical performances.
- Film and Television: Producing, directing, and editing films and television shows.

Design Careers:

- Industrial Design: Developing innovative product designs that are functional and aesthetically pleasing.
- Interior Design: Creating well-designed interior spaces for residential and commercial purposes.
- Fashion Design: Designing clothing, accessories, and footwear for the fashion industry.

Emerging STEAM Career Opportunities:

Robotics and Automation:

- Robotics Engineering: Designing and developing robots for various industries and applications.
- Automation Systems: Implementing automated systems to streamline processes and improve efficiency.
- Artificial Intelligence: Developing AI technologies that can learn and perform tasks autonomously.

Renewable Energy:

- Solar and Wind Energy: Designing, installing, and maintaining renewable energy systems.
- Energy Efficiency: Implementing energy-saving strategies and technologies in buildings and industries.
- Sustainable Technologies: Developing innovative solutions to promote sustainable practices.

Virtual Reality and Augmented Reality:

- Gaming and Entertainment: Creating immersive gaming experiences and virtual reality content.
- Education and Training: Developing virtual reality and augmented reality tools for educational purposes.
- Healthcare: Utilizing virtual reality for therapy, surgical training, and medical simulations.

Interdisciplinary STEAM Careers:



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STEAM Education:

- Teaching: Educating students in STEAM subjects at various educational levels.
- Curriculum Development: Designing and developing STEAM-focused educational programs and materials.
- Educational Technology: Utilizing technology to enhance STEAM learning experiences.

Entrepreneurship and Innovation:

- Start-ups: Founding and leading innovative companies that leverage STEAM expertise.
- Entrepreneurship: Driving innovation within established organizations using STEAM skills.
- Product Development: Creating new products and services by combining STEAM knowledge and market insights.

4.3 Scientific Illustration and Communication:

- Scientific Illustration: Creating visual representations of scientific concepts and research findings.
- Science Journalism: Communicating scientific information to the public through various media channels.
- Science Outreach and Communication: Engaging and inspiring others with science through interactive programs and exhibits.

Future Trends and Skills for STEAM Careers:

Emerging Technologies:

- Artificial Intelligence and Machine Learning: Understanding and leveraging AI-powered technologies.
- Block chain: Exploring the potential of block chain in various industries, such as finance and supply chain.
- Internet of Things: Harnessing the power of connected devices and data.

Trans disciplinary Skills:

- Critical Thinking: Analyzing information, evaluating evidence, and making informed decisions.
- Creativity and Innovation: Generating novel ideas and approaches to problem-solving.
- Collaboration and Communication: Working effectively in teams and conveying ideas to diverse audiences.



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- Adaptability and Resilience: Embracing change, learning from setbacks, and thriving in dynamic environments.

Lifelong Learning:

- Continuous Skill Development: Embracing a growth mindset and staying updated with emerging trends and technologies.

- Professional Development: Seeking out opportunities for training, certifications, and advanced education.

Interdisciplinary STEAM Careers

The intersection of Science, Technology, Engineering, Arts, and Mathematics (STEAM) opens up a world of interdisciplinary career opportunities that integrate knowledge and skills from multiple fields. This chapter explores the exciting realm of interdisciplinary STEAM careers, where professionals collaborate across disciplines to solve complex problems, drive innovation, and create holistic solutions. By bridging the gap between traditionally separate domains, interdisciplinary STEAM careers offer unique pathways that require a diverse skill set and a multidimensional approach to problem-solving.

1. Design and Innovation:

- User-Centered Design: Explore the process of designing products, services, and experiences that prioritize user needs and enhance user experiences.

- Design Thinking: Discuss the human-centered problem-solving approach that combines empathy, creativity, and critical thinking to address complex challenges.

- Innovation Management: Highlight the skills required to foster a culture of innovation, manage projects, and bring innovative ideas to fruition.

2. Bioengineering and Biotechnology:

- Bio mimicry: Explore how nature inspires innovative solutions in engineering and design, taking inspiration from biological systems and processes.

- Biomedical Engineering: Discuss the integration of engineering principles and biological sciences to develop medical devices, prosthetics, and tissue engineering solutions.

- Genetic Engineering: Highlight the application of genetic manipulation techniques in agriculture, healthcare, and environmental conservation.

3. Digital Media and Virtual Reality:

- Interactive Media Design: Explore the creation of immersive digital experiences, including virtual reality, augmented reality, and interactive installations.



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- Game Design and Development: Discuss the merging of art, technology, and storytelling in the creation of interactive games and virtual worlds.

- Digital Marketing and Content Creation: Highlight the use of digital media platforms, social media, and content creation strategies to engage audiences and promote products or ideas.

4. Sustainable Architecture and Urban Planning:

- Green Building Design: Explore sustainable design principles and strategies for constructing energy-efficient and environmentally friendly buildings.

- Urban Planning and Design: Discuss the interdisciplinary approach to planning cities and communities, incorporating sustainability, transportation, and social considerations.

- Renewable Energy Integration: Highlight the integration of renewable energy systems into architectural designs and urban infrastructure to promote sustainability.

5. Data Science and Visualization:

- Data Analytics and Visualization: Discuss the use of data-driven insights to inform decision-making and the visualization techniques for effectively communicating complex information.

- Information Design: Explore the art of transforming complex data sets into visually appealing and understandable representations.

- Predictive Analytics and Machine Learning: Highlight the application of data science techniques, such as predictive modeling and machine learning algorithms, to extract valuable insights and make data-driven predictions.

6. STEAM Education and Outreach:

- STEAM Education Programming: Explore the development and implementation of educational programs that integrate multiple STEAM disciplines to foster creativity, critical thinking, and problem-solving skills.

- Science Communication: Discuss the effective communication of scientific concepts to diverse audiences through various mediums, such as writing, public speaking, and multimedia presentations.

- Community Engagement: Highlight the importance of engaging with communities, promoting access to STEAM education, and inspiring the next generation of interdisciplinary thinkers.

Conclusion:

STEAM education opens doors to a multitude of exciting career pathways and future opportunities. By providing students with a strong foundation in science, technology, engineering, arts, and mathematics, STEAM education equips them with the skills and knowledge to succeed in diverse

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industries. As students explore their passions within the STEAM fields, they not only contribute to innovation and problem-solving but also make a positive impact on society and shape the future of our world.

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Need and Importance of Curriculum

Mrs. Archana Patel ¹, Mr. Devesh Keshwani ²

¹Assistant Professor Disha College Raipur

²Assistant Professor AFT University Raipur

Abstract:

In this article, the significance of curriculum in education is explored. The objectives of a curriculum include developing cognitive skills, acquiring knowledge, fostering personal growth, and promoting social awareness. Different types of curricula, such as subject-centered, learner-centered, problem-based, and assessed, cater to diverse learning needs. The curriculum plays a crucial role for teachers in planning and delivering instruction, for students in receiving a comprehensive education, and for authors in acquiring knowledge and skills for their creative endeavors. Understanding the importance of curriculum is essential for shaping effective and meaningful learning experiences.

Introduction:

Curriculum plays a crucial role in education, shaping the learning experiences and outcomes for both teachers and students. It serves as a guiding framework that outlines the objectives, content, and methods of instruction in various subject areas. The objectives of a curriculum range from developing cognitive skills and acquiring knowledge to promoting personal growth and social awareness. Different types of curricula, such as subject-centered, learner-centered, problem-based, taught, hidden, and assessed, cater to diverse learning needs and approaches. In this article, we will explore the objectives of curriculum, types of curricula, and delve into the significance of curriculum in the lives of teachers, students, and authors. By understanding the importance of curriculum, we can gain insights into its role in shaping education and fostering intellectual, personal, and creative development.

The curriculum serves as a fundamental framework that shapes education at various levels. It provides teachers with guidance in planning and delivering instruction, ensures students receive a comprehensive and well-rounded education, and offers authors a foundation of knowledge and skills to enrich their creative endeavors. Understanding the importance of curriculum is crucial in fostering effective and meaningful learning experiences that empower individuals to thrive intellectually, personally, and creatively.

Objectives of curriculum:

- Cognitive skills: To develop the students' ability to think critically and independently.
- Knowledge Acquisition: To provide students with essential knowledge and understanding of key concepts, theories, principles, and facts within a particular subject area.



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- **Skill Development:** To develop a range of skills, including cognitive skills (critical thinking, problem-solving, creativity), practical skills (communication, collaboration, research), and subject-specific skills.
- **Personal Development:** To foster the personal growth of students by promoting self-awareness, emotional intelligence, character development, and values education.
- **Social and Cultural Awareness:** To cultivate an understanding and appreciation of different cultures, traditions, and perspectives, promoting inclusivity, tolerance, and global citizenship.
- **Application and Transfer of Learning:** To equip students with the ability to apply knowledge and skills in real-life situations and across different contexts, encouraging lifelong learning.
- **Continuous learning and adaptability:** A curriculum often seeks to foster a love for learning, curiosity, and a lifelong learning mindset. It aims to instill in students the ability to adapt to changing circumstances, embrace new technologies, and engage in ongoing personal and professional development.
- **Citizenship and social engagement:** Some curricula emphasize the development of responsible and engaged citizens. They aim to promote an understanding of democratic values, human rights, social justice, and environmental sustainability. The curriculum may encourage active participation in community service, volunteerwork, and civic activities.

Types of curriculums:

1. **Subject-Centered Curriculum:** This type of curriculum focuses on organizing learning around specific subjects or disciplines, such as mathematics, science, or history. It emphasizes in-depth knowledge and mastery of subject content.
2. **Learner-Centered Curriculum:** This curriculum puts the learner at the center of the educational experience. It considers students' interests, needs, and abilities, and seeks to personalize learning experiences accordingly. Learner-centered curricula often promote student autonomy, choice, and active engagement.
3. **Problem-Based Curriculum:** This curriculum approach revolves around real-world problems or challenges. Students work collaboratively to identify and solve problems, applying interdisciplinary knowledge and skills. Problem-based curricula emphasize critical thinking, problem-solving, and application of knowledge in practical contexts.
4. **Taught Curriculum:** This type of curriculum refers to how teachers actually teach. This is a less predictable and less standardized type of curriculum because how an educator delivers material can vary from one to the next. It can also change based on the types of tools a teacher has at their disposal. This can include experiments, demonstrations and other types of engagement through group work and hands-on activities. Taught curriculum is extremely critical for students in special education or those who require another kind of specialized support.
5. **Hidden Curriculum:** The hidden curriculum refers to the unintended or implicit messages and values that are conveyed to students through the structure, practices, and interactions within an educational environment, beyond the explicit content of the formal curriculum. It

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encompasses the values, attitudes, behaviors, and social norms that students acquire through their experiences in school.

6. **Assessed Curriculum**: An assessed curriculum is also known as a tested curriculum. It refers to quizzes, tests and other kinds of methods to measure students' success. This can encompass a number of different assessment techniques, including presentations, a portfolio, a demonstration as well as state and federal standardized tests.
7. **Experiential or Hands-on Curriculum**: Experiential curricula emphasize learning through real-world experiences and practical applications. They provide opportunities for students to engage in hands-on activities, experiments, field trips, simulations, and project-based learning. This approach promotes active learning, critical thinking, and problem-solving skills.
8. **Spiral Curriculum**: A spiral curriculum introduces key concepts or skills at a basic level and revisits them in subsequent years, gradually deepening understanding and complexity. It recognizes that learning is an ongoing process and aims to build upon prior knowledge and skills. This approach helps reinforce learning and allows for continuous review and expansion of knowledge.

Need and importance of Curriculum:

The curriculum fosters a culture of lifelong learning by instilling a love for learning, curiosity, and critical thinking skills in students. It encourages students to become self-directed learners who can adapt to new situations, acquire new knowledge, and engage in continuous personal and professional development throughout their lives.

1. **Importance of Curriculum for Teacher**: The curriculum plays a vital role in the work of teachers as it provides them with a guiding framework for planning and delivering instruction. It serves as a roadmap that outlines the content, learning objectives, and desired outcomes for each grade level or subject area. With a clear set of learning goals, teachers can identify what students need to know and be able to do, enabling them to focus their instructional efforts and align their teaching strategies accordingly. Additionally, a standardized curriculum ensures consistency and equity in educational experiences, providing all students with equal opportunities to receive a quality education. The curriculum also helps teachers align their resources, materials, and instructional strategies with the intended learning outcomes. It serves as a foundation for professional development, offering teachers the necessary training and support to effectively implement the curriculum in their classrooms.
2. **Importance of Curriculum for Students**: A curriculum outlines a sequence of courses and tasks that students must successfully complete in order to master a subject. A well-developed curriculum not only facilitates skill development but also encourages students to ask questions and actively engage in their learning. It provides clear direction and defines the desired outcomes of the class. Additionally, a comprehensive curriculum allows

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schools and families to establish expectations and effectively teach important subjects such as literature, geography, and science, ensuring that children receive proper support and instruction. Moreover, the curriculum plays a vital role in instilling democratic values like liberty, fraternity, and equality in the minds of students. Overall, the significance of curriculum extends to various aspects of life.

3. Importance of Curriculum for Author: The importance of curriculum extends to the life of an author in numerous ways. A well-designed curriculum provides authors with the opportunity to develop a strong foundation of knowledge and skills in their chosen field. By engaging with a diverse range of subjects, authors can expand their understanding of literature, history, science, or philosophy, which in turn can greatly enrich their writing and bring depth to their work. Moreover, a curriculum that fosters creativity and encourages original thinking nurtures the author's ability to generate unique ideas and concepts. It allows authors to explore different disciplines, exposing them to a variety of perspectives and forms of expression, which can enhance their creativity and contribute to the originality of their writing. Additionally, a curriculum that emphasizes multiculturalism, diversity, and global perspectives broadens the author's understanding of the world and fosters empathy and inclusivity in their writing. Language and communication skills are also honed through language arts curricula, enabling authors to effectively articulate their thoughts, emotions, and stories to their readers.

Future Trends in Curriculum Development:

It's important to note that future trends in curriculum development can vary and depend on factors such as technological advancements, societal changes, and educational research.

Here are a few potential future trends in curriculum development:

Personalized and Adaptive Learning: With the advancements in technology and the availability of learning analytics, there is a growing emphasis on personalized and adaptive learning experiences. Future curricula may incorporate individualized learning paths, adaptive assessments, and tailored content to meet the specific needs and learning styles of each student.

STEAM Education: Integrating Science, Technology, Engineering, Arts, and Mathematics (STEAM) into the curriculum is gaining momentum. Future curricula may focus on interdisciplinary approaches, project-based learning, and real-world problem-solving to prepare students for the demands of a rapidly changing workforce.

Critical Thinking and Problem-Solving: In an era of information overload, critical thinking and problem-solving skills are becoming increasingly important. Future curricula may prioritize the development of these skills through inquiry-based learning, open-ended tasks, and opportunities for creative and analytical thinking.

Digital Literacy and Computational Thinking: With the pervasive use of technology, future curricula may include a strong emphasis on digital literacy and computational thinking.

Students may learn coding, data analysis, algorithmic reasoning, and other skills to navigate and



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leverage technology effectively.

Global and Intercultural Competence: As the world becomes more interconnected, there is a growing need for global and intercultural competence. Future curricula may integrate global perspectives, cultural awareness, and collaboration across borders to foster understanding and prepare students for a globalized society.

Social and Emotional Learning (SEL): Recognizing the importance of social and emotional skills, future curricula may incorporate SEL components. This includes promoting self-awareness, empathy, resilience, and interpersonal skills to support students' well-being and success in various aspects of life.

Environmental Education and Sustainability: With increasing concerns about climate change and environmental sustainability, future curricula may emphasize environmental education. Students may learn about ecological systems, sustainable practices, and become aware of their role in creating a more sustainable future.

Ethical and Responsible Use of Technology: As technology continues to advance, future curricula may address ethical considerations and responsible use of technology. This includes digital citizenship, online safety, privacy, and ethical decision-making in the digital age.

Conclusion:

The curriculum holds significant importance in the lives of teachers, students, and authors alike. For teachers, the curriculum provides a framework for planning and delivering instruction, ensuring consistency, and guiding professional development. Students benefit from a well-developed curriculum by acquiring knowledge, developing skills, and fostering personal growth. The curriculum also instills democratic values and promotes social and cultural awareness. In the case of authors, the curriculum plays a vital role in their development by offering a foundation of knowledge and skills, enhancing creativity and originality, broadening perspectives, and refining language and communication abilities.

Ultimately, the curriculum serves as a pathway to success, guiding educational experiences and shaping the lives of individuals involved in the teaching, learning, and creative processes.

Authors benefit from the curriculum by acquiring knowledge, nurturing creativity, broadening perspectives, and refining communication skills. Ultimately, the curriculum is a pathway to success, empowering individuals to thrive in their educational, personal, and creative pursuits. By recognizing the importance of curriculum, we can promote effective and meaningful learning experiences that prepare individuals for a dynamic and ever-changing world.

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Multidisciplinary Education for Gender Equality Empowering the Future

Mrs. Poonam Shukla¹, Mr. Apurba Chakraborty², Mr. Amit Das³

¹Assistant Professor Disha College, Raipur

²Assistant Professor AAFT University Raipur

³Assistant Professor AAFT University Raipur

Introduction:

Gender equality is a fundamental human right and a key driver of social progress. Achieving true gender equality requires a multifaceted approach that addresses the deep-rooted societal norms, biases, and stereotypes that perpetuate gender-based discrimination, the Indian constitution not only grant equality to woman's but also empowers the state to adopt measures of positive discrimination in favor of women. Education plays a pivotal role in transforming attitudes and fostering inclusive societies. In this regard, multidisciplinary education emerges as a powerful tool to promote gender equality by breaking down disciplinary barriers and fostering holistic understanding, by providing education to boys and girls on healthy relationship and gender equality education can help to reduce the risk of gender bias and also reduces gender based violence. Gender equality refers to the equal rights ,responsibilities and opportunities for all individuals .In education all gender have to receive education to develop themselves, This article explores the significance of multidisciplinary education in promoting gender equality and empowering individuals to challenge gender stereotypes, biases, and discrimination.

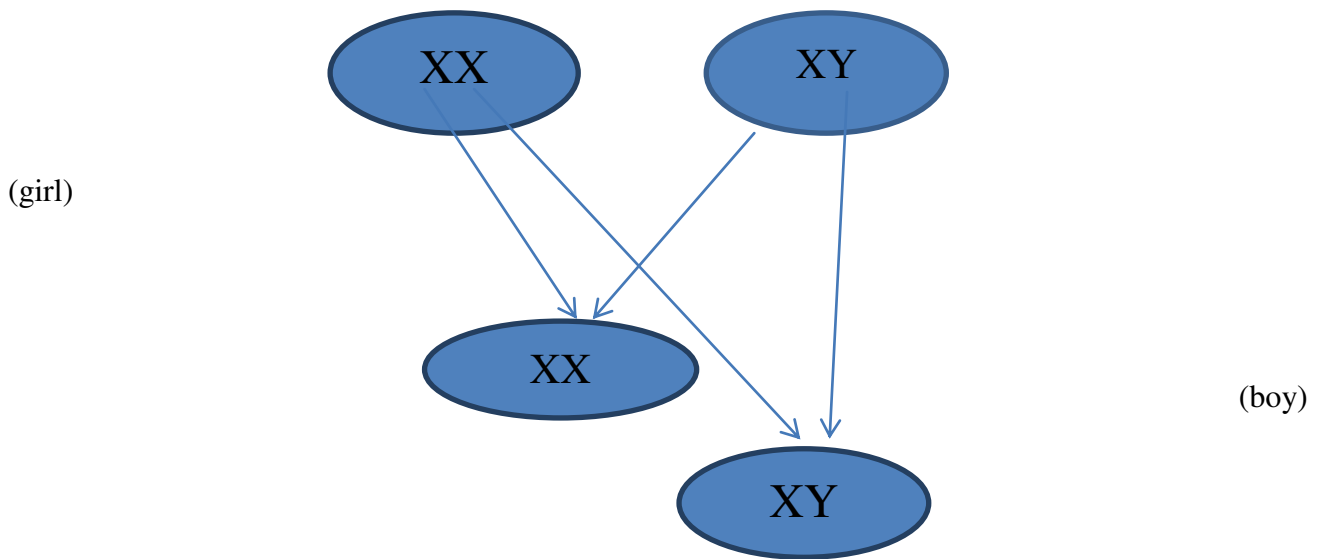
Meaning and definition of Sex and gender:-

Sex :It the biological determination of any individual and which is based on chromosomes and their functioning. On the basis of chromosomes the new one is identifies their assign male or female. Biology tells the the importance of chromosomes and its role ,both man and women have 23 pair of chromosomes that is (22+1) in which 22 pair is common and 1 pair is considered as sex determining chromosome's

Gender: gender involves social norms and it may not depend upon biological trait, and also describes how societies determine and manage sex categories ;there are three type of gender found which is describes their roles in the society-first gender(male), second gender(female) and third gender means trans gender.



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Gender Discrimination Means:

Gender discrimination refers to the unequal treatment or opportunities of individuals based on their gender. This can take many forms, including discrimination in the workplace, in education, and in other areas of life. It can involve unequal pay, lack of access to education or other resources, or being subjected to violence or harassment because of one's gender. Gender discrimination is a significant issue in India, and women in particular face numerous forms of discrimination and inequality. Some specific examples of gender discrimination in India include:

Unequal pay: Lack of education Violence against women Health care discrimination Restrictions on women's freedom Data shows the earning in India

According to the World Inequality Report 2022

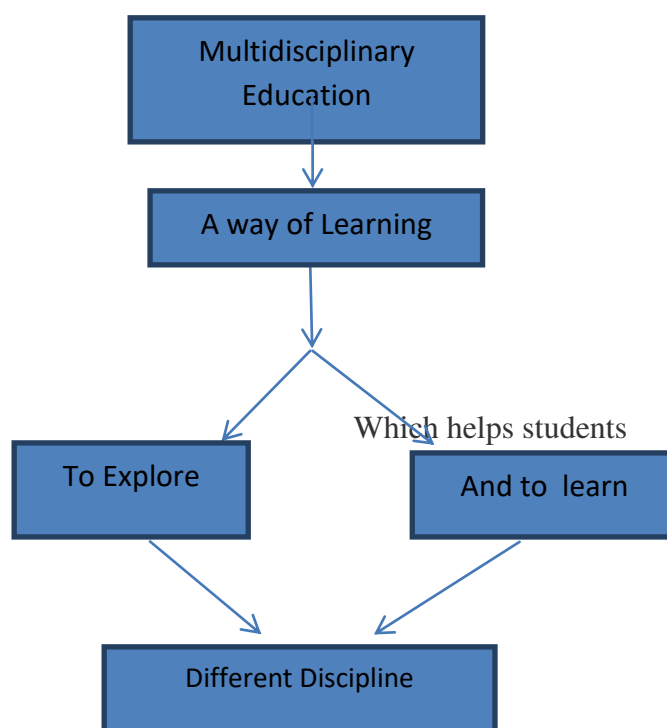
Earning of Man(2022)	Earning of Women(2022)
Men in India earn 82%	Women in India earn 18%.
Education Data	
75% men were literate	51% Women literacy Rate
Violence Rate In India(National Crime Records Bureau)	
371 503 reported cases of violence in India (2020)	
Health care discrimination	
difficulty accessing quality health care due to a number of factors, including poverty, lack of education, and lack of access to transportation	
Restrictions on women's freedom	
include societal norms expectations that limit their choices and opportunities	



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Multidisciplinary Education –

A multidisciplinary Education means studying the same topic from the different viewpoints of more than one discipline and known as a cross-disciplinary Education which means the aim to exchange the knowledge between different disciplines.



Multidisciplinary education act like a method in which teacher can used integration of subjects and relates their content to different diversities, in such a way one can use more than one discipline for illustrating one topic.

Multidisciplinary education involves integrating knowledge and methodologies from different disciplines to provide a comprehensive understanding of complex issues. It encourages cross-disciplinary collaboration and emphasizes the interconnectedness of various fields of study.

The National Education Policy (NEP) 2020 is an aspiring policy document points to Transforms the education system in India. One of the most important point of NEP 2020 is the policy is given more emphasis on a multidisciplinary approach in education.

Multidisciplinary education is a form of educational methodology that brings together multiple disciplines to fabricate a holistic learning occurrence. It is designed to encourage an understanding of the interconnectedness of various discipline and how they can be integrated for better problem-solving. Multidisciplinary education, if implemented in schools and colleges, allows students to

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gain a deeper understanding of the subject matter through the lens of different disciplines. This approach uplifting creative thinking, critical analysis, collaboration, and communication skills.

The NEP 2020 recommended the importance and need to encompass this educational strategy into the curriculum from an early age. By giving importance to student's exposure to the multiple disciplines, one can help students to acknowledge their chosen field finer and also develop an cherishing for diverse knowledge systems. This will enable them to become more well-rounded citizens and prepare them for the future.(EXAMPLE)

The main goal education is to develop knowledge about a certain discipline that can engender in students the capacity to analyses information and apply it to real life cases. To improve students' understanding and make the learning process more productive and enjoyable, they need to experience the connection between different subjects of the respective curriculum.

The impact of having this type of interdisciplinary work on students' learning process was identified. The following learning outcomes were achieved by integrating a computer programming methodology in a real-life mathematics problem:

- **Apply self-teaching:** This is achieved by guiding the students to the source of information they need to investigate and understand principles in mathematics and computer programming.
- **Develop practical skills:** Learn how to apply the theoretical mathematical skills on actual engineering cases and use computer programming as a solution tool for highly accurate results.
- **Introduce problem-solving skills:** This is achieved by analysing the assignment problem and comparing the results achieved by hand calculations and the developed computer code.
- **Connect academics:** Improve the interaction and collaboration between the academics of different disciplines to share their thoughts on how to make the students' learning process more exciting.

The Importance of Multidisciplinary Approaches:

Multidisciplinary education recognizes that societal challenges, such as gender inequality, are multifaceted and cannot be effectively addressed within the confines of a single discipline. By drawing insights from diverse fields such as sociology, psychology, economics, and anthropology, multidisciplinary approaches shed light on the complex dynamics that contribute to gender inequality.

Gender Equality: An Imperative for Sustainable Development

Gender Inequality:

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Gender equality, also known as sexual equality or equality of the sexes, is the state of equal ease of access to resources and opportunities regardless of gender, including economic participation and decision-making; and the state of valuing different behaviors, aspirations and needs equally, regardless of gender.

UNICEF says gender equality "means that women and men, and girls and boys, enjoy the same rights, resources, opportunities and protections. It does not require that girls and boys, or women and men, be the same, or that they be treated exactly alike .As of 2017, gender equality is the fifth of seventeen sustainable development goals (SDG 5) of the United Nations. Gender inequality is measured annually by the Programmes Human Development Reports. Gender issues equality in particular, can be regarded as cross cutting issues in the implementation of the sustainable development goals (SDGs) SDGs achieves gender equality and empower all women and girls.

Gender issues equality in particular, can be regarded as cross cutting issues in the implementation of the sustainable development goals (SDGs) SDGs achieves gender equality and empower all women and girls .

Understanding the Dimensions of SDGs: Gender inequality manifests in various forms, including unequal access to education, economic opportunities, healthcare, and decision-making power, unequal opportunities in workplace and unequal pays in service, unequal economic growth unequal social. It is crucial to examine the structural, cultural, and systemic factors that perpetuate gender disparities across different contexts.

The Impacts of Gender Inequality:

Gender inequality hampers social progress and economic development. It limits individuals' potential, perpetuates cycles of poverty, and exacerbates social and economic disparities. Promoting gender equality is not only a matter of justice and human rights but also a prerequisite for achieving sustainable development goals.

Multidisciplinary Education and its Role in Promoting Gender Equality:

Challenging Gender Stereotypes:

Multidisciplinary education equips learners with a comprehensive understanding of the social construction of gender, enabling them to critically analyze and challenge gender stereotypes and biases. By integrating perspectives from psychology, sociology, and gender studies, students can recognize the detrimental effects of gender stereotypes on individuals and society.

Examining Intersectionality :

Intersectionality is a vital concept in understanding the interplay of gender with other social identities such as race, ethnicity, class, and sexuality. Multidisciplinary education fosters intersectional perspectives by exploring how different forms of oppression and privilege intersect and compound gender inequality.

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Economics and Gender Equality:

Integrating economic perspectives into multidisciplinary education enables students to grasp the economic implications of gender inequality. By analyzing labor market dynamics, wage gaps, and discriminatory practices, students can develop evidence-based solutions to promote gender equality in economic spheres.

Legal and Policy Perspectives:

Understanding legal frameworks and policies related to gender equality is crucial for advocating for change. Multidisciplinary education equips individuals with knowledge of international conventions, national laws, and policy interventions aimed at addressing gender inequality and promoting women's rights.

Health and Well-being:

Multidisciplinary education explores the intersections of gender, health, and well-being. It enables learners to understand the gendered dimensions of health, including access to healthcare, reproductive rights, and the impact of gender-based violence. This knowledge is essential for developing comprehensive approaches to ensure gender-sensitive healthcare services.

Challenges and Recommendations

Overcoming Disciplinary Silos: Integrating multidisciplinary approaches into education requires concerted efforts to overcome disciplinary silos. Collaborative initiatives between academic departments, curriculum reforms, and professional development opportunities for educators can foster interdisciplinary learning environments.

Teacher Training and Pedagogical Approaches:

Teacher training programs should incorporate multidisciplinary perspectives on gender equality, empowering educators to integrate diverse viewpoints into their teaching practices. Utilizing interactive and participatory pedagogical approaches can enhance students' engagement and critical thinking on gender issues.

Collaboration and Partnerships:

1-Collaboration between educational institutions, civil society organizations, and policymakers is crucial for promoting multidisciplinary education for gender equality.

2-Partnerships can facilitate knowledge sharing, resource mobilization, and the development of comprehensive strategies for promoting gender equality in education.

Conclusion

Multidisciplinary education holds immense potential to challenge gender inequality and create a more equitable and inclusive society. By integrating knowledge, perspectives, and methodologies

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from various disciplines, individuals are empowered to challenge gender stereotypes, advocate for change, and contribute to the realization of gender equality. To harness the transformative power of multidisciplinary education, it is essential to foster collaboration between academia, policymakers, and civil society, while also addressing disciplinary silos and incorporating gender perspectives across educational curricula. By equipping future generations with a comprehensive understanding of gender dynamics, multidisciplinary education paves the way for a more equitable and sustainable future.

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National Integration and Emotional Integration in Adolescent Students

Mrs. Sarita Sharma¹, Dr. Abhaya R. Joglekar², Ms. Naina Agrawal³, Mr. Atanu Dutta⁴

¹Assistant Professor Disha College, Raipur

²Professor, ^{3,4}Assistant Professor, D.B. Girls College, Raipur

India is a diverse country in terms of racial groups, religions, languages, and traditions. Dr. Radhakrishnan stated, "Education should train people for unity and not for localism, for democracy and not for dictatorship, if India is to remain free, united, and democratic." The main factor promoting emotional integration among all people is education. All teachers, educators, and students will be given instructions on how to include the educational benefits for national and emotional integration through the curriculum, methods, purposes, and objectives, among other things. Nowadays, crime, murder, agitation, kidnapping, dacoity, political and religious fanaticism, and polarizing tendencies are constantly reported on in our society and media. These events collectively point to the necessity of "education for national and emotional integration."

Quality Education will be considered for the holistic improvement of the human race. Education is the most valuable key to success for an individual. It will be considered a lifelong learning process. An individual needs training to use his/her reason, so that thereby he/she may learn to live orderly life or moral life. Accurately, education means training the person to differentiate between 'good and evil', both on the quantity of physical reaction and psychological reaction. Education is the training of the mind, body and spirit; it is an instruction in cooperation, intimacy and consolation.

What is National Integration?

National Integration most simply and briefly means national unity. National Integration is the awareness of a common identity amongst the citizens of a country. It is unity in diversity. It means unifying all the forces in the country so as to give the idea of one nation. National Integration involves, the sentiments of nationalism the feeling of oneness. Social, political, economic, linguistic and cultural unity, common ideas of life and common code of behavior, the ability to subordinate sectarian and parochial loyalties to loyalty of the nation.

Definition of National Integration

According to Ross, "National unity is an inspiration, influenced by which people living in one country keep goodwill with each other as citizens of one nation and together they are active for the progress, security and welfare of the country."



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Importance of National Integration

National Integration is the bond and togetherness between people regardless of their case, creed, religion or gender. It is the feeling of oneness, brotherhood and social unity under communities and society in a country. National Integration helps to keep the country unified and strong from within despite the diversities. So, the importance of national integration can be from the fact that the nation which remains integrated.

It will always progress on the track of development and prosperity. National Integration plays a dynamic role in making the country a one. This happens only by uniting every section of society. It provides an equal opportunity for each citizen. It also offers an equal platform in terms of social, cultural and economic development.

National Integration also helps to unite the minorities as well as gives them the freedom to live their life in their way without any interference. Thus National Integration is also essential for the country's development. Because the country with national unity will always flourish and develop.

Aims of National Integration

National Integration principally aims at providing a better environment for the people of a country. Thus they can develop themselves in all the aspects. It also aids to bind multi-racial and multilingual country like India, which has people with diverse culture and tradition. It also multiplies the union of brotherhood amongst communities, societies and the people.

National Integration also helps in keeping the stability of a country and adds up to its whole development. It supports to nature communal harmony and fights casteism, regionalism, and linguism, etc. National Integration improves the feeling of loyalty and fraternity towards the nation. It unites the people in case of any national emergency.

Dimension of National Integration

The concept of national integration is multidimensional. Its rules are as follows-

Social Integration:- For social unity, it is necessary to have love, cooperation and tolerance, faith in democracy and humanism, selflessness, adjustment, social responsibility, social sensitivity and a sense of social justice among different sections and communities of the society.

Cultural Integration:- Cultural integration means establishing harmony among different religious, linguistic, regional communities regarding the superiority of them. The development of a common national culture by the sum of all the subcultures can maintain the cultural unity of the nation.

Linguistic Integration:- For linguistic unity, it is necessary that people should stay away from linguistic immunity, respect all languages, study each other's language and exchange ideas in them and make a common language the national language. Give rating.

Economic Integration :- For economic unity, it is necessary that economic inequality in the society should end. There should be no class discrimination on economic basis, no one should be exploited and the standard of living of the common people should be improved.



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How to Promote National Integration

As national integration demonstrates a crucial part in the development of a country, it becomes important to develop the feeling of national integrity among its citizens.

Therefore, focus on all the sections of society and making them financially dependent will promote national integration.

This will help to promote economic integrity. This is one of the most important factors in promoting national integration. Tolerance and respect for other caste or religion also support to promote national integrity. Education, social and cultural unity, equality among people also helps to teach the feeling of national integration.

Advantages of National Integration

National Integration plays a very important role in political, economic, cultural and social dimensions of a country. It helps the country in the following ways:

Promotes Social Harmony

National Integration makes the people of a country be present in harmony. This works only by strengthening the social bond between them. It indorses brotherhood, peace, and tolerance among them.

Unites the Nation

National Integration aids to unite people of different race, caste, creed or thoughts and makes the country as a single entity. It strengthens the country and makes it powerful on the international platform.

Increases Economic Growth

It is a well-known fact that the country has less internal matters and problems. They will always prosper and develop. The country which is united will always have fewer problems as compared to the country which is socially unstable.

Promotes Loyalty for the Nation

National Integration indorses loyalty of the citizen for the country. It aids to make people join hands and stand for the advancement of the country forgetting their petty issues.

Factors affecting National Integration

India, is a country with innumerable diversities, an entity of many communities, races classes, languages and subcultures. In any such nation, there are many obstacles to the achievement of national integration.

In India the following hindrances are obstructing the growth of national feeling, casteism, communalism, linguistic fanaticism, social disparity, economic inequalities and immortality, regionalism etc.



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Casteism

Caste is an imported part of our social fabric. This was developed in the past on the basis of division of labor in the society. But now casteism has segregated the society. Unity and integrity has become a dream in a caste ridden society. The feeling of socially neglected scheduled castes under the suppression of upper caste ruined the sense of we feeling and unity. It becomes a problem of national integration.

Communalism

Religions antagonism has posed a serious challenge to national integration in India. India is a multi-religious land. Political manipulation has projected one religion against the other which resulted in communal riot, bloodbath, mutual, distrust and disintegration of the country. Large scale illiteracy and superstition are responsible along with other causes for raise communalism in the country. It is very difficult to promote national integration under these situations.

Linguistic Fanaticism

Multi-linguism is one of the important characters of India. India has fifteen officially recognized languages. There are about 1652 languages are spoken in India which shows its diversities. There is conflict and riots of the languages issue. People of one language try to establish their language over others. When Hindi was declared as the national language people of South India resented against this decision supporting English language. Language issue became a barrier on the way of national integration.

Regionalism

There are several regions of India having their unique traditions, food habits, dress and languages. Each regional differs from the other in one or other ways which leads to disintegration of the country. People of one region compete with the person of other regions which leads to conflict and riots. Land dispute, language problem are some of the reasons which pose hurdle on the way of national integration.

Social Disparity

Social disparity among the people of different communities, castes and sometime within the community and caste causes tension and imbalance among the people, Social disparity poses great challenge to national integration.

Economic Inequalities

Economic standard of people in a state depends on the fertility of land, resources available and manpower management. All the states are not equal in the above matter which leads to economic backwardness of the people. Even in a state distribution of wealth is not properly done. Day by day poor becoming poorer and rich become richest this causes tension and conflict. It is a problem of national integration.

Aims of National Integration and Education

In order to develop the spirit of national integration, the following objectives of education can be set-



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- To inculcate in the student a sense of respect for different cultures.
- To develop desirable behavior in the students.
- To develop the feeling of patriotism in the students.
- To develop vocational skills in the students.
- To develop democratic citizens among the students.
- To inculcate in the students faith in human relations.
- To develop in the students the spirit of serving the nation to the best of their ability.

Role of Teacher in the Development of National Integration

The success of education depends on the teacher. The attainment of national unity through education can be possible only when the teacher is qualified, expert in his subject, he has complete knowledge of the glorious civilization and culture of the nation, he is the historical, geographical, political, social, economic and Be fully aware of industrial problems. He has the ability to put his views in front of others in a strong way and should be liberal, broad outlook, aware of his duties, there should be no difference in his words and deeds, who considers social service as his religion, who Be imbued with the feeling of patriotism and wish to lay down your life at the time of crisis at the sacrifice of the nation.

Students consider the teacher as their role model and follow it. Therefore, if we want to develop the feeling of patriotism and nationalism in our students, then the teacher will have to be full of the feeling of patriotism and nationalism, he will have to be devoted to the nation's interest with all his heart and wealth, he has to put his personal interests before the national interest. and family interests, he will have to instill in his mind reverence and respect for the national flag, national anthem and national language, he will have to keep his behavior fair towards the students and he will not have to say any such thing knowingly or unknowingly. Only such a thing has to be done which is against the national interest and which gives strength to the separatist nature. Only such a teacher will be able to inculcate the feeling of nationalism in the students.

What is Emotional Integration?

Emotional integration is the capacity of adolescents to balance emotions that cover their competence for Emotional progression, Independence, Social adjustment, Emotional stability, Personality integration, etc. Emotional Integration is to carefully feel and notice an event, most of the time, one of hurt. It is the process of completely experiencing our feelings, which break down their ability over us. Our ideas are feelings born from the body, the brain and the heart. The outcome of this process is to sit in the accurate self, living without play, on the way to understanding.

Meaning and Definition of Emotional integration.

Man is an emotional being. People attach to one another due to emotions. and separate from one another due to emotions. When two or more persons are attracted to one another due to some



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similarity, such as blood, caste, place, lifestyle, eating habits, customs, traditions, language, literature, religion, conduct and thought, etc., or due to any other reason, and when there is no possibility of their being separated.

We say that they have emotional integration, and when this emotional integration ceases, their existence is imperiled. But there is no definite limit to emotional integration. This term is used for the integration established on a personal level and for the integration established on the levels of caste, region, religion, economic, political, national, and international. In the field of education, emotional integration is taken in the context of national integration. The opinion of Pandit Jawaharlal Nehru is worth mentioning in this regard.

In his words:

“By emotional integration, I mean the integration of our minds and hearts, the suppression of feelings of separatism” –**Jawaharlal Nehru**

However small or large a country may be, people of different races and religions live in it. There is a difference in their lifestyle, eating manners, conduct and thought beliefs, faiths, and values.

Despite these differences, if the citizens of the nation become united in the name of the nation, then we say that there is emotional integration in the people of that nation.

In this context, the words of K.G.Saiyidain are important, in his words:

“Emotional integration does not mean a leveling down of differences. It means that the people have the right to differ and express their differences reasonably and fearlessly within the larger framework of national unity and basic loyalties.”

National integration and Emotional integration

The particular type of emotional integration is national integration. The term "national integration" refers to the emotional integration that occurs among all citizens of a nation on the basis of shared interests, in which case they put aside their individual and group interests in favor of those of the nation. This emotional integration can be based on any basis, including place, caste, language, culture, or religion, and its scope can range from any two people to the entire human race.

As a result, the foundation and parameters of national integration are clear, and it is imperative to put national objectives ahead of individual and group interests. However, we refer to national integration when we discuss emotional integration in the context of education. These two ideas serve as our basis for national integration.

Why there is a need of development of National Integration and emotional integration in adolescent students?

A significant time in a person's life is adolescence. During the journey from infancy to maturity, a significant transformation occurs. The teenage years are viewed as a time of stress and turmoil.

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Rapid overall changes are occurring in an individual's physical, moral, mental, spiritual, sexual, and social characteristics at this time. It is the enchantment of concerns, fears, goals, conflicts, and complexity. Temper, anger, psychic stress, and anxiousness are all effects of rapid physical growth. Peer pressure has a significant function in teenage development. Adolescents struggle to balance their needs with those of their parents, their peers, and society as a whole. As a result, social and psychological problems, particularly those involving behavior and academic issues, are more prevalent during this stage of childhood than at any other. Biological, cognitive, moral, emotional, and social changes are among the most significant. A psychoanalyst should evaluate adolescents for inhibition. Certain aspects of adolescence, such as depression, stress, and messy eating, are typical.

Emotional integration is the capacity of adolescents to balance emotions that cover their competence for Emotional progression, Independence, Social adjustment, Emotional stability, Personality integration, etc. Emotional Integration is to carefully feel and notice an event, most of the time, one of hurt. It is the process of completely experiencing our feelings, which break down their ability over us. Our ideas are feelings born from the body, the brain and the heart. The outcome of this process is to sit in the accurate self, living without play, on the way to understanding. Whereas National integration and national unity is the need of today's generation. In this context the students can play a significant role in promoting nationalism and feeling of oneness. adolescent's role in national integration:

- The future of any nation depends upon the students.
- They are the hope of tomorrow.
- They can serve to the nation at the time of natural calamities.
- They can take leadership helped during the national emergencies.
- Student's organizations such as NCC, NSS and Scout helped a lot at the time of national need.

How national integration and educational integration evolve in adolescents: Adolescent students can gain a sense of identity, belonging, and empathy for others through developing national integration and educational integration. Additionally, it can foster a feeling of civic duty and motivate students to take an active role in their communities. Adolescent pupils must integrate both nationally and emotionally if they are to feel a sense of identity and belonging.

In conclusion, it is critical for students' overall development that national integration and educational integration grow during adolescence. It may aid children in developing into dependable, sympathetic individuals who can make valuable contributions to society. Students can act as change agents and contribute to the development of a more inclusive and peaceful society by being encouraged to have a sense of identity, belonging, and social responsibility.

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Role of Teacher in Conceptual Development

Mrs. Hemlata Rathod¹ , Mr. Rahul Shakya²

¹Assistant Professor, Disha College Raipur

²Assistant Professor AAFT University Raipur

Conceptual development is the process after learning. Learning cannot be complete unless there is conceptual development. Only role learning cannot called learning. Concept development is the compulsory stage of learning. The child's concept development reflects the child's understanding. In general terms, conceptual development is combined with the child's understanding. While psychological development has a different meaning of conceptual development. In the term concept development are two words.



In which the general meaning of the concept is explained in the following form –

“When a child experiences an object, place or any special properties through his senses. The perception that is made about that object, creature or other is called a concept.

The concepts are formed on the basis of sensation and perception.

Rathus clarified the sense that – “Sensation refers to the stimulation of sensory organs and the transmission of sensory information to the central nervous system.”.

That is through sensation, received information about on object, creature or other. This information is usually received through sensory organs and it is completely short term based. It is difficult to reach a definite conclusion based on sensation.

After this the process of perception begins, the perception –

Rathus – 1984 – States that –

Perception is the process by which sensation are organized as an internal depiction of the world – a psychological process by which the information conveyed is interpreted.”

That is, perception is the process through which meaning is conveyed to information received through sensation. In simple words – “information is received through sensation and the information received through perception is given meaning. The concepts that develop in the brain on the basis of sensation and perception are called concept.

This can also be understood through an example – Such as when a child sees a motorcycle for the first time. This viewing process is called sensation, one gets to know the shape and structure of the motorcycle. Knowledge of the general properties of a motorcycle is through perception such as a



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motorcycle driven by petrol, two wheels etc. The child later sees different types of motor cycles and divides and classified them. This is called a concept. The child starts differentiating through different types of motorcycle like Bajaj's motorcycle, Honda's, Hero's, TVS's, Suzuki's etc. Further, he also distinguishes which motorcycle is for how much gear, how much it averages, how much it is worth, etc. When a child or a person starts doing this type of differentiation, it is included under the concept.

Definition of the concept:-

According to wood worth – “concept are ideas which refer to objects, events, qualities etc.”

According to Douglas & Holland – “concept refer to formation of an idea in the mind.”

It is clear from the above definitions that about any object creature, event, qualities etc. the thoughts which are formed in the mind of a person are called concept.

“The aim of education is to develop a concept in a person.”

Characteristics of Concept –

1. **General perception** – Concepts are general perceptions of an object, person, actions or others. These perception form a certain shape in the mind of a person towards a subject.
2. **Based on previous experiences** - Concepts are based on prior experiences. The more prior experience a person has, the concept formation will be more and clear. Through sensation, perception and prior experience, a person develops a concept.
3. **Abstract and concrete** – Concepts can be both concrete and abstract, common nouns i.e. person or creature, object, place etc. fall under the category of concrete whereas abstract norms in which thoughts, imagination, emotion, values, goodness, evil, sweetness, pungency, honesty etc. are included under the abstract.
4. **From unclear to clear** – In the process of concept formation, as people move forward, they move from unclear to clear concept. On the basis of age, maturity, experience etc. the concepts are clearer.
5. **Subjective nature** – A concept is a subjective, the construction of a concept changes according to the person. Different people may have different opinions about the same topic. As the clarity of the theory increases, this subjectivity subsequently changes into objectivity.

In this way it is clear that the concept is a mental process in which individuals construct a concept towards a subject through sensation and perception. Concept has been considered try to develop their own concept. Teachers also develop the concept through many examples and lectures etc.

Steps of concept formation / development –

Concept formation is a complex process, if not enough attention is given by the teacher then flawed concept formation can also occur. How is the construction of a concept in a child, it can be understood on the basis of the following points –



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1. **Sensation and perception** – Concept development is not possible in the absence of sensation and perception. For example – to see a motorcycle is sensation and to assume the meaning of a motorcycle is called perception.
2. **Analysis** – When the child constantly makes a perception of an object, he starts analyzing the general and special properties of that object. Persons looks at different types of motorcycle and analyzes the properties of the motorcycle etc.
3. **Comparison** – Children identify the properties through analysis and later they are able to compare the properties.
For example – after analyzing the motorcycle, he compares different types of motorcycle such as Bajaj, Honda, Hero etc.
4. **Discrimination** – After comparison, the child tries to separate on the basis of Equal and dissimilar qualities. Separation is done on the basis of similar average, same appearance, same colour, same gear, same price etc.
5. **Generalization** – At this stage, the child generalizes a subject the child starts knowing that object etc. on the basis of general properties. He starts to think about the object etc. without seeing or seeing it. From which concept of that object becomes permanent. Like when he sees any motorcycle, that concept comes in mind.

Factors influencing conceptual development –

Concept formation/development depends on various elements which are explained as follows –

1. **Transfer of learning:-** The effect of the previously learned theory on the current theory is called transfer. We also call it transfer of learning if someone is being learned from a previously learned concept, then that can be learned quickly. It is also called positive transfer. As the concept of the bicycle is clear to the child, then he will learn the concept of motorcycle easily. Whereas some of the earlier concepts, which cause an obstacle in learning new concepts, it is called negative transfer.
2. **Separation:-** Concept formation is easy whose general characteristics are easy to detect, while whose general characteristics are difficult to detect, it is difficult to concept formation
3. **Capacity of manipulation** – Individuals who have more ability to identify, classify, organize content related to common characteristics develop the concept more quickly. In which this capacity is less the concept gradually develops.
4. **Vocabulary** – The formation of a concept is simple due to the excess of vocabulary. Due to the vocabulary. People easily derive the meanings of different words, which also makes the construction of the concept simple. Those whose vocabulary are short, find it difficult to construct a concept.
5. **Age and maturity:-** Age and maturity have an effect on the concept formation. Along with the increase in age and maturity, as well as the development of the concept occurs.
6. **Necessary Guidance:-** Necessary guidance has a wide impact on concept development, when the necessary guidance is provided to the child through teacher, guardian or any subject



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specialist, the development of the concept is rapid. Guidance is necessary for correct and above mentioned development. Those who do not receive this guidance. Their development is slow.

7. **Intelligence and mental level** – The intelligence and mental level of a child has an effect on the concept formation. Children whose intelligence and mental level are good, they quickly develop any concept, whereas people of lower intelligence and mental level are not able to easily develop a concept.

Apart from these, there are many points which have an effect on the concept development, such as the person's desire to learn, aptitude, motivation, aspiration level, factors reacted to the teachers, teaching qualities, subject knowledge, content related factors, size and nature of content, utility of content etc.

Role of teacher in conceptual development:-

Education plays an important role in constructing a concept. Through education, the child gets many such opportunities, which lead to possible development of the child. After observation, discussion and content with the external environment the child gradually develops the concept. It would be flawed to consider concept development as a purely natural process as well as a planned process, through education, teachers provide many opportunities in the classroom, which makes the speed of concept development fast and sustainable. The role of education in concept development is as follows:-

1. To provide freedom of through expression in the classroom.
2. Continuous communication with the teacher.
3. Providing appropriate guidance and support related to the subject to the children through the teacher.
4. To provide more opportunities for children to analyze and compare.
5. Learning of children should be done on the basis of prior knowledge.
6. Prior knowledge should be associated with new knowledge.
7. Children should be provided more and more opportunities for sensation and perception.
8. Conceptual development in children should be investigated by teachers from time to time through question etc.
9. More opportunities should be given to children for generalization of the concept.

By the time the child enters the school, his feelings have become strong and he starts perception through many kinds of sensations. But the children are not able to develop any particular concept in such a situation, it is the responsibility of the teacher to make a concept development in the children through classroom teaching.

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Chapter 12



New Trends on Multidisciplinary Approach in Computer Science

Mrs. Barkha Raghuwanshi¹, Mr. Arpit Agrawal², Mr. Atul Shrivastava³

¹Assistant Professor Disha College Raipur

²Assistant Professor AAFT University Raipur

³Assistant Professor AAFT University Raipur

Introduction-

Multidisciplinary approach in education is a new method which allows the students to explore and study distinct subjects or curriculum from various fields. A **multidisciplinary education** is one in which the same topic is studied from the viewpoint of more than one discipline. It is also called cross-disciplinary which indicates the aim to cross boundaries between disciplines.

India is one of the youngest nations in the world moving toward knowledge-based leadership. India has prepared an ambitious plan to establish 'multidisciplinary education (MERUs). Multidisciplinary higher education is a key theme in the National Education Policy (NEP).

Importance of multidisciplinary education:

- Offers student, the flexibility of choosing subjects
- Helps students to pursue their passions along with mainstream education
- Helps to develop pragmatic attitude
- Helps to develop collaborative teacher-student relationship
- Helps in encouraging students, promotes creativity and critical thinking, provides more comprehensive understanding of complex issues, prepares students for real-world problem solving etc.

Examples of Multidisciplinary approach:

- A student who has taken science and maths also studies history.
- An engineering student can pursue a subject in humanities

Implementation of Multidisciplinary approach

- NEP plans to create standards for the curriculum and credit structure for four-year undergraduate programmes, regulations outlining the minimum requirements and the process for awarding one-year certificates, two-year diplomas, three-year bachelor's degrees, four-year bachelor's degrees (honour's), and master's degrees with multiple entry and exit options, as well as the transformation of HEIs into multidisciplinary institutions.

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- One of the biggest changes was the conversion of the three-year undergraduate or bachelor's degree programme to a four-year multidisciplinary UG programme with several entry and exit options in order to better prepare the students for the workforce. Students can now transfer between universities if necessary and accrue credits based on their work.

Various committees have been formed to create a multidisciplinary four-year degree programme with designed modules and a credit system for various levels of the multidisciplinary four-year and five-year integrated PG programme.

Structure of UG Single Core Discipline Program



- Note -

A student successfully completes an in-depth research project in their major during their fourth year of a bachelor's degree (honors with research).

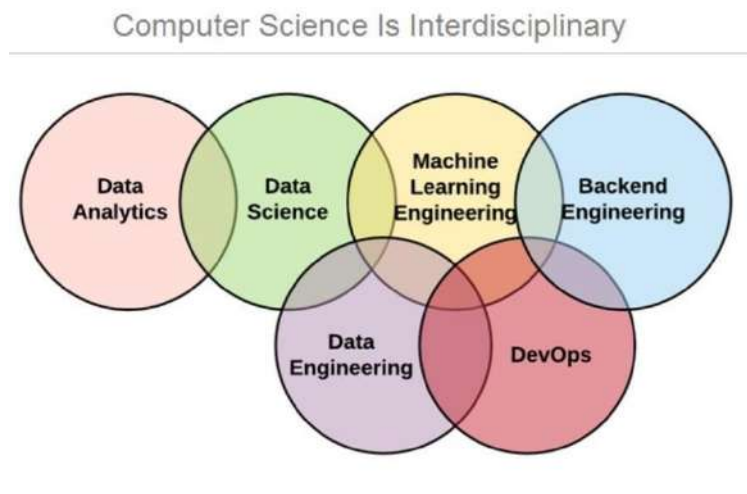
- Integrated Educational ERP software equipped with **Choice-Based Credit System (CBCS)** can simplify the multidisciplinary approach as traditional methods can be extremely tedious and would require high overhead costs and more resources.
- Emphasis has been placed on integrating a variety of courses, including environmental studies, value education, professional ethics, and life skills, in addition to a variety of Majors and Minors, in order to encourage holistic and **multidisciplinary education**.
- "**Curriculum and Credit Framework for Undergraduate Programmes (CCFUP)**" has been developed. It includes a flexible choice-based credit system, a multidisciplinary approach, and multiple admission and exit choices. By selecting the subject or field of their interest, students will find it easier to pursue their career route.

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Interdisciplinary Branches for Computer Science Graduate

Computer science is a broad discipline that touches many other disciplines. It is reflected by research in the area of interdisciplinary topics. These topics span from the very small, such as nanotechnology, molecular computing and quantum computing, to the very large, such as the impact of technology on society as a whole. The areas intersecting with biology, education, physics and social science, Electrical Engineering, Backend Engineering, Data science etc.



These branches provide a unique blend of computer science with other disciplines, enabling students to gain expertise in multiple fields and broaden their career opportunities. However it's important to research each program thoroughly and ensure that it aligns with your interests and career goals.

There are several interdisciplinary branches that computer science graduates can pursue for an M.Tech degree. Some popular options include:

1. Computational Science and Engineering
2. Data Science and Engineering
3. Artificial Intelligence and Machine Learning
4. Human-Computer Interaction
5. Cyber security
6. Bioinformatics
7. Cognitive Science
8. Computational Linguistics
9. Embedded System
10. Mobile Computing
11. Computer Application
12. VLSI Design Tools and Technology
13. Energy Studies

Other than M.Tech there are various courses in computer science field for specialization which are interdisciplinary. Some are as follows:-

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Artificial intelligence (AI)

We use AI in our homes, our cars, our businesses, and even in public spaces. Machine learning enables an AI system to learn from data. Working in the field of AI and machine learning means innovating the technology of tomorrow.

Robotics

The growing field of robotics focuses on building robots that can replicate human actions. A foundation in computer science equips you to program the software that helps physical and virtual bots operate effectively.

It involves computer programming as well as electrical and mechanical engineering, electronics, optical engineering etc.

Cyber security and ethical hacking

Cyber security refers to the practice of protecting computer systems, networks, programs, and mobile devices from unauthorized access or digital attacks. Cyber-attacks rank among the fastest-growing crimes, fueling global demand for cyber security skills.

Ethical hacking takes a proactive approach to cyber security by trying to find vulnerabilities before malicious hackers do.

Video game design

While video game design isn't a new industry, it's one that will likely continue to evolve. As games get more advanced, gaming companies will need more people skilled in designing and programming virtual reality, graphics, game physics, networks, and user interfaces.

Cloud computing

With the emergence of cloud computing technology, companies no longer need their own servers to build products. As the cloud continues to grow, so will the demand for professionals with cloud computing skills, including cloud security, database management, and network architecture. This industry is perfect for you if you're interested in how the Internet can help transform businesses.

Bioinformatics

Bioinformatics combines mathematics, biology, and computer science to better understand biological data. Scientists in this field use the growing stream of biological data by storing, analysing, and interpreting big data sets using computer technology. This industry is perfect for you if: You like analysing facts and working with ideas. You're interested in biological sciences as well as computers.

UX design



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User experience (UX) design

It helps shape a customer's emotions and attitudes when using a particular product, service, or system. Whether for a physical product or, more often, for a website or app, user design is concerned with gathering and analysing data to craft the most enjoyable and efficient user experience. This industry is perfect for you if: You are interested in human behaviour. You want a career where you can use your creativity.

Big data

Businesses are often inundated with data each day, more data than the human mind can make sense of on its own. That's where big data analytics comes in. This field deals with collecting and analysing large data sets to find valuable information that can be leveraged to make better business decisions. This industry is perfect for you if: you enjoy mathematics and making sense of large data sets.

Internet of things (IoT)

Physical objects around the globe—from thermostats and lightbulbs to toys and audio speakers—are now connected to the internet. The Internet of things (IoT) refers to this collection of devices and the technology used to connect the physical with the digital. As the number of "smart" objects grows, companies will need professionals with the skills to design, develop, and program them. This industry is perfect for you if: you're a natural tinkerer obsessed with the latest gadgets.

Internet of things job titles:

- IoT developer
- Embedded systems designer
- Vulnerability analyst

Common job requirements: Bachelor of Computer Science, IoT or cloud development certification, proficiency with JavaScript and Python

Computer forensics

Computer forensics

Computer forensics exists at the intersection of law and computer science. Computer forensics, also called data or digital forensics, deals with the recovery and analysis of digital evidence recovered from computers, networks, and digital storage devices. You might work in a crime lab, law enforcement department, public agency, or private contractor. This industry may be good for you if: you're naturally inquisitive and are interested in cybercrime and law enforcement.

A Multidisciplinary Approach

"Global Emerging Educational Trends of Education"



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Augmented reality, virtual reality are really challenging in future education for different critical subjects. Collaborative and cooperative learning is more efficient for student concentration and attention game based learning plays crucial role. For gaining knowledge of different concepts and experience of enjoying subject project based learning is effective. For fast gaining of new concepts Nano learning is amazing technique. In this way it all will help for better education environment.

These are some top educational trends:

Virtual Reality and augmented Reality

VR and AR are future of education. VR is trending in education VR is are artificial computer generated simulation or recreation of a real life environment or situation. VR is simulated experience that can be similar or completely different from real world. Two types are there mobile VR & console VR mobile VR is cardboard VR by google.

VR by national geography google earth VR (explore real world in VR) just by one click you can go through whole world cities roads its an amazing beauty of this google earth. VR is very special in learning complete attention is given. all human senses are involved in it deeply & excellent interaction is happened it just like Audio, visual and kinesthetic learning environment you feel in different world there are different application of VR gaming medical video conference training travelling etc.

Mobile learning

Mobile learning is learning across multiple contexts through social and content interactions using personal electronic devices. It is a new way to access learning content using mobiles'-learning is any type of content that is developed or consumed on mobile devices smartphones, tablets podcasts learning courses. Through this m-learning anywhere anytime learning happens. It is new technology. There are different ways to learn through mobiles e-book, video, document ppt, pdf,e-learning modules mobile apps. There are different mobile apps like TED, khan academy, Lynda,udemy now recently in 2021 mostly used apps are you tube, Spotify Wikipedia, QuoraEdx etc.

Moocs– massive open online courses

Moocs are free online course available for anyone to enroll moocs provide flexilble way to learn new skills advance your career and deliver quality educational experiences at scale moocs courses are available in all subjects humanities, education, engineering education & teaching maths healthmedicine.

Online Education / Schooling-is form of education which is administered through using internet. There classess are virtual classes. Student can take from home or library or anywhere.

Project based learning

It is a teaching method in which student working for an extended period of time to investigate and



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response to authentic problem or challenge student can do project on different things like presentations, newsletters posters, resumes, mind maps , developing a news product or service implementing a news business process, Renovating the rooms.

Nano learning –

Nano learning is program designed to permit a participant to learn a given subject in ten-minute time frame through the use of electronic media without interaction with real time instructor. It provides unique opportunity to tackle new subjects, presented in bite size learning modules. It includes video, audio, scenario examples ranges from 2 minutes to maximum of 10 minutes. It covers single learning objective and provides focused learning on the single topic, most nano learning course has links related materials for training, practice aids or other additional resources, to expand the knowledge base of learner.

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Quality Control: Ensuring Excellence in Products and Services

Mrs. Anjali Bhaskar¹, Dr. Shweta Bajaj²

¹Assistant Professor Disha College, Raipur

²Associate Professor AAFT University Raipur

Introduction

In today's competitive market, delivering high-quality products and services is essential for the success and reputation of any organization. Quality control plays a crucial role in ensuring that products and services meet or exceed customer expectations. This chapter provides an overview of quality control, its importance, and the key principles and techniques involved. This chapter explores the concept of quality control, its significance, and the various methodologies and tools employed to achieve and maintain high-quality standards. By implementing effective quality control measures, organizations can enhance customer satisfaction, reduce defects, and improve overall business performance.

Definition of Quality Control

Quality control (QC) refers to the set of activities and processes designed to monitor, measure, and control the quality of products or services throughout their lifecycle. It involves systematic inspection, testing, and analysis to ensure that products or services conform to defined quality standards and meet customer requirements. Quality control aims to identify defects, deviations, or non-conformities early in the production or service delivery process to prevent their occurrence or rectify them promptly.

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Importance of Quality Control

Effective quality control is vital for several reasons:

- 1. Customer Satisfaction:** Customers expect products and services to meet their needs and perform as promised. Quality control ensures that products or services consistently meet or exceed customer expectations, enhancing satisfaction and loyalty.

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2. **Brand Reputation:** High-quality products or services build a positive brand image and reputation. Quality control helps maintain brand integrity by ensuring consistent quality levels and minimizing the risk of product recalls, customer complaints, or negative feedback.
3. **Cost Reduction:** Implementing quality control measures can help identify and address issues early, reducing the cost of rework, scrap, or warranty claims. By preventing defects and non-conformities, organizations can also improve operational efficiency and minimize production disruptions.
4. **Compliance and Regulations:** Many industries have specific quality standards and regulations that must be met. Quality control ensures adherence to these requirements, avoiding legal issues, penalties, or damage to the organization's reputation.
5. **Continuous Improvement:** Quality control processes provide valuable data and insights for continuous improvement efforts. By analyzing quality metrics and trends, organizations can identify areas for enhancement, optimize processes, and drive innovation.

Principles of Quality Control:

Effective quality control is based on several key principles:

1. **Quality Planning:** Quality control begins with clear quality objectives and a well-defined plan. This involves establishing quality standards, defining measurement methods, and determining inspection points throughout the production or service delivery process.
2. **Process Control:** Quality control focuses on controlling the processes that influence product or service quality. It involves monitoring key process parameters, identifying sources of variation, and implementing corrective actions to maintain consistent quality levels.
3. **Inspection and Testing:** Inspection and testing are integral components of quality control. They involve evaluating product or service characteristics against defined standards to identify defects, deviations, or non-conformities. Various techniques such as statistical sampling, visual inspection, and laboratory testing are used based on the nature of the product or service.
4. **Documentation and Record-keeping:** Quality control requires comprehensive documentation of quality standards, procedures, and test results. This documentation serves as a reference for future inspections, audits, and traceability purposes. Accurate record-keeping facilitates data analysis, trend identification, and decision-making.
5. **Continuous Improvement:** Quality control is an ongoing process that seeks to drive continuous improvement. Organizations should regularly review quality control procedures, analyze quality



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data, and implement corrective and preventive actions to enhance product or service quality and reliability.

Quality Control Techniques

Several techniques and tools are commonly used in quality control:

Quality control methods are techniques and processes used to ensure that products or services meet specified standards and customer expectations. These methods help identify defects, inconsistencies, and deviations from desired quality levels, allowing organizations to take corrective actions and improve their overall quality. Here are some commonly used quality control methods:

1. Statistical Process Control (SPC): SPC involves monitoring and controlling a process through statistical methods. It uses control charts and statistical analysis to identify variations and trends in data, enabling early detection of potential quality issues. Statistical Process Control (SPC) is a methodology used in manufacturing and other industries to monitor and control production processes. It involves collecting and analyzing data in real-time to understand the variation in a process and make informed decisions to improve its performance.

The main objectives of SPC are:

Monitor process performance: SPC helps monitor process outputs or characteristics to ensure they are within specified limits. It uses statistical techniques to determine if the process is stable and predictable or if there are signs of variation or nonconformities.

Identify and reduce variability: SPC aims to identify sources of variation in a process, such as equipment issues or operator errors, and take corrective actions to reduce or eliminate those sources. By reducing variability, SPC helps improve product quality and consistency.

Continuous improvement: SPC is a part of the broader concept of continuous improvement. By monitoring process performance and making data-driven decisions, organizations can identify areas for improvement, implement changes, and monitor the impact of those changes over time.

Key components of Statistical Process Control include:

Control Charts: Control charts are graphical representations of process data over time. They provide a visual display of the process performance and help identify patterns, trends, or points that fall outside acceptable limits.

Data Collection: SPC relies on accurate and timely data collection. Data can be collected manually or automatically using various measurement and data acquisition techniques.



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Statistical Analysis: SPC involves applying statistical methods to analyze process data, calculate control limits, and determine the stability and capability of the process. Common statistical techniques used in SPC include mean and range calculations, standard deviation, process capability analysis, and hypothesis testing.

Process Improvement: SPC provides insights into process performance and variability, allowing organizations to make informed decisions for process improvement. It enables organizations to identify root causes of process issues, implement corrective actions, and monitor the effectiveness of those actions.

By implementing Statistical Process Control, organizations can achieve greater process control, improved product quality, reduced defects, increased efficiency, and enhanced customer satisfaction.

2. Six Sigma: Six Sigma is a data-driven approach that aims to reduce defects and improve quality by systematically identifying and eliminating the root causes of problems. It utilizes statistical tools, such as DMAIC (Define, Measure, Analyze, Improve, Control), to drive process improvements. Six Sigma is a set of methodologies and tools used to improve business processes by reducing defects and errors, minimizing variation, and increasing quality and efficiency. Six Sigma is a methodology that focuses on improving business processes by reducing defects and variations, thereby improving quality and efficiency. It was originally developed by Motorola in the 1980s and has since been adopted by numerous organizations across various industries.

The term "Six Sigma" refers to a statistical concept that measures how far a process deviates from perfection. It represents a level of quality where the occurrence of defects is extremely rare, at approximately 3.4 defects per million opportunities (DPMO). The goal of Six Sigma is to achieve this high level of quality by systematically identifying and eliminating the root causes of defects and reducing process variations.

Six Sigma follows a structured problem-solving approach known as DMAIC, which stands for Define, Measure, Analyze, Improve, and Control. Let's briefly go through each phase:

Define: Clearly define the problem, goals, and customer requirements. Identify the key metrics and establish project boundaries.

Measure: Gather data on the current performance of the process and analyze it to understand the magnitude of the problem. Develop metrics and establish a baseline for measurement.

Analyze: Use statistical tools and techniques to identify the root causes of defects and process variations. Analyze the data to gain insights into the factors influencing the process performance.

Improve: Develop and implement solutions to address the identified root causes. Use various improvement methodologies, such as lean principles, to streamline the process and eliminate waste.



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Control: Establish controls to sustain the improvements made and prevent the process from reverting to its previous state. Monitor the process performance using statistical process control (SPC) techniques and implement mechanisms to continuously improve.

Six Sigma utilizes a range of statistical tools and techniques, such as process mapping, control charts, regression analysis, hypothesis testing, design of experiments (DOE), and many others, to support the problem-solving process and drive data-based decision making.

The methodology has been widely adopted by organizations seeking to enhance quality, reduce defects, optimize processes, and improve customer satisfaction. Many companies also provide Six Sigma training and certification programs to develop individuals with the necessary skills to lead and implement Six Sigma projects.

3. Failure Mode and Effects Analysis (FMEA): FMEA is a proactive method used to identify and prioritize potential failure modes in a product or process. It assesses the severity, occurrence, and detectability of each failure mode to determine appropriate actions for prevention or mitigation. FMEA stands for Failure Mode and Effects Analysis. It is a systematic and proactive approach used in various industries to identify and mitigate potential failures or errors in a process, system, or product. FMEA is typically conducted during the design or early development stages to prevent or minimize risks and improve overall reliability.

The primary goal of FMEA is to identify and prioritize potential failure modes, their causes, and the potential effects or consequences of those failures. By doing so, organizations can take appropriate actions to prevent or reduce the likelihood of failures, and mitigate their impact if they occur. FMEA helps in improving the safety, quality, and reliability of products or processes.

The FMEA process generally involves the following steps:

Define the scope: Determine the boundaries and objectives of the analysis, including the specific system, process, or component under consideration.

Assemble the team: Form a multidisciplinary team of experts and stakeholders whose knowledge and experience have related to the system being analyzed.

Identify potential failure modes: Brainstorm and list all possible ways in which the system or process could fail. Consider both functional failures (when the system does not perform its intended function) and potential failures related to safety, quality, or performance.

Determine the causes and effects: For each failure mode identified, determine the underlying causes or reasons for the failure and the potential effects or consequences that could result from it. This step helps understand the criticality of each failure mode.

Assign severity, occurrence, and detection ratings: Assign ratings to each failure mode based on its severity (potential impact), occurrence (likelihood of the failure happening), and detection (ability to detect the failure before it reaches the customer).



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Calculate the Risk Priority Number (RPN): Multiply the severity, occurrence, and detection ratings to obtain the Risk Priority Number. The RPN helps prioritize the failure modes and focus on the ones with the highest risk.

Develop and implement corrective actions: Identify and prioritize actions to mitigate or eliminate the high-risk failure modes. These actions may involve design changes, process improvements, additional testing or inspections, or other measures to reduce the likelihood of failure or its impact.

Verify the effectiveness of actions: Monitor and track the implemented actions to ensure they are effective in reducing the identified risks. If necessary, refine the actions or implement additional measures.

FMEA is an iterative process that can be repeated throughout the lifecycle of a product or process, especially during design changes or process improvements. It is widely used in industries such as automotive, aerospace, manufacturing, healthcare, and many others to enhance product quality, reliability, and safety.

4. Root Cause Analysis (RCA): RCA is a problem-solving technique that focuses on identifying the underlying causes of quality issues. It involves investigating the factors contributing to a problem, analyzing data, and implementing corrective actions to address the root causes. Root cause analysis (RCA) is a problem-solving technique used to identify the underlying causes of an issue or problem. It involves investigating the symptoms and factors that contribute to a problem in order to determine its root cause. By addressing the root cause, organizations can implement effective solutions that prevent the problem from recurring.

The process of root cause analysis typically involves the following steps:

Define the problem: Clearly articulate the problem or issue that needs to be addressed. It's important to describe the problem in specific terms to ensure a focused analysis.

Gather data: Collect relevant data and information about the problem. This may involve reviewing incident reports, conducting interviews, analyzing documentation, or examining any available data related to the problem.

Identify possible causes: Brainstorm and identify potential factors or causes that could have contributed to the problem. This can be done through techniques like the "Five Whys," where you ask "why" repeatedly to delve deeper into the underlying causes.

Analyze causes: Evaluate each potential cause and assess its likelihood of contributing to the problem. Use tools like fishbone diagrams or fault trees to visually map out the relationship between causes and their effects.

Determine the root cause: Based on the analysis, identify the root cause or causes that, if addressed, will have the most significant impact on preventing the problem from occurring again. The root cause is the fundamental reason behind the problem, rather than its symptoms.



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Develop solutions: Once the root cause is determined, brainstorm and develop potential solutions or corrective actions that will effectively address the identified cause. Consider both immediate corrective actions and long-term preventive measures.

Implement solutions: Put the selected solutions into action. This may involve implementing process changes, providing additional training, modifying equipment or systems, or making other necessary adjustments.

Monitor and evaluate: Track the effectiveness of the implemented solutions and monitor the situation to ensure that the problem does not recur. Evaluate the outcomes and make any necessary adjustments or improvements as needed.

Root cause analysis is widely used in various industries, including manufacturing, healthcare, information technology, and quality management. It helps organizations improve their processes, reduce costs, enhance productivity, and enhance overall performance by addressing the underlying causes of problems.

5. Pareto Analysis: **Pareto analysis** is a technique that prioritizes quality issues based on their frequency or impact. It uses the Pareto principle (80/20 rule) to identify the vital few factors that account for the majority of problems, helping organizations allocate their resources effectively. Pareto analysis, also known as the 80/20 rule or the Pareto principle, is a technique used to identify and prioritize the most significant factors or issues contributing to a particular outcome. It is named after Italian economist Vilfredo Pareto, who observed that approximately 80% of the effects come from 20% of the causes in many situations.

The Pareto analysis involves the following steps:

Define the problem or outcome: Clearly identify the issue or outcome that you want to analyze. For example, it could be product defects, customer complaints, sales revenue, or any other measurable aspect.

Collect data: Gather relevant data related to the problem. This could involve reviewing historical records, conducting surveys, analyzing customer feedback, or examining production logs, depending on the nature of the problem.

Categorize the data: Organize the data into different categories or groups that are meaningful to the analysis. For example, if you are analyzing customer complaints, you might categorize them by the type of complaint, such as product quality, delivery issues, or customer service problems.

Calculate the frequency or impact: Determine the frequency or impact of each category by counting occurrences or measuring the severity of the issue. This step helps quantify the relative significance of each category.

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Rank the categories: Sort the categories in descending order based on their frequency or impact. The goal is to identify the few categories that contribute the most to the overall problem or outcome.

Analyze the Pareto chart: Present the ranked categories in a Pareto chart, which is a bar chart with the categories on the x-axis and the frequency or impact on the y-axis. The chart visually represents the cumulative contribution of each category, with the most significant categories appearing first.

Focus on the vital few: The Pareto analysis highlights the "vital few" categories that have the most significant impact. It suggests that efforts and resources should be focused on addressing these high-priority categories to achieve the greatest improvement or results.

Pareto analysis is commonly used in quality management, project management, problem-solving, and decision-making processes. By identifying the critical factors or causes, it helps teams allocate their efforts efficiently and prioritize actions to achieve the most significant impact.

6. Checklists and Standard Operating Procedures (SOPs): Checklists and SOPs provide detailed guidelines and instructions to ensure consistency and adherence to predefined quality standards. They help in standardizing processes, reducing errors, and facilitating effective quality control.

7. Sampling and Inspection: Sampling methods involve selecting a representative subset from a larger population or batch of products for inspection. Various statistical sampling techniques, such as random sampling or acceptance sampling plans, can be employed to assess product quality efficiently.

8. Kaizen: Kaizen, a Japanese term meaning "continuous improvement," emphasizes small, incremental changes to improve quality over time. It encourages employee involvement, teamwork, and a culture of continuous learning and improvement. Kaizen is a Japanese term that translates to "change for the better" or "continuous improvement." It is a philosophy and approach to management that focuses on making incremental improvements in processes, products, and systems on an ongoing basis. Kaizen originated in Japan and became popularized by Toyota as part of the Toyota Production System.

The core idea behind Kaizen is that small, continuous improvements, when implemented consistently over time, can lead to significant advancements and efficiencies. It emphasizes the involvement of all employees in identifying and implementing improvements, as they are considered the experts in their own work processes. Kaizen encourages a culture of continuous learning, problem-solving, and teamwork.

There are several key principles and techniques associated with Kaizen, including:

PDCA Cycle: PDCA stands for Plan, Do, Check, Act. It is a four-step management method used to drive improvement. The cycle involves planning a change, implementing it on a small scale, checking the results, and then acting on what was learned to make further improvements.



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Gemba: Gemba refers to the actual place where work is done or where value is created. It emphasizes the importance of going to the source, observing processes firsthand, and engaging with the employees directly involved in the work. This approach helps to identify waste, inefficiencies, and opportunities for improvement.

5S: 5S is a systematic approach to workplace organization and standardization. The five S's stand for Sort, Set in Order, Shine, Standardize, and Sustain. This method aims to create an organized, clean, and efficient work environment, which in turn improves productivity and reduces waste.

Kaizen Events: Kaizen events, also known as Kaizen blitzes or rapid improvement events, are focused and intensive improvement activities that bring together a cross-functional team to solve a specific problem or improve a process within a short timeframe. These events aim to generate quick results and foster collaboration among team members.

Kaizen is not limited to manufacturing or production processes and can be applied to various aspects of an organization, including service delivery, administrative processes, and customer interactions. It promotes a mindset of continuous learning, adaptation, and innovation, and has been widely adopted by organizations worldwide as a means to enhance performance, quality, and customer satisfaction.

9. Lean Manufacturing: Lean principles focus on eliminating waste and optimizing processes to enhance quality and efficiency. Techniques like value stream mapping, 5S methodology, and Just-in-Time (JIT) manufacturing can be applied to identify and eliminate non-value-added activities. Lean manufacturing, also known as lean production or simply lean, is a systematic approach to manufacturing that aims to eliminate waste and maximize value for the customer. It was originally developed by Toyota as part of the Toyota Production System (TPS) and has since been adopted and adapted by many other industries and organizations worldwide.

The core principle of lean manufacturing is to identify and eliminate any activities or processes that do not add value to the final product, thereby reducing waste and increasing efficiency. Waste, in this context, refers to any activity or resource that consumes time, energy, or materials without contributing to the final product or customer satisfaction.

The main types of waste targeted by lean manufacturing are:

Overproduction: Producing more than what is needed or producing too early, resulting in excess inventory, storage costs, and potential obsolescence.

Waiting: Delays or idle time between production steps, which waste time and reduce overall productivity.

Transportation: Unnecessary movement or handling of materials, products, or equipment, which adds cost and potential damage.

Over processing: Performing unnecessary or non-value-added activities beyond what the customer requires, increasing costs without adding value.

Inventory: Excess inventory that ties up capital, occupies space, and increases the risk of obsolescence or damage.



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Motion: Unnecessary movement or motion of people or equipment, which can lead to inefficiency and fatigue.

Defects: Producing defective products that require rework or result in customer dissatisfaction.

To achieve lean manufacturing, organizations employ various techniques and tools, such as:

Value Stream Mapping: Mapping the entire production process to identify waste, bottlenecks, and opportunities for improvement.

Just-in-Time (JIT) Production: Producing only what is needed, when it is needed, to minimize inventory and storage costs.

Kanban System: Using visual signals or cards to control the flow of materials and production, ensuring that items are replenished only when necessary.

5S Methodology: A set of practices (Sort, Set in Order, Shine, Standardize, Sustain) aimed at organizing the workplace, reducing waste, and improving safety and efficiency.

Kaizen: Continuous improvement through small, incremental changes made by employees at all levels of the organization.

Poka-yoke: Designing processes and equipment to prevent errors or defects from occurring.

Total Productive Maintenance (TPM): Systematic approach to equipment maintenance to maximize uptime, reduce breakdowns, and improve overall productivity.

Andon System: Visual alert systems that notify workers and managers of any problems or abnormalities in the production process.

By adopting lean manufacturing principles and practices, organizations can achieve improved quality, reduced costs, shorter lead times, increased productivity, and enhanced customer satisfaction. It promotes a culture of continuous improvement and empowers employees to identify and solve problems, driving efficiency and innovation throughout the organization.

10. Total Quality Management (TQM): TQM is a comprehensive approach to quality management that involves all aspects of an organization. It emphasizes customer satisfaction, employee involvement, continuous improvement, and a process-oriented mindset to achieve superior quality. TQM stands for Total Quality Management. It is a management philosophy and approach that aims to achieve long-term success by focusing on customer satisfaction through continuous improvement of all aspects of an organization's processes, products, and services.

The key principles of TQM include:

Customer Focus: Placing the customer at the center of all activities and understanding their needs and expectations.

Continuous Improvement: Striving for constant improvement in all areas of the organization, with the involvement of every employee.

Employee Empowerment: Encouraging and empowering employees to take ownership of their work, make decisions, and contribute to improving quality.



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Process-Oriented Approach: Emphasizing the importance of well-defined and efficient processes to achieve consistent quality outcomes.

Data-Driven Decision Making: Making decisions based on accurate and reliable data, rather than assumptions or guesswork.

Supplier Relationships: Collaborating closely with suppliers to ensure the quality of inputs and establish mutually beneficial relationships.

Leadership Involvement: Active involvement and support from top management in promoting and implementing TQM principles throughout the organization.

By implementing TQM, organizations aim to reduce waste, enhance efficiency, improve customer satisfaction, and ultimately achieve sustainable business success. TQM requires a commitment to continuous learning, open communication, and a culture of quality throughout the organization.

These are just a few examples of quality control methods. The choice of methods may vary depending on the industry, context, and specific quality objectives of an organization. It's important to select and implement the most suitable methods based on the nature of the product or service and the desired quality standards.

Conclusion:

Quality Control depends on the specific context and purpose of the quality control process. However, in general, the conclusion of quality control involves evaluating the results and determining whether the product or process meets the established quality standards. Here are some possible conclusions that can be drawn from quality control:

Acceptance: If the product or process meets all the predetermined quality criteria, it can be accepted as meeting the required standards. This conclusion indicates that the quality control measures have been successful, and the product can proceed to the next stage or be delivered to customers.

Rejection: If the product or process fails to meet the quality standards, it is rejected. This conclusion suggests that further corrective actions or improvements are necessary to bring the product or process up to the desired quality level. Rejection could involve rework, repair, or scrapping of the defective items.

Nonconformities and corrective actions: Quality control may identify specific nonconformities or deviations from the quality standards. In such cases, the conclusion may involve documenting the identified issues and initiating appropriate corrective actions to address them. This approach aims to rectify the problems and prevent their recurrence in the future.

Continuous improvement: Quality control is an ongoing process, and the conclusion may emphasize the importance of continuous improvement. It may involve analyzing the quality control

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data, identifying trends or patterns, and implementing measures to enhance the overall quality performance. This conclusion highlights the need for a proactive approach to quality management.

Statistical analysis: In certain situations, quality control may involve statistical analysis of the data collected during the process. The conclusion may involve statistical interpretations, such as determining process capability, establishing control limits, or identifying statistical trends that provide insights into the quality performance.

Ultimately, the conclusion of quality control should provide insights into the effectiveness of the quality management system, identify areas for improvement, and guide decision-making to enhance product quality and customer satisfaction.

Reference Books on quality control:

- [1] *"Quality Control for Dummies"* by Larry Webber and Michael Wallace
- [2] *"Total Quality Control"* by Armand V. Feigenbaum
- [3] *"The Quality Toolbox"* by Nancy R. Tague
- [4] *"Quality Management for Organizational Excellence: Introduction to Total Quality"* by David L. Goetsch and Stanley



Chapter 14

Quantum Mind: Unleashing the Power of Machine Learning in the Quantum Domain

Ms Pooja Singh¹, Mr.Santosh Tiwari ²

¹Assistant Professor Disha College Raipur
²Controller of Examiner AAFT University Raipur

Introduction

Overview of the chapter:

In this chapter, I will delve into the fascinating field of quantum machine learning (QML) and explore the intersection of quantum computing and machine learning techniques. We will examine the principles, algorithms, and potential applications of QML, highlighting its significance in shaping the future of technology.

Brief explanation of quantum machine learning (QML):

Quantum machine learning (QML) is an emerging field that combines the principles of quantum computing with machine learning algorithms. It aims to leverage the unique properties of quantum systems, such as superposition and entanglement, to enhance the capabilities of classical machine-learning approaches. By harnessing the computational power of quantum computers, QML has the potential to address complex problems more efficiently and overcome limitations faced by classical algorithms.

Importance and potential impact of QML:

Advancing computational power: Quantum computers offer exponential computational power over classical computers. By incorporating quantum techniques into machine learning algorithms, QML can accelerate computations, enabling the analysis of larger datasets and solving complex optimization problems more effectively. This can lead to significant advancements in various domains, including scientific research, drug discovery, and financial modeling.

Enhanced algorithm optimization: Quantum algorithms, such as the Quantum Approximate Optimization Algorithm (QAOA) and the Variational Quantum Eigensolver (VQE), can optimize machine learning models more efficiently. These algorithms leverage quantum principles to explore solution spaces and find optimal solutions. With QML, we can expect improved optimization techniques for tasks like feature selection, hyperparameter tuning, and model training.

Solving intractable problems: QML has the potential to tackle problems that are computationally intractable for classical algorithms. For example, quantum algorithms like the Quantum Support Vector Machine (QSVM) can efficiently process high-dimensional data, enabling better

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classification and regression tasks. QML opens up possibilities for breakthroughs in areas such as cryptography, graph analysis, and artificial intelligence.

Enabling quantum-enhanced learning: QML offers a pathway to integrate classical and quantum machine learning techniques. Hybrid approaches combining classical and quantum models can exploit the strengths of both paradigms, providing enhanced learning capabilities. This synergy can lead to novel advancements in fields such as deep learning, reinforcement learning, and generative models.

Potential for disruptive innovation: QML has the potential to revolutionize industries and create transformative technologies. It can drive innovations in personalized medicine, intelligent systems, optimization of complex processes, and data-driven decision-making. By unlocking new insights and solutions, QML can reshape the way we approach critical problems and provide substantial societal benefits.

Understanding the significance of QML and its potential impact on various domains is crucial for researchers, professionals, and technology enthusiasts. By exploring the chapters that follow, we will gain deeper insights into the principles, algorithms, and applications of QML, paving the way for future advancements at the intersection of quantum computing and machine learning.

Quantum Computing Primer

Basic principles of quantum computing:

Quantum computing is a computational paradigm that leverages the principles of quantum mechanics to perform computations. Understanding the following basic principles is essential:

Superposition: Unlike classical bits that can only be in a state of 0 or 1, quantum bits, or qubits, can exist in a superposition of both 0 and 1 simultaneously. This property enables qubits to represent multiple states simultaneously, exponentially increasing the computational capacity of quantum computers.

Entanglement: Entanglement is a phenomenon where two or more qubits become correlated in such a way that the state of one qubit is dependent on the state of the others, regardless of the distance between them. Entanglement enables quantum computers to perform parallel computations and enables quantum communication protocols like quantum teleportation.

Quantum gates: Quantum gates are analogous to classical logic gates but operate on qubits. These gates manipulate the quantum state of qubits to perform quantum operations such as rotations, flips, and entanglements. Common examples include the Hadamard gate, Pauli gates (X, Y, Z), and the controlled-NOT (CNOT) gate.

Comparison between quantum and classical computing:

Quantum computing differs from classical computing in several key aspects:

Representation: Classical computers use bits that can be in a state of 0 or 1, whereas quantum computers employ qubits, which can exist in superpositions of 0 and 1.



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Parallelism: While classical computers process information sequentially, quantum computers can process multiple states simultaneously due to superposition. This parallelism provides the potential for exponential speedup in certain computational tasks.

Measurement: Classical computers provide deterministic results upon measurement, where the measured value corresponds to the state of the bits. In quantum computing, measurement collapses the superposition of qubits into a classical state, providing a probabilistic outcome based on the qubit's probability amplitudes.

Key concepts: qubits, superposition, entanglement, and quantum gates:

Qubits: Qubits are the basic units of quantum information, analogous to classical bits. They can exist in a state of 0, 1, or a superposition of both simultaneously.

Superposition: Superposition is a property of qubits that allows them to exist in multiple states simultaneously, significantly expanding the computational possibilities.

Entanglement: Entanglement is a quantum phenomenon where the states of two or more qubits become correlated, even when physically separated. Entangled qubits exhibit a high degree of correlation, enabling powerful quantum operations and communication protocols.

Quantum gates: Quantum gates are operators that act on qubits to perform specific operations, such as rotations, flips, and entanglements. These gates manipulate the quantum state of qubits, allowing quantum computations to be executed.

Quantum Feature Mapping

Introduction to quantum feature mapping:

Quantum feature mapping is a crucial aspect of quantum machine learning that involves encoding classical data into quantum states. It allows us to utilize the power of quantum computing to process and analyze classical data using quantum algorithms. Quantum feature mapping enables the representation of classical data in a quantum form, which can then be processed using quantum algorithms for machine learning tasks.

Techniques for encoding classical data into quantum states:

Several techniques exist for encoding classical data into quantum states, including:

Quantum Amplitude Encoding: In this technique, the amplitude of a quantum state corresponds to a feature value. By adjusting the amplitude of the quantum state, we can represent different feature values. Quantum amplitude encoding is often used for representing discrete data.

Quantum Phase Encoding: In quantum phase encoding, the phase of a quantum state encodes the feature value. By manipulating the phase, different feature values can be encoded. Quantum phase encoding is typically used for representing continuous data.

Quantum Basis Encoding: Quantum basis encoding maps classical data directly onto the basis states of the qubits. Each basis state represents a specific feature value. By preparing the qubits in the corresponding basis states, classical data can be encoded into the quantum state.



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Quantum Kernel Methods: Quantum kernel methods leverage quantum computations to calculate similarity measures between data points. By encoding classical data into quantum states and performing quantum computations, quantum kernel methods enable efficient similarity calculations for various machine learning tasks.

Advantages and limitations of different feature mapping strategies:

Different feature mapping strategies in quantum machine learning have their advantages and limitations:

Advantages:

Increased dimensionality: Quantum feature mapping allows for an exponential increase in the dimensionality of the feature space, potentially capturing more complex relationships in the data.

Quantum algorithm compatibility: Quantum feature mapping techniques are designed to be compatible with quantum algorithms, enabling the utilization of powerful quantum algorithms for processing the encoded data.

Potential for quantum speedup: By leveraging quantum parallelism and interference, quantum feature mapping techniques have the potential to provide computational advantages over classical feature mapping methods.

Limitations:

Limited scalability: The implementation of quantum feature mapping techniques may face scalability challenges due to the current limitations of quantum hardware, such as the number of qubits and noise.

Encoding complexity: Depending on the specific feature mapping technique used, the encoding process can be complex, requiring careful consideration of quantum gates and resources.

Data representation constraints: Quantum feature mapping techniques may have limitations in representing certain types of data, such as high-dimensional continuous data, due to the constraints of quantum systems.

Quantum Variational Algorithms

Overview of quantum variational algorithms:

Quantum variational algorithms are a class of algorithms that leverage the power of quantum computing to optimize parameters of a variational ansatz. These algorithms aim to find the optimal solution to a given optimization problem by iteratively updating the parameters of a parameterized quantum circuit.

Variational Quantum Eigen solver (VQE):

VQE is a quantum variational algorithm designed to find the ground state energy of a given Hamiltonian, which is a fundamental problem in quantum chemistry and physics. It employs a parameterized quantum circuit, known as the ansatz, to prepare a trial wavefunction. By varying the



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parameters of the ansatz and measuring the energy expectation value, VQE iteratively optimizes the parameters to minimize the energy, converging to an approximation of the ground state energy.

Quantum Approximate Optimization Algorithm (QAOA):

QAOA is a quantum variational algorithm primarily used for solving combinatorial optimization problems. It aims to find the optimal solution by mapping the optimization problem to a Hamiltonian and using a parameterized quantum circuit to evolve the initial state towards the ground state of the Hamiltonian. By iteratively updating the parameters of the circuit and measuring the objective function, QAOA explores the solution space to find an approximation of the optimal solution.

Applications of variational algorithms in machine learning:

Quantum-enhanced optimization: Variational algorithms, such as VQE and QAOA, have the potential to improve optimization tasks in machine learning. They can be used to optimize hyperparameters, feature selection, and model parameters more efficiently, potentially leading to better performing machine learning models.

Generative modeling: Variational quantum algorithms can be applied to generative modeling tasks, such as generating realistic samples from complex probability distributions. By optimizing the parameters of a parameterized quantum circuit, these algorithms can generate samples that capture the underlying patterns and distributions of the given dataset.

Quantum kernel methods: Variational algorithms can be employed in quantum kernel methods, which utilize quantum computations to calculate similarity measures between data points. By optimizing the parameters of the quantum circuit, these methods can enhance the performance of kernel-based machine learning algorithms, such as support vector machines (SVMs) and kernel ridge regression.

Quantum reinforcement learning: Variational algorithms can be integrated with reinforcement learning frameworks to enhance the optimization process. By combining the parameterized quantum circuits with classical reinforcement learning algorithms, it is possible to leverage the power of quantum computing to improve the efficiency of reinforcement learning tasks.

Quantum Neural Networks

Introduction to quantum neural networks (QNNs):

Quantum neural networks (QNNs) are a class of neural networks that incorporate quantum computing principles to enhance their computational capabilities. QNNs combine the power of classical neural networks with quantum information processing techniques to tackle complex problems in pattern recognition, optimization, and machine learning.

Architectures of QNNs: quantum perceptrons, Hopfield networks, and Boltzmann machines:



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Quantum Perceptrons: Quantum perceptrons are the quantum counterpart of classical perceptrons. They consist of qubits that represent inputs and quantum gates that perform computations on these inputs. By leveraging the principles of superposition and entanglement, quantum perceptrons can process inputs in a highly parallel manner, potentially leading to enhanced classification and decision-making capabilities.

Hopfield Networks: Hopfield networks are a type of recurrent neural network that can be implemented using quantum systems. These networks utilize the principles of quantum interference and entanglement to store and retrieve patterns. Quantum Hopfield networks have the potential to provide more efficient and robust pattern recognition and associative memory capabilities compared to classical versions.

Boltzmann Machines: Quantum Boltzmann machines are probabilistic generative models that employ quantum principles to learn and represent complex probability distributions. These models use qubits and quantum gates to simulate the interactions between variables and compute the probabilities of different states. Quantum Boltzmann machines can offer improved sampling and optimization capabilities compared to classical versions.

Unique characteristics of QNNs: quantum interference and entanglement:

Quantum Interference: Quantum interference is a fundamental property of quantum systems that allows for constructive and destructive interference between quantum states. In QNNs, quantum interference can enhance the representation and processing of information, leading to more efficient computations and improved learning capabilities.

Entanglement: Entanglement is a key characteristic of quantum systems where the states of multiple qubits become correlated and interconnected. In QNNs, entanglement allows for the exploration of complex relationships between input features, enabling the network to capture more intricate patterns and dependencies in the data.

Potential applications of QNNs in pattern recognition and optimization:

Pattern Recognition: QNNs have the potential to improve pattern recognition tasks, such as image and speech recognition, by leveraging their quantum capabilities. The parallelism and entanglement properties of QNNs can enable more efficient and accurate recognition of complex patterns in large datasets.

Optimization: QNNs can be applied to optimization problems, such as combinatorial optimization and constraint satisfaction, to improve the efficiency of finding optimal solutions. The ability of QNNs to explore multiple solution states simultaneously can potentially lead to faster convergence and better solutions for complex optimization tasks.

Quantum Machine Learning: QNNs can be integrated with quantum machine learning frameworks to leverage the strengths of both quantum and classical machine learning techniques. By combining



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quantum information processing with classical learning algorithms, QNNs can potentially provide enhanced learning capabilities, enabling more accurate predictions and analysis.

Quantum Clustering and Dimensionality Reduction

Overview of clustering and dimensionality reduction:

Clustering and dimensionality reduction are essential techniques in data analysis and machine learning.

Clustering: Clustering aims to group similar data points together based on their intrinsic properties. It helps uncover patterns, structures, and relationships within data without prior knowledge of the classes or labels.

Dimensionality reduction: Dimensionality reduction techniques aim to reduce the number of features or variables in a dataset while preserving relevant information. It helps overcome the curse of dimensionality, simplifies data representation, and improves computational efficiency.

Quantum clustering algorithms: quantum k-means, quantum hierarchical clustering:

Quantum k-means: Quantum k-means is a quantum version of the classical k-means clustering algorithm. It aims to partition data points into k clusters by minimizing the average distance between each data point and the centroid of its assigned cluster. Quantum k-means leverages quantum superposition and interference to perform computations in parallel, potentially providing advantages in terms of speedup and clustering accuracy.

Quantum hierarchical clustering: Quantum hierarchical clustering is a quantum version of the classical hierarchical clustering algorithm. It builds a hierarchy of clusters by iteratively merging or splitting clusters based on the distance between data points. Quantum hierarchical clustering leverages quantum interference and superposition to explore different cluster assignments efficiently, potentially enabling faster and more accurate clustering compared to classical methods.

Quantum algorithms for dimensionality reduction: quantum PCA, quantum t-SNE:

Quantum PCA (Principal Component Analysis): Quantum PCA is a quantum version of the classical PCA algorithm, which aims to find the most informative low-dimensional representation of a dataset by capturing the principal components. Quantum PCA utilizes quantum algorithms and quantum state preparation techniques to perform efficient eigendecomposition of the covariance matrix, enabling the extraction of principal components in a quantum setting.

Quantum t-SNE (t-Distributed Stochastic Neighbor Embedding): Quantum t-SNE is a quantum variant of the classical t-SNE algorithm, which is commonly used for visualizing high-dimensional data. Quantum t-SNE leverages quantum superposition and interference to compute pairwise similarities between data points and represents them in a low-dimensional space, facilitating visualization and interpretation of complex data structures.

Challenges and Future Directions

Current challenges in QML: noisy quantum hardware, error correction, scalability:



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Noisy Quantum Hardware: One of the primary challenges in QML is the presence of noise in quantum hardware. Quantum systems are prone to errors due to factors such as decoherence and imperfect gate operations. Mitigating and managing noise is crucial for achieving reliable and accurate quantum computations in machine learning tasks.

Error Correction: Error correction is a critical aspect of QML. Quantum error correction techniques aim to protect quantum information from errors and maintain the integrity of computations. Developing efficient error correction codes and protocols is essential for building robust QML systems that can tolerate and correct errors during quantum computations.

Scalability: As QML progresses, scalability becomes a significant challenge. Current quantum hardware has limited qubit counts, making it difficult to handle large-scale machine learning problems. Overcoming the scalability challenge involves advancements in hardware technology, error mitigation techniques, and algorithmic improvements to handle more complex computations.

Ongoing research efforts in QML:

Researchers are actively working on various aspects of QML to address the current challenges and advance the field. Ongoing research efforts include:

Noise-Resilient Algorithms: Developing algorithms that are robust to noise and can handle noisy quantum data is a key area of research. Noise-resilient algorithms aim to enhance the accuracy and reliability of QML models by incorporating error mitigation techniques and leveraging the strengths of quantum computations.

Hybrid Approaches: Combining quantum computing with classical machine learning techniques is an active research direction. Hybrid approaches seek to leverage the power of quantum computations while utilizing classical resources for preprocessing, postprocessing, and optimizing the overall performance of QML models.

Quantum Error Correction: Advancements in quantum error correction techniques are crucial for overcoming the challenges of noisy quantum hardware. Research focuses on developing more efficient error correction codes and error mitigation strategies to enhance the reliability and scalability of QML algorithms.

Potential future directions and advancements in QML:

Quantum Hardware Improvements: Future advancements in quantum hardware technology, such as the development of fault-tolerant quantum computers with increased qubit counts, improved gate fidelities, and longer coherence times, will significantly impact the progress of QML. Enhanced hardware capabilities will enable the execution of more complex QML algorithms and support larger-scale machine learning tasks.

Quantum-Classical Synergy: Exploring the synergy between quantum and classical machine learning techniques holds promise for advancing QML. Developing hybrid models that combine the strengths of quantum and classical approaches, as well as leveraging classical machine learning algorithms to enhance quantum computations, can lead to improved performance and broader applicability of QML.



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Algorithmic Innovations: Continual research into novel quantum algorithms specifically tailored for machine learning tasks will drive advancements in QML. Exploring new algorithms for optimization, sampling, clustering, and other machine learning tasks that harness the unique properties of quantum computing will expand the range of problems that can be effectively solved using QML.

Quantum Neural Networks: Further exploration of quantum neural network architectures and training algorithms holds promise for advancements in QML. Research into more efficient training methods, improved learning dynamics, and better utilization of quantum properties like entanglement and interference can enhance the capabilities of QNNs and enable their application to a broader range of machine learning tasks.

Conclusion

Recap of key points covered in the chapter:

In this chapter, we explored the exciting field of quantum machine learning (QML). We began with an overview of QML and its potential impact on the future of machine learning. We then delved into the fundamental principles of quantum computing, highlighting the differences between quantum and classical computing. Key concepts such as qubits, superposition, entanglement, and quantum gates were explained to establish a foundation for understanding QML.

We then discussed quantum feature mapping, which involves encoding classical data into quantum states, and examined various techniques, advantages, and limitations of feature mapping strategies. Next, we explored quantum variational algorithms, including the Variational Quantum Eigensolver (VQE) and the Quantum Approximate Optimization Algorithm (QAOA), and discussed their applications in machine learning.

The chapter further covered quantum neural networks (QNNs), which combine quantum computing principles with neural network architectures. We explored different QNN architectures, such as quantum perceptrons, Hopfield networks, and Boltzmann machines, and highlighted their unique characteristics, such as quantum interference and entanglement. We also discussed the potential applications of QNNs in pattern recognition and optimization.

Additionally, we explored quantum clustering and dimensionality reduction techniques, including quantum k-means, quantum hierarchical clustering, quantum PCA, and quantum t-SNE, which leverage quantum computing principles to enhance clustering and reduce the dimensionality of data.

Significance of QML for the future of machine learning:

QML holds immense significance for the future of machine learning. It has the potential to revolutionize the field by leveraging the unique properties of quantum systems, such as superposition and entanglement, to perform computations in parallel and explore complex patterns and relationships within data. QML offers the promise of solving computationally intensive tasks more efficiently and accurately compared to classical approaches.

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By combining quantum computing with machine learning techniques, QML has the potential to address challenges in optimization, pattern recognition, and data analysis. It can enable breakthroughs in fields such as drug discovery, materials science, finance, and artificial intelligence by providing more powerful tools for data analysis, modeling, and decision-making.

Closing thoughts on the potential impact of QML:

Quantum machine learning represents a cutting-edge frontier that merges two transformative fields: quantum computing and machine learning. While there are still challenges to overcome, such as noisy quantum hardware and scalability limitations, ongoing research efforts and technological advancements are continuously pushing the boundaries of QML.

The potential impact of QML is vast, ranging from solving complex optimization problems to advancing pattern recognition and data analysis. It has the potential to unlock new insights, improve predictions, and enable breakthroughs in various industries. As QML progresses, it will shape the future of machine learning, paving the way for innovative applications, more efficient algorithms, and a deeper understanding of complex data.

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Emergence of AI in New Education System

Ms. Harsha Verma¹, Mr. Pankaj Soni²

¹Assistant Professor Disha College Raipur

²incharge IT AAFT University Raipur

Abstract

Education is come at which stage where quality education is not possible without using technology. AI plays big role to achieve the quality education in new education system in this chapter we will discuss how AI will make education innovative & interactive .The main purpose of using AI in education is to replicate the human, improve problem solving, thinking &resoning abilities thereby enhance the productivity of education system along with that also include some challenges that comes while implementation.

Keyword - AI , New Education System

1. Introduction

In recent years, the world has witnessed significant advancements in artificial intelligence (AI) technology, which has permeated various aspects of our lives. One area where AI is making profound strides is in the field of education. With the emergence of AI, a new education system is being shaped, revolutionizing the way we learn, teach, and engage with knowledge.

AI technologies encompass a range of applications such as machine learning, natural language processing, and data analytics. These tools have the ability to process vast amounts of information, recognize patterns, and generate insights that can enhance the educational experience for both students and educators. By leveraging AI, the new education system aims to address existing challenges, personalize learning, and equip students with the skills they need to thrive in the 21st century.

This short research paper explores the key aspects of the emergence of AI in the new education system. We will delve into the transformative potential of AI in improving educational outcomes, the role of AI in personalized learning, the benefits and concerns surrounding AI in education, and the necessary considerations for its successful integration.

2. Definition of Artificial Intelligence

Artificial Intelligence (AI) refers to the development and deployment of computer systems that can perform tasks that typically require human intelligence. It is a broad field that encompasses various subfields, techniques, and applications. AI refers to highly autonomous systems that possess the ability to understand, learn, and apply knowledge across a wide range of tasks similar to human intelligence. General AI would exhibit cognitive abilities comparable to humans and would be capable of reasoning, learning, and adapting to different situations.



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3. Purpose And Scope Of AI

The purpose of Artificial Intelligence (AI) is to develop computer systems and algorithms that can perform tasks that typically require human intelligence. AI aims to replicate human cognitive abilities such as problem-solving, learning, reasoning, perception, and language understanding. The ultimate goal of AI is to create machines that can think, learn, and make decisions autonomously, thereby enhancing efficiency, productivity, and problem-solving capabilities across various domains. As AI continues to evolve, it is crucial to understand its potential impact on education. By embracing this technology, we have the opportunity to create a more efficient, inclusive, and adaptive education system that empowers learners and prepares them for the challenges and opportunities of the future.

4. The Role Of Ai In Education

AI technology has been making significant advancements in various fields, including education. The integration of AI in education aims to enhance learning experiences, personalize instruction, and improve overall educational outcomes. Here's some background information on the new education system in AI:

Personalized Learning

AI in education enables personalized learning experiences tailored to individual students' needs and preferences. Machine learning algorithms analyze students' performance, learning styles, and progress to provide personalized recommendations and adapt instruction accordingly.

Intelligent Tutoring Systems

AI-powered tutoring systems utilize natural language processing and machine learning techniques to simulate human-like tutoring experiences. These systems can provide immediate feedback, answer questions, and offer guidance to students, thereby enhancing their understanding of concepts.

Adaptive Assessment

AI-based assessment tools can evaluate students' knowledge and skills in real-time. These tools use algorithms to adapt the difficulty and format of questions based on the student's performance, providing accurate and timely feedback to both students and teachers.

Data Analytics

AI technology enables the collection and analysis of vast amounts of educational data. This data can be utilized to identify patterns, trends, and insights about students' learning behaviors, instructional effectiveness, and curriculum design. Educators can use this information to make informed decisions and optimize the learning process.

Virtual Reality (VR) and Augmented Reality (AR)

AI is often used in conjunction with VR and AR technologies to create immersive and interactive learning environments. These technologies can simulate real-world scenarios, enabling students to engage in hands-on experiences and enhance their understanding of complex concepts.



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Intelligent Content Creation

AI algorithms can generate educational content such as quizzes, lesson plans, and instructional materials. This automation of content creation saves time for educators and allows for the customization of resources based on specific learning objectives.

Ethical Considerations

The integration of AI in education raises important ethical considerations. These include ensuring data privacy, addressing algorithmic biases, and maintaining human supervision in critical decision-making processes. It is essential to strike a balance between the benefits of AI and the protection of students' rights and well-being.

5. AI Applications In The New Education System

AI applications in the new education system offer a wide range of possibilities to enhance teaching and learning. Here are some key AI applications in education:

Intelligent Tutoring Systems

AI-powered tutoring systems can provide personalized instruction and support to students. These systems use adaptive algorithms to assess individual learning needs, deliver targeted content, and provide immediate feedback and guidance.

Personalized Learning

AI can facilitate personalized learning experiences by analyzing student data and tailoring instruction to their specific needs, interests, and learning styles. It enables adaptive learning paths, recommending resources, and adjusting the pace and difficulty of content.

Natural Language Processing (NLP)

NLP technology enables AI systems to understand and generate human language. It can be used to develop conversational agents and chatbots that interact with students, answer questions, and provide support in real-time.

Intelligent Content Creation

AI algorithms can generate educational content, including quizzes, lesson plans, and instructional materials. This automation helps educators save time and create customized resources based on specific learning objectives.

Data Analytics and Predictive Analytics

AI-powered data analytics can analyze vast amounts of educational data to identify patterns, trends, and insights. Predictive analytics can forecast student performance, dropout rates, and intervention needs, enabling proactive support and personalized interventions.

Grading and Assessment



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AI can automate the grading process for objective assessments, such as multiple-choice questions. It can also analyze open-ended responses and provide preliminary feedback to support teachers' assessment tasks.

Learning Analytics

AI can analyze students' online behaviors, engagement patterns, and progress data to provide insights into their learning processes. These analytics help educators understand student performance, identify areas of improvement, and personalize instruction.

Intelligent Course Design

AI can assist in designing and organizing educational courses. It can suggest learning pathways, recommend resources, and optimize curriculum based on student performance and feedback.

Language Learning and Translation

AI language models can support language learning by providing language practice, vocabulary assistance, and grammar correction. AI translation tools facilitate communication and understanding between students who speak different languages.

These applications demonstrate the potential of AI to transform education by personalizing instruction, automating tasks, and improving overall learning experiences. However, it's important to note that the ethical implications and responsible use of AI in education must be carefully considered to ensure privacy, equity, and fairness for all learners.

6. Implementation Challenges and Ethical Considerations

Implementing AI in education poses various challenges and raises important ethical considerations. Here are some key implementation challenges and ethical considerations associated with AI in education:

Access and Equity

One of the primary challenges is ensuring equal access to AI-based educational resources and opportunities. Not all students may have access to the necessary technology or reliable internet connections, creating a digital divide. Efforts should be made to address these disparities and ensure equitable access for all students.

Data Privacy and Security

AI relies on the collection and analysis of large amounts of student data. Safeguarding this data is crucial to protect students' privacy. Schools and educational institutions must have robust data protection measures in place and comply with relevant data privacy regulations to ensure the responsible use of student data.

Algorithmic Bias and Fairness



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AI algorithms can be influenced by biases present in the data they are trained on, leading to discriminatory outcomes. It is essential to regularly evaluate and mitigate algorithmic biases to ensure fairness and prevent the perpetuation of biases in educational systems.

Transparency and Explain ability

AI algorithms can often be complex and difficult to understand, leading to concerns about transparency and accountability. It is important to ensure that AI systems used in education are transparent and provide explanations for their decisions and recommendations, particularly in high-stakes areas such as grading and assessments.

Teacher Training and Support

Implementing AI in education requires adequate training and support for teachers. Educators need to be equipped with the necessary knowledge and skills to effectively use AI tools and technologies in their teaching practices. Professional development opportunities and ongoing support should be provided to ensure successful implementation.

Ethical Use of Student Data

AI systems generate and rely on extensive student data, raising questions about how this data is collected, stored, and used. Educational institutions must establish clear guidelines and policies for the ethical use of student data, ensuring that data is used solely for educational purposes and with informed consent from students and their families.

Human-Centered Approach

While AI can enhance educational experiences, it should not replace human interactions and the role of teachers. It is crucial to maintain a human-centered approach, where AI is used to complement and augment teachers' expertise, rather than replace them.

Impact on Employment

The introduction of AI in education may raise concerns about the potential impact on employment for educators. It is important to carefully consider the role of teachers and ensure that AI is used to support and empower them in their teaching practices rather than replacing them.

Psychological and Emotional Well-being

AI systems that interact with students need to be designed with considerations for their psychological and emotional well-being. It is important to ensure that AI systems are sensitive, respectful, and supportive in their interactions with students.

Ethical Decision-Making

AI systems should align with ethical guidelines and principles. Designers, developers, and educators should be mindful of the ethical implications of AI in education, ensuring that decisions made by AI systems are transparent, fair, and aligned with educational values.



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Addressing these implementation challenges and ethical considerations requires collaboration among policymakers, educators, technology developers, and other stakeholders to ensure responsible and equitable use of AI in education. Continuous monitoring, evaluation, and refinement of AI systems are necessary to address emerging challenges and ensure that AI technologies contribute positively to the learning experiences of students.

7. Future Prospects of AI

The future prospects of AI are vast and hold tremendous potential for transforming various aspects of our society. Here are some key areas where AI is expected to have significant impacts:

Healthcare

AI can revolutionize healthcare by enabling more accurate diagnoses, personalized treatment plans, and improved patient outcomes. Machine learning algorithms can analyze medical data, assist in drug discovery, predict disease progression, and support telemedicine initiatives.

Autonomous Vehicles

AI is driving the development of self-driving cars and other autonomous vehicles. With advanced sensors, computer vision, and machine learning algorithms, AI can enhance safety, reduce accidents, and revolutionize transportation systems.

Robotics and Automation

AI-powered robots can perform complex tasks in various industries, such as manufacturing, logistics, and agriculture. From assembly line automation to warehouse management, robots can improve efficiency and productivity.

Natural Language Processing

AI's ability to understand and generate human language has significant implications for virtual assistants, chatbots, and translation services. Natural language processing advancements can enhance communication and facilitate interactions between humans and machines.

Education

AI has the potential to transform education by personalizing instruction, providing intelligent tutoring, and automating administrative tasks. AI applications can adapt to individual learning needs, offer personalized recommendations, and improve educational outcomes.

Cyber Security

AI can help defend against cyber threats by detecting and mitigating attacks in real-time. Machine learning algorithms can identify patterns of suspicious behavior, identify vulnerabilities, and enhance overall cyber security measures.

Environmental Sustainability



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AI can contribute to addressing environmental challenges. It can help optimize energy consumption, improve waste management systems, facilitate climate modeling, and support conservation efforts through data analysis and predictive modeling.

Financial Services

AI is already being utilized in the financial sector for fraud detection, algorithmic trading, risk assessment, and customer service. AI's ability to analyze large volumes of financial data and make data-driven decisions can streamline processes and enhance customer experiences.

Entertainment and Gaming

AI is shaping the entertainment industry, from personalized content recommendations on streaming platforms to immersive gaming experiences. AI algorithms can analyze user preferences, behavior, and feedback to deliver tailored entertainment options.

Ethics and Governance

As AI continues to advance, there will be a growing need for ethical frameworks and governance mechanisms. Ensuring transparency, fairness, and accountability in AI systems will be critical to address potential biases, privacy concerns, and societal impact.

It's important to note that while the future prospects of AI are promising, ethical considerations, responsible development, and human oversight are crucial to harness its potential for the benefit of society. Striking the right balance between innovation and ethical use will be essential in shaping the future of AI.

8. Implication for Today

AI has significant implications for various aspects of our lives today. Here are some key implications of AI in different fields:

Automation and Job Displacement

AI technology has the potential to automate tasks and processes in industries such as manufacturing, customer service, transportation, and data analysis. While this can lead to increased efficiency and productivity, there is also concern about potential job displacement. It is crucial to focus on reskilling and upskilling the workforce to adapt to the changing job landscape.

Personalization and User Experience

AI algorithms can analyze vast amounts of data about individuals' preferences, behaviors, and interactions to deliver personalized experiences. From personalized product recommendations on e-commerce platforms to personalized news feeds on social media, AI is shaping how we consume and interact with digital content.

Healthcare and Medical Diagnosis

AI has the potential to revolutionize healthcare by assisting in medical diagnosis and treatment. Machine learning algorithms can analyze medical data, identify patterns, and provide



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recommendations to healthcare professionals. AI applications in medical imaging, genomics, and drug discovery hold promise for improving patient care and outcomes.

Natural Language Processing and Virtual Assistants AI-powered virtual assistants, such as voice-activated smart speakers, chatbots, and virtual customer service agents, have become increasingly prevalent. These systems utilize natural language processing to understand and respond to user queries, provide information, and assist with tasks.

Cyber Security and Fraud Detection

AI is being utilized to enhance cyber Security measures by detecting and preventing cyber threats. Machine learning algorithms can analyze network traffic, identify patterns of suspicious behavior, and help protect against malicious activities and fraud.

Data Analysis and Insights

AI enables the analysis of large volumes of data to extract valuable insights and make data-driven decisions. Businesses and organizations can leverage AI to uncover patterns, trends, and correlations in data, enabling more effective decision-making and strategy development.

Smart Cities and Infrastructure

AI plays a crucial role in building smart cities and improving urban infrastructure. It can optimize traffic flow, manage energy consumption, monitor environmental conditions, and enhance public services by leveraging data and AI algorithms.

Education and Learning

AI applications in education are transforming the learning experience. Personalized learning platforms, intelligent tutoring systems, and adaptive assessments are helping tailor education to individual needs, improve outcomes, and provide more effective support for students and teachers.

Ethical Considerations

The rapid advancement of AI raises ethical concerns related to privacy, bias, transparency, and accountability. It is important to address these considerations to ensure the responsible and ethical use of AI technology.

Research and Innovation

AI has accelerated research and innovation across various disciplines. AI algorithms are being used in scientific research, drug discovery, climate modeling, and other fields to analyze complex data, simulate scenarios, and generate insights.

These implications demonstrate that AI is already reshaping industries, services, and our daily lives. As AI continues to evolve, it is crucial to navigate the ethical, societal, and policy implications to ensure that AI technology benefits individuals and society as a whole.

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9. Conclusion

The paper has highlighted the transformative potential of AI in personalized learning, intelligent tutoring systems, data analytics, virtual reality, and content creation. It has also emphasized the importance of addressing challenges such as access and equity, data privacy, algorithmic bias, and transparency.

Furthermore, the future prospects of AI have been examined, indicating its potential impact in healthcare, autonomous vehicles, robotics, natural language processing, education, cybersecurity, and environmental sustainability. As AI continues to evolve, it is imperative to focus on ethics, responsible development, and human oversight to ensure its ethical and equitable implementation.

In today's world, AI has already had significant implications. It has led to automation and job displacement, personalized user experiences, advancements in healthcare and medical diagnosis, enhanced cybersecurity measures, data analysis capabilities, and the development of smart cities and infrastructure. However, ethical considerations remain critical to address potential biases, privacy concerns, and the impact on employment.

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Multidisciplinary Education: Different Perspective

Mrs. Ketki Parmanand Appalwar¹, Mr. Nikhil Tiwari²

¹Assistant Professor Disha College Raipur

²Assistant Professor AFT University Raipur

Abstract

Disciplinary knowledge was the basis of 19th and 20th century University. In the 21st century there is real need to understand the advances in knowledge through the lens of disciplines as well as the dynamic interactions of disciplines in order to find solutions to the problems of society. The perspective on interdisciplinary is related to a postmodern approach of learning for a fluctuating market conditions and transferrable job skills. Interdisciplinary is lauded as the gold standard of the progressive modern university.

Introduction

Multidisciplinary: Juxtaposition of various disciplines, sometimes with no apparent connection between them. e.g.: music + mathematics + history

Pluridisciplinary: Juxtaposition of disciplines assumed to be more or less related. e.g.: mathematics + physics, or French + Latin + Greek: “classical humanities” in France.

Transdisciplinary: Establishing a common system of axioms for a set of disciplines (e.g. anthropology considered as “the science of man and his accomplishments”, according to Linton’s definition). From above definitions it is clear that multidisciplinary and transdisciplinary are two poles separated from each other and interdisciplinary lies between them.

In non-technical sense, Multidisciplinary and interdisciplinary are terms used synonymously. However, in academic jargon, interdisciplinary education is used more frequently than multidisciplinary education.

Multidisciplinary Approach: International Perspectives

Some Report notes that the origins of interdisciplinary are found in cultural and intellectual traditions of an academic system. In the USA, the general education is imparted for personal and social development, whereas in Europe, for intellectual and scientific development. In both the systems the interdisciplinarity in teaching and research develops in order to respond to and better able to explain the questions arising out of the needs of the system. The interdisciplinarity, report notes, follows many patterns. At times, interdisciplinarity is seen in terms of crisis, whereby the rigidity of the original discipline could be broken. At other times, interdisciplinarity comes about through the conjunction of a discipline with application. At times, greater specialization within a discipline itself becomes interdisciplinary. Most importantly, the specific demand to solve the issues and problems of gender, environment, urban, language, policy, geographical area (Africa, Asia, Latin America) etc., the centers or departments in the universities or outside were established where experts from different disciplines were appointed to serve the centers or departments, giving rise to interdisciplinary studies. Interdisciplinarity serves various interests of students. Interdisciplinarity allows

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students adjust to the fluctuations in the job market in the minimum time. From the point of view of students, greater practice-oriented skill and knowledge enables them to fetch a job. However, from the point of view of teachers, interdisciplinarity opens up new fields of knowledge and allows them to be relevant for the society with greater specialization. University thus connects itself with society through the interdisciplinarity

Multidisciplinary Approach: National Perspectives

The University Grants Commission initiated in 1963 a programme of providing assistance to selected universities for undertaking studies relating to various aspects of different countries and regions of the world particularly of those with which India has close and direct contact. Area Study Centers are initiatives to promote studies in interdisciplinary framework. For example, School of International and Area Studies (SIAS), Goa University is anchored in the realm of Global and Area Studies with a view to deepening and enhancing pedagogy and research, concerning the specialized disciplines of international relations, defense, security, and strategic studies. The Centre for Canadian Studies at the University of Kerala was set up in 1991 to further India Canada relationship and to explore and promote academic research in Canadian Studies. In recognition of the commendable work done by the Centre, the UGC awarded it the prestigious Area Studies Centre Status in 2003 to promote teaching and research on Canada. The Centre focuses attention on Culture and Literary Studies, Sociological and Demographic Studies, Science and Technology, Political Science and International Relations. Another example is Area Study Centre on India and Asian Studies in BhagatPhool Singh MahilaVishwavidyalaya to promote Indo-Asian knowledge systems in sciences, technology, business, management, arts, architecture, ethics, philosophyhistory, culture, societal values, customs and practices, polity and pluralism.

NEP 2020, India focus points in Multidisciplinary Education

Yash Pal Committee Report underscores the importance of multidisciplinary education. The report notes “there is a need to expose students, especially at the undergraduate level, to various disciplines” Interdisciplinarity is a fundamental operating assumption for the modern university, its management, and faculty. National Education Policy 2020 is an important policy document that provides the vision of the government for modernizing education in India.

Multidisciplinary education is of utmost priority in achieving modernization. Towards achieving multidisciplinary education, NEP 2020 makes the following recommendations:

1. Institutional Restructuring: Presently universities impart postgraduate education (second degree) in university departments and affiliate large number of colleges, majority of them imparts first degree undergraduate education. Autonomous degree ranting multidisciplinary institution. NEP 2020 further notes that Model public universities for holistic and multidisciplinary education, at par with IITs, IIMs, etc., called MERUs (Multidisciplinary Education and Research Universities) will be set up. They will help set the highest standards for multidisciplinary education across India.

2. Curriculum Restructuring: NEP 2020 notes that “Multidisciplinary education ... shall be, in the long term, the approach of all undergraduate programmes, including those in professional, technical, and vocational disciplines” . Policy recommends that there will be further integration of science, vocational subjects and skill with the arts and humanities. In order to achieve above, imaginative and flexible curricular structure shall be promoted with creative combinations of disciplines for studyAffiliated colleges impart education limited to few disciplines, and many a times single discipline. Affiliating system leads to postgraduate – undergraduate divide and discourages multidisciplinary. From the point of governance and quality affiliating system is not

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favoured by various commissions and committees (Government of India, 2005, and Yashpal, 2009). suggested in a move to restructuring higher education. Research intensive multidisciplinary university, teaching intensive multidisciplinary university and Besides the increasing possibility of multiple entry and exit points shall create conditions for lifelong learning. This will create a good connect of university with the labor market.

3. High Quality Teaching and Research: Multidisciplinary universities and colleges shall promote multidisciplinary research at graduate level, master's and doctoral education. It will facilitate quality teaching achieving holistic education and specialized education. Teaching pedagogy will have an increased emphasis on communication, discussion, debate, research, and opportunities for cross disciplinary and interdisciplinary thinking.

Multidisciplinary Approach and Curriculum

There have been two important curricular reforms introduced by the University Grants Commission. The first reform began in 2008 when it directed all central, state and deemed universities in the country to adopt a semester based system and to introduce the credit-based courses. UGC set up Gnanam Committee which gave its report in 2009 which recommended for an action plan for academic reforms which included:

- a) Semester system;
- b) Choice based credit system;
- c) Curriculum development;
- d) Admission procedures; and
- e) Examination reforms (University Grants Commission, 2009).

Subsequently UGC issued guidelines in 2015 for choice-based credit system (University Grants Commission, 2015). CBCS allows students to choose inter-disciplinary, intradisciplinary courses, skill-oriented papers (even from other disciplines according to their learning needs, interests and aptitude). As per the guidelines of UGC, a core course is a compulsory requirement of course in specialized discipline. An elective course has two components – elective within discipline and generic electives which allows for interdisciplinary course selection by student. Elective also allows for a project work to acquire skill or knowledge in specialized area of interest.

Besides, there is a third element of skill enhancement course. An undergraduate degree with Honors in a discipline may be awarded if a student completes 14 core papers in that discipline, 2 Ability Enhancement Compulsory Courses (AECC), minimum 2 Skill Enhancement Courses (SEC) and 4 papers each from a list of Discipline Specific Elective and Generic Elective papers respectively. Curriculum suggested in UGC guidelines followed by universities and colleges in India at the undergraduate level allows for interdisciplinary teaching. Another curricular reform by UGC is based on a learning outcomes-based curriculum framework. It mentions both disciplinary and interdisciplinary learning outcomes. For example, in case of Chemistry it mentions sub fields such as life, environmental and material sciences. Synthesis and applied learning outcomes are important in the case of interdisciplinary education. Curricular reform related to outcome-based education is beginning to be discussed in universities. Its full implementation will promote applied aspect of multidisciplinary education. Curricular reform introducing multidisciplinary teaching has also been practiced on the initiatives of university departments and colleges. However, in majority of cases, it has been practiced

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to make curricula employment oriented. In some lead universities, research collaboration has been active involving participants from various disciplines.

Multidisciplinary Teaching and Research

Indian Council of Social Science Research (ICSSR) promotes research in social sciences under two categories of research projects. First, Major and Minor Research Projects and secondly Research Programmes, formerly known as Research Projects Responsive and Research Projects Sponsored respectively. Among other objectives of research programme, disciplinary research as well as collaborative, multidisciplinary research activities are noted

Indian Institute of Science promotes interdisciplinarity through a specific division of interdisciplinary sciences. Specific research areas are: Bioengineering, Urban Infrastructure and Transportation, Nanoscale Materials, Nano Devices and Systems, Economics, Finance, Human Resource Management, Marketing, Optimization, Public Policy, Energy, Water, Internet of Things, Distributed Sensing, Computer Systems, Computational Science, Data Sciences and Bioinformatics. Transdisciplinary Research Cluster was established in October 2013 in Jawaharlal Nehru University to plan the University's teaching and research to fulfil the vision of university of innovation and social change and to promote interdisciplinary research in areas such as disaster research, energy, silk road and cognitive sciences, sustainability studies, history and philosophy of science, natural disasters and development, international migration and diaspora studies, language technology, non-invasive molecular imaging, pluralist health care: knowledge, technology, practice and policy. Jadavpur University has Interdisciplinary Studies, Law and Management and various centres of studies which offer programmes of teaching and research. DST Centre for Interdisciplinary Mathematical Sciences was formed in 2007 in BHU with the active cooperation from the Departments of Mathematics, Statistics, Computer Science, and Applied Mathematics of the university. The DBT-BHU Interdisciplinary School of Life Sciences (ISLS) was established in 2009 in the Faculty of Science under an initiative of the Department of Biotechnology, Ministry of Science & Technology, Government of India. Its objective is to foster and promote interdisciplinary and interactive research among the faculty members, especially of life science departments.

Establishing Multidisciplinary University

There are many challenges in the implementation of NEP 2020 for establishing multidisciplinary university. First, almost all affiliating universities in India have large number of colleges which are single discipline colleges. For example, medical college, engineering college, education college, etc. It is a huge task to convert them into multi-disciplinary college. These institutions are government owned and private. It may be difficult to convince private managed colleges to add new departments and recruit additional teachers. Neither government nor private management will be ready to invest money of such a high order. Many state, private and deemed universities and institutions of national importance are single discipline universities. To restructure them into multidisciplinary universities would also amount to large investment. In fact, there are many non-viable colleges in rural areas. They may have to be closed down. Under above circumstances, there may be a very small group of colleges and universities which can be restructured into multidisciplinary institution. However, so far as curricular change is concerned there have been government initiatives to add multidisciplinary centres/ departments in existing central and state universities. These initiatives need to be promoted. Besides, multidisciplinary teaching and research also may be promoted.

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Conclusion

Multidisciplinary in higher education revolutionises knowledge through the interactions of disciplinary knowledge and is helpful to solve problems in society. Since 1970s multidisciplinary centres and departments were established. Curricular changes allowed multidisciplinary education. Choice based credit system offered students the choices to study specialization based on disciplines as well as the option to study subjects from other disciplines. The recent initiative of multidisciplinary education of the government of India, contained in NEP 2020, is important. There are challenges of institutional restructuring as large investment is required for a single discipline institution to convert into multidisciplinary institution. However, partially the curricular restructuring will enable multidisciplinary teaching in Indian higher education.

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The Whole Picture: Multidisciplinary Perspectives on Nature and Environmental Studies

Mr. Yogendra Kumar Sao¹, Dr. Shardha Vaishnav²

¹Assistant Professor, Disha College, Raipur

²Assistant Professor, AAFT University, Raipur

Abstract : *This paper seeks to explore the multifaceted dimensions of nature and environmental studies by integrating perspectives from diverse academic fields. In today's world, understanding and addressing environmental challenges requires a multidisciplinary approach that goes beyond the boundaries of individual scientific disciplines. This chapter delves into the concept of "The Whole Picture" in environmental studies, which emphasizes the integration of diverse perspectives to gain a comprehensive understanding of nature and environmental issues. By embracing multidisciplinary approaches, we can develop effective strategies for conservation, sustainable development, and the preservation of our planet's ecosystems.*

Key Words: Environmental studies, Nature, Multidisciplinary, Conservation, Sustainable, Ecosystem.

Introduction: There is nothing like this environmental course. It is more than just a list of data and facts about the environment. It is about how everyone of us ought to live. It is anticipated that it will present environmental data that makes individuals concerned about their own environments. Human connection with the environment is methodically studied in the diverse academic area of environmental studies (EVS). Environmental studies combine ideas from the humanities, social sciences, business/economics, and physical science to handle today's complex environmental concerns. It is a vast area of study that covers both the built environment and the natural environment, as well as how they interact. The field includes research on fundamentals of ecology and environmental science as well as related fields like ethics, geography, anthropology, public policy (environmental policy), education, political science, urban planning, law, economics, philosophy, sociology, and social justice, as well as planning, pollution control, and natural resource management.

Overview of the multidisciplinary nature of environmental studies

Environmental studies are characterized by a multidisciplinary nature, which makes it possible to examine any aspect of an organism's environment. Knowledge of nature and its influence on humans

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is encouraged by the multidisciplinary nature of environmental studies. Applying science aims at finding practical solutions in the limits of Earth's scarce resources that would allow human civilization to survive.

The environmental catastrophe is one of the greatest challenges facing the 21st century. A number of organizations and nations are working on solutions in order to tackle the increasing issues arising from degradation of the environment. They are looking for sustainable development strategies that can only be achieved by involving in environmental research, on account of its interdisciplinary.

Definition, Scope and Importance

Definition:

Environmental studies deal with all problems affecting an organism. It is essentially a multidisciplinary approach that offers an appreciation of our natural world and the impacts humans have on its integrity. It is an applied science because it seeks practical answers to make human civilization sustainable on the limited resources of the earth.

Environment can be defined as a sum total of all the living and non-living elements and their effects that influence human life. While all living or biotic elements are animals, plants, forests, fisheries, and birds, non-living or abiotic elements include water, land, sunlight, rocks, and air. Its components include biology, geology, chemistry, physics, engineering, sociology, health, anthropology, economics, statistics, computers, and philosophy.

To understand everything different aspects of the environment in which we need to understand biology, chemistry, physics, geography, resource management, economics and demographic issues, as such, the field of environmental studies is extremely broad and inclusive aspect of most core subjects. We live in a world where natural resources limited. Water, air, soil, mineral, petroleum, and products we get from forests, grasslands, oceans and agriculture and livestock, all of which are part of our life support systems. Without them, life by itself would be impossible.

Scope:

As we look around the areas in which we live, we realize that our environment was originally a natural landscape, such as forests, rivers, mountains, deserts, or a combination there of. Most of us live in landscapes heavily altered by humans, such as villages, towns and cities. However, even those of us who live in cities depend on the surrounding villages for food, and these villages depend on natural landscape s

Such as forests, grasslands, rivers, and coasts, as well as resources such as water, fire wood, fodder, and fish for agriculture. In this way, our daily life is connected with the environment and in evitably affects it. We use water for drinking and other daily activities.

Therefore, most traditions refer to our environment as "**Mother Nature**" and most traditional societies have learned that respect for nature is essential to their lives.

Historical Background:

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The origins of the subject in its present form typically date back to the 20th century. The "father of environmental sciences" has been identified as professor Rex N. Olinares, emeritus at the University of the Philippines. In order to avoid the introduction of microbiological organisms, he suggested that sanitary and hygienic measures should be taken. On May 27th, 1907 in the U.S. state of Pennsylvania, Rachel Louise Carson was born and has been growing up on a farm where she's enjoyed watching all kinds of flora and fauna around her.

Ramdeo Mishra is the founder of ecology in India. In this country he has been at the forefront of environmental and ecological science. He's known as the father of Indian ecology by ecologists around the world. The study of interactions between the environment and living beings is ecology.

As environmental problems grew in the 1960s and 1970s as part of a global political agenda, environment history became an emerging field of study. It seeks to demonstrate that environmental change and human activity are connected in a fundamental way.

The Supreme Court ordered India's government in 1991 to introduce compulsory environmental education at all levels of learning, and from 2004 onwards the environment was being taught within the school curriculum.

The Interconnectedness of Nature: Nature is a complex web of interconnected systems, where every component plays a crucial role. Traditional scientific disciplines such as biology, ecology, geology, and atmospheric sciences provide valuable insights into these systems. However, a multidisciplinary perspective allows us to see the intricate relationships between living organisms, their habitats, and the broader environmental factors that influence their existence. By integrating knowledge from various fields, we can comprehend the whole picture of how ecosystems function and the cascading impacts of environmental changes.

- ❖ Interactions between Humans and the Environment
- ❖ Exploring the Biological Components of the Natural World
- ❖ Investigating the Chemical Components of the Natural World
- ❖ Considering the Social and Cultural Aspects of the Natural World

What are Environmental Studies?

The French word "*environ*" means landscape, on which the word "*environment*" is based. Which is why we use the word "environment" to describe everything in front of us. All living things are surrounded by the elements and forces that make up their environment. It must be possible for any organism to meet the environmental requirements.

The environment creates favorable conditions for the emergence and development of organisms. Any organism needs a constant stream of resources and waste removal in order to survive.

It consists of all factors of the herbal world, each animate and inanimate. This surroundings consists of the interactions of all organisms, climate, climate and herbal assets that have an effect on human survival and monetary activity. Environmental research is interdisciplinary because it spans a couple

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of disciplines along with chemistry, physics, medicine, lifestyles sciences, agriculture, and public health.

Environmental studies are an interdisciplinary field of study that focuses on understanding the environment and the complex interactions between humans and their surroundings. It examines the impact of human activities on the natural world and seeks to find sustainable solutions for environmental challenges. Environmental studies draw upon knowledge from various disciplines such as biology, ecology, chemistry, sociology, economics, and ethics to provide a holistic understanding of environmental issues.

Environmental studies play a crucial role in schools and education for several reasons:

Programs in environmental studies offer a wide variety of abilities and analytical tools necessary to tackle the environmental problems facing our planet. Students majoring in environmental studies acquire the knowledge and analytical tools necessary to comprehend and confront the pressing environmental concerns of our day and its effects on people, society, and the environment. The basic objective of environmental education is to develop in all societal

members a pro-environmental mindset and attitude. Environmental studies have a number of degree options, including a Master's and a Bachelor's degree. This will promote environmental ethics and increase public knowledge of the value of biodiversity and environmental conservation.

Integrating Natural and Social Sciences: Environmental issues are not solely ecological; they are also deeply intertwined with human societies and their behaviors. The social sciences, including sociology, economics, anthropology, and political science, provide essential perspectives on how human activities shape and are influenced by the environment.

By considering the socio-economic aspects, cultural values, and governance systems, we can develop more effective strategies for sustainable development, resource management, and environmental policy-making.

Technological Innovations and Environmental Studies: Advancements in technology have opened up new opportunities for environmental research, monitoring, and management. Fields such as remote sensing, geographic information systems (GIS), and data science enable us to gather and analyze vast amounts of environmental data. Multidisciplinary collaborations between scientists, engineers, and technologists contribute to the development of innovative solutions for environmental challenges. For example, the use of drones for ecosystem mapping, artificial intelligence for species identification, or renewable energy technologies for reducing carbon footprints.

Ethics and Environmental Studies: A comprehensive understanding of nature and environmental studies requires ethical considerations. Environmental ethics explore the moral obligations and responsibilities towards the environment and its inhabitants.

Incorporating ethical perspectives from philosophy, theology, and environmental humanities helps us reflect on our relationship with nature and guides decision-making processes. It raises questions

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about sustainable resource use, the intrinsic value of biodiversity, and the rights of future generations, fostering a more responsible approach to environmental stewardship.

Collaborative Approaches and Knowledge Exchange: Multidisciplinary research thrives on collaboration and knowledge exchange. It brings together scientists, policymakers, indigenous communities, local stakeholders, and other relevant actors to share their expertise and experiences. Collaborative approaches facilitate the co-creation of knowledge, integrating traditional ecological knowledge with scientific insights. Such collaborations foster inclusive and participatory processes that lead to more effective and context-specific solutions for environmental challenges.

Biology and Environmental Science: Exploring Ecosystems and Biodiversity

Biology and Environmental Science are closely related fields that study the living organisms and their interactions with the environment. These disciplines play a crucial role in understanding the complexity of ecological systems, how they function, and how human activities impact them. Here's a closer look at the relationship between biology and environmental science:

- ❖ **Ecological Studies:** Both biology and environmental science contribute significantly to the study of ecosystems and their dynamics. Ecologists, who often have a background in biology, investigate how living organisms interact with each other and their environment. They study population dynamics, food webs, energy flow, and nutrient cycling, among other ecological processes. Environmental scientists build upon this knowledge to assess how human activities influence ecosystems, identify threats to biodiversity, and develop conservation strategies.
- ❖ **Conservation Biology:** Biology and environmental science converge in the field of conservation biology. This discipline seeks to understand the factors threatening biodiversity and the preservation of endangered species. Conservation biologists work to develop effective strategies for maintaining the health and stability of ecosystems, protecting habitats, and promoting sustainable practices to minimize human impact on the environment.
- ❖ **Environmental Toxicology:** Biology and environmental science play key roles in assessing the impact of pollutants and toxins on living organisms. Environmental toxicologists, often with a background in biology or related fields, study how contaminants affect wildlife, human health, and the overall ecosystem. They analyze the bioaccumulation of pollutants and the long-term consequences of exposure to hazardous substances.
- ❖ **Environmental Physiology:** Environmental physiology examines how living organisms adapt to and cope with environmental changes. This field, which draws heavily from biology, investigates how factors like temperature, humidity, and pollutants affect the physiology of organisms. Understanding these responses is crucial for predicting the impacts of climate change and other environmental stressors on various species.
- ❖ **Climate Change Biology:** Biology and environmental science come together in studying the effects of climate change on living organisms. Climate change biology explores how species respond to shifts in temperature, altered precipitation patterns, and changing habitats. This research helps predict potential species' range shifts, adaptations, and the implications for ecosystems and human societies.

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- ❖ **Environmental Genetics and Genomics:** The intersection of biology and environmental science is evident in environmental genetics and genomics. Researchers in this field study the genetic basis of adaptive traits in response to environmental changes. They explore how genes and genetic diversity play a role in the resilience and vulnerability of populations facing environmental challenges.
- ❖ **Restoration Ecology:** Restoration ecology is another area where biology and environmental science collaborate. It involves the application of ecological principles and biological knowledge to restore degraded ecosystems, such as wetlands, forests, and grasslands. This interdisciplinary approach aims to bring back native species, improve ecosystem functions, and enhance ecological resilience.

Overall, biology and environmental science together provide a comprehensive understanding of the living world and its interactions with the environment. Their collaboration is essential for addressing current environmental issues, promoting sustainable practices, and safeguarding biodiversity and the health of our planet for future generations.

Physics and Environmental Science: Investigating Energy and Climate

- Energy in Environmental Systems
- Energy Transfer and Transformation in the Environment
- Renewable and Non-renewable Energy Sources
- The Role of Physics in Energy Efficiency and conservation
- Climate Science and Environmental Change
- Understanding Climate Dynamics and Climate Systems
- Impacts of Climate Change on Ecosystems and Societies
- Investigating Climate Change and Its Causes
- Mitigation and Adaptation Strategies for Climate Change

Physics and Environmental Science may seem like distinct fields, but they share a significant connection when it comes to understanding and addressing environmental issues. Here are some ways in which physics and environmental science intersect:

- ❖ **Climate Science:** Physics plays a fundamental role in understanding the Earth's climate system. Climate science involves the study of atmospheric physics, radiative transfer, thermodynamics, and fluid dynamics to comprehend the factors driving climate patterns and changes. Physics-based models are used to simulate and predict climate behavior, including the greenhouse effect, global warming, and climate variability.
- ❖ **Atmospheric Physics:** Physics principles are crucial in studying the behavior of the Earth's atmosphere. Understanding the interactions between solar radiation, atmospheric gases, and the Earth's surface helps explain phenomena like the greenhouse effect, ozone depletion, and air pollution. These insights are essential for assessing the impacts of human activities on the atmosphere and climate.

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- ❖ **Renewable Energy:** Physics principles underpin the functioning of renewable energy technologies such as solar cells, wind turbines, and hydroelectric power generators. Environmental scientists utilize physics concepts to assess the efficiency and potential of these energy sources in reducing greenhouse gas emissions and promoting sustainable energy solutions.
- ❖ **Remote Sensing:** Physics-based remote sensing techniques are used to collect data on the Earth's surface and atmosphere from satellites and other instruments. This data is vital for environmental monitoring, including tracking changes in land use, deforestation, ocean temperature, and atmospheric composition.
- ❖ **Environmental Monitoring and Instrumentation:** Physics plays a significant role in developing and using various instruments for environmental monitoring. For example, physics-based sensors measure air and water quality, pollutant concentrations, and environmental parameters critical for studying ecosystems and pollution levels.
- ❖ **Environmental Fluid Mechanics:** This area of physics examines how fluids, including air and water, interact with the environment. It is relevant in understanding ocean currents, river dynamics, coastal erosion, and other natural processes that influence the environment.
- ❖ **Environmental Radiation and Nuclear Safety:** Physics principles are essential in assessing the impacts of radiation on the environment and human health. Environmental scientists use physics-based models to study the dispersion and deposition of radioactive substances, as well as to develop safety measures for nuclear facilities.
- ❖ **Environmental Acoustics:** Physics principles are applied in studying the propagation of sound in the environment, which helps assess noise pollution and its effects on ecosystems and human well-being.

The collaboration between physics and environmental science is crucial for gaining a comprehensive understanding of environmental processes, predicting environmental changes, and developing sustainable solutions. The insights and tools provided by physics contribute significantly to the efforts aimed at mitigating environmental issues and promoting a healthier and more sustainable planet.

Research and Environmental Science:

The first environmentalist was Alexander von Humboldt. Environmental science deals with all aspects of the Earth's physical and biological environment in a multidisciplinary way. In doing so, it helps to set a standard of safety, cleanness and health for nature's ecosystem. Important issues which include safe, clean drinking water, hygienic living conditions and an environment free from pollutants as well as air quality, soil fertility, sustainable eating and development are also addressed.

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Research in environmental science is essential for understanding the complexities of the natural world and the impact of human activities on the environment. Here are some crucial points on the significance of research in environmental science:

- ❖ **Understanding Ecosystems:** Research in environmental science helps us gain insights into the functioning of ecosystems, including their structure, interactions, and resilience. This knowledge is critical for maintaining ecological balance and conserving biodiversity.
- ❖ **Assessing Environmental Issues:** Research enables the identification and assessment of environmental problems such as climate change, biodiversity loss, pollution, deforestation, and water scarcity. It provides the scientific basis for understanding the causes and consequences of these issues.
- ❖ **Developing Sustainable Solutions:** Environmental science research plays a key role in developing sustainable solutions to environmental challenges. It provides evidence-based strategies for mitigating the impacts of human activities and promoting sustainable practices.
- ❖ **Monitoring Environmental Changes:** Research allows for the monitoring of environmental changes over time, enabling the detection of trends and potential risks. Long-term monitoring provides valuable data for policy-making and adaptive management.
- ❖ **Evaluating Environmental Policies:** Environmental science research helps in evaluating the effectiveness of environmental policies and regulations. By studying the outcomes of different approaches, policymakers can make informed decisions to improve environmental protection.
- ❖ **Investigating Human-Environment Interactions:** Environmental science research explores the complex interactions between human societies and the environment. It delves into how cultural, social, economic, and political factors influence environmental attitudes and behaviors.
- ❖ **Advancing Technology and Innovation:** Research in environmental science drives technological advancements and innovations. It leads to the development of eco-friendly technologies, renewable energy sources, and efficient waste management solutions.
- ❖ **Addressing Climate Change:** Research is crucial for understanding the drivers and impacts of climate change. It informs climate modeling, projections, and adaptation strategies to mitigate the effects of global warming.
- ❖ **Supporting Conservation Efforts:** Environmental science research contributes to the conservation of natural resources and protected areas. It informs habitat restoration, species conservation, and efforts to combat wildlife trafficking.

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- ❖ **Engaging with Stakeholders:** Research in environmental science fosters collaboration among scientists, policymakers, communities, industries, and non-governmental organizations. It promotes interdisciplinary dialogue and inclusive decision-making for environmental issues.
- ❖ **Promoting Environmental Education:** Environmental science research supports environmental education and awareness initiatives. It helps disseminate knowledge about environmental challenges and the importance of sustainable practices.
- ❖ **Preserving Ecosystem Services:** Understanding ecosystem services and their economic and societal value is crucial. Research in environmental science helps to quantify and protect these services, which are vital for human well-being.

In conclusion, research in environmental science is indispensable for addressing pressing environmental challenges, promoting sustainable development, and safeguarding the planet's natural resources for future generations. It forms the foundation for evidence-based decision-making and collective action to create a more sustainable and resilient world.

Nature and Environmental Issues:

Nature and environmental issues encompass a wide range of challenges that impact the natural world and the relationship between humans and their surroundings. These issues have become increasingly critical as the global population grows, economies expand, and technologies advance. Some of the key nature and environmental issues include:

- ❖ **Climate Change:** One of the most pressing environmental challenges, climate change refers to long-term alterations in Earth's climate patterns, primarily driven by human activities, such as burning fossil fuels and deforestation. It leads to rising temperatures, extreme weather events, sea-level rise, and disruptions to ecosystems and human societies.
- ❖ **Biodiversity Loss:** The ongoing loss of biodiversity is a significant concern. Human activities like habitat destruction, pollution, over-exploitation of resources, and the introduction of invasive species threaten the survival of countless plant and animal species, disrupting ecosystems and their functioning.
- ❖ **Deforestation:** Deforestation involves the clearing of forests for agriculture, logging, and urban development. This leads to habitat loss, reduced carbon sequestration, and increased greenhouse gas emissions, contributing to climate change and the decline of biodiversity.
- ❖ **Pollution:** Pollution of air, water, and soil from industrial activities, agricultural practices, and waste disposal poses serious threats to human health and the

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environment. Air pollution leads to respiratory problems and climate change, while water pollution affects aquatic ecosystems and human water supplies.

- ❖ **Water Scarcity:** Growing demand for freshwater, coupled with climate change impacts on precipitation patterns, has led to water scarcity in many regions. This affects agriculture, industries, and human populations, leading to conflicts over water resources.
- ❖ **Overpopulation:** The increasing global population places immense pressure on natural resources and ecosystems, leading to resource depletion, habitat destruction, and biodiversity loss.
- ❖ **Land Degradation:** Unsustainable land use practices, such as overgrazing, intensive agriculture, and urbanization, degrade soil quality and reduce its ability to support healthy ecosystems.
- ❖ **Ocean Acidification:** The absorption of excess carbon dioxide by the oceans results in acidification, which negatively impacts marine life, particularly organisms with calcium carbonate shells, such as corals and some plankton species.
- ❖ **Energy Transition:** Transitioning from fossil fuels to renewable energy sources is a critical aspect of addressing climate change and reducing environmental impacts.
- ❖ **Plastic Pollution:** The widespread use of single-use plastics and improper waste management has led to the accumulation of plastic debris in the oceans and terrestrial environments, harming wildlife and ecosystems.
- ❖ **Land and Wildlife Conservation:** Protecting and preserving natural habitats and wildlife through conservation efforts are essential to maintain biodiversity and ecosystem balance.

Addressing these nature and environmental issues requires concerted efforts at the local, national, and global levels. Multidisciplinary approaches, as mentioned in the paper's abstract, are crucial for understanding the complexity of these challenges and developing sustainable solutions that consider both ecological and human dimensions.

Conclusion: "The Whole Picture: Multidisciplinary Perspectives on Nature and Environmental Studies" emphasizes the need for a multidimensional understanding of environmental issues. By embracing diverse disciplines, integrating natural and social sciences, leveraging technological innovations, considering ethical dimensions, and promoting collaborative approaches, we can develop a holistic view of nature and work towards sustainable solutions. This chapter sets the stage for the subsequent exploration of specific multidisciplinary approaches in environmental studies, highlighting the importance of collective efforts in addressing the complex challenges we face in protecting and preserving our environment. This multidisciplinary paper advocates for a more inclusive and holistic approach to environmental studies, recognizing that the complex issues facing our planet require cooperation and integration across diverse academic fields. Only by embracing a

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comprehensive understanding of nature and environmental dynamics can we effectively safeguard the health and sustainability of our planet for future generations.

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Emergence of Virtual and Augmented Reality in new Education System

Mr. Mahendra Soni¹, Mr. PBS Subramniam²

¹Assistant Professor, Disha College, Raipur

²Assistant Professor, AAFT University, Raipur

Abstract

Virtual reality (VR) is a technology which allows a user to interact with a computer-simulated environment, whether that environment is a simulation of the real world or an imaginary world. It is the key to experiencing, feeling and touching the past, present and the future. It is the medium of creating our own world, our own customized reality. It could range from creating a video game to having a virtual stroll around the universe, from walking through our own dream house to experiencing a walk on an alien planet. With virtual reality, we can experience the most intimidating and gruelling situations by playing safe and with a learning perspective. Very few people, however, really know what VR is, what its basic principles and its open problems are. In this paper a historical overview of virtual reality is presented, basic terminology and classes of VR systems are listed. An insightful study of typical VR systems is done and finds the challenges of Virtual Reality.

Introduction:

Virtual Reality (VR) is an immersive technology that simulates a computer-generated environment to create a lifelike experience for users. Through the use of specialized hardware and software, VR allows individuals to interact with and explore artificial worlds that can resemble real-life scenarios or entirely fantastical settings. This technology aims to engage users' senses, primarily sight and hearing, to provide a sense of presence and immersion in the virtual environment. Virtual Reality (VR) has the potential to revolutionize the field of education by enhancing learning experiences and making them more immersive, interactive, and engaging. It allows students to go beyond traditional textbooks and lectures, enabling them to explore virtual environments and interact with simulated objects, scenarios, and historical events

History

Nowadays computer graphics is used in many domains of our life. At the end of the 20th century it is difficult to imagine an architect, engineer, or interior designer working without a graphics workstation. In the last years the stormy development of microprocessor technology brings faster and faster computers to the market. These machines are equipped with better and faster graphics boards and their prices fall down rapidly. It becomes possible even for an average user, to move into the world of computer graphics. This fascination with a new (ir) reality often starts with computer games and lasts forever. It allows to see the surrounding world in other dimension and to experience things that are not accessible in real life or even not yet created. Moreover, the world of three-dimensional graphics has neither borders nor constraints and can be created and manipulated by ourselves as we wish – we can enhance it by a fourth dimension: the dimension of our imagination...



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But not enough: people always want more. They want to step into this world and interact with it – instead of just watching a picture on the monitor. This technology which becomes overwhelmingly popular and fashionable in current decade is called Virtual Reality (VR). The very first idea of it was presented by Ivan Sutherland in 1965: “make that (virtual) world in the window look real, sound real, feel real, and respond realistically to the viewer’s actions”. It has been a long time since then, a lot of research has been done and status quo: “the Sutherland’s challenge of the Promised Land has not been reached yet but we are at least in sight of it”

Sensorama – in years 1960-1962 Morton Heilig created a multi-sensory simulator. A prerecorded film in color and stereo, was augmented by binaural sound, scent, wind and vibration experiences. This was the first approach to create a virtual reality system and it had all the features of such an environment, but it was not interactive.

The Ultimate Display – in 1965 Ivan Sutherland proposed the ultimate solution of virtual reality: an artificial world construction concept that included interactive graphics, force-feedback, sound, smell and taste.

“The Sword of Damocles” – the first virtual reality system realized in hardware, not in concept. Ivan Sutherland constructs a device considered as the first Head Mounted Display (HMD), with appropriate head tracking. It supported a stereo view that was updated correctly according to the user’s head position and orientation.

GROPE – the first prototype of a force-feedback system realized at the University of North Carolina (UNC) in 1971.

VIDEOPLACE – Artificial Reality created in 1975 by Myron Krueger – “a conceptual environment, with no existence”. In this system the silhouettes of the users grabbed by the cameras were projected on a large screen. The participants were able to interact one with the other thanks to the image processing techniques that determined their positions in 2D screen’s space.

VCASS – Thomas Furness at the US Air Force’s Armstrong Medical Research Laboratories developed in 1982 the Visually Coupled Airborne Systems Simulator – an advanced flight simulator. The fighter pilot wore a HMD that augmented the out-the-window view by the graphics describing targeting or optimal flight path information.

VIVED – Virtual Visual Environment Display – constructed at the NASA Ames in 1984 with off-the-shelf technology a stereoscopic monochrome HMD.

VPL – the VPL company manufactures the popular DataGlove (1985) and the Eyephone HMD (1988) – the first commercially available VR devices. VIRTUAL REALITY HISTORY, APPLICATIONS, TECHNOLOGY AND FUTURE - 3

BOOM – commercialized in 1989 by the Fake Space Labs. BOOM is a small box containing two CRT monitors that can be viewed through the eye holes. The user can grab the box, keep it by the eyes and move through the virtual world, as the mechanical arm measures the position and orientation of the box.

UNC Walkthrough project – in the second half of 1980s at the University of North Carolina an architectural walkthrough application was developed. Several VR devices were constructed to improve the quality of this system like: HMDs, optical trackers and the Pixel-Plane graphics engine.



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Virtual Wind Tunnel – developed in early 1990s at the NASA Ames application that allowed the observation and investigation of flow-fields with the help of BOOM and DataGlove (see also section 1.3.2).

CAVE – presented in 1992 CAVE (CAVE Automatic Virtual Environment) is a virtual reality and scientific visualization system. Instead of using a HMD it projects stereoscopic images on the walls of room (user must wear LCD shutter glasses). This approach assures superior quality and resolution of viewed images, and wider field of view in comparison to HMD based systems (see also section 2.5.1).

Virtual reality (VR) in Education

Virtual reality (VR) in education is a rapidly emerging technology that has the potential to revolutionize the way students learn and engage with educational content. VR provides an immersive and interactive experience that allows learners to explore three-dimensional environments, simulate real-life scenarios, and interact with objects and characters in a virtual setting. Here are some key aspects and benefits of using VR in education:

1. **Immersive Learning Experience:** VR allows students to be fully immersed in educational content, creating a sense of presence that enhances learning retention and engagement. Instead of passively absorbing information from textbooks or lectures, students can actively participate in the learning process.
2. **Enhanced Visualization:** Complex concepts and abstract ideas can be challenging to understand with traditional teaching methods. VR can offer visualizations that make it easier for students to grasp these concepts by visualizing them in a tangible and interactive way.
3. **Real-World Simulations:** VR enables students to experience real-life situations without leaving the classroom. For example, medical students can practice surgeries, engineering students can build and test structures, and history students can explore historical landmarks.
4. **Personalized Learning:** VR technology can adapt to individual learning styles and paces. Educators can design VR experiences that cater to each student's needs, allowing for personalized and self-paced learning journeys.
5. **Remote Learning:** VR can be especially valuable in remote or online education settings, as it provides a more interactive and engaging alternative to traditional video conferencing or e-learning platforms.
6. **Increased Motivation and Engagement:** The immersive nature of VR can make learning more enjoyable and engaging for students. It can help reduce distractions and increase focus on the educational content.
7. **Safe Learning Environment:** In fields where real-world training can be hazardous, such as military training or medical procedures, VR offers a safe environment for students to practice without any risk.
8. **Global Collaboration:** VR can facilitate collaboration and communication between students and educators across the globe. It allows learners from different countries and backgrounds to work together on projects and share experiences.
9. **Accessibility and Inclusivity:** VR can cater to diverse learning needs and abilities. It can provide alternative methods of learning for students with disabilities and create a more inclusive learning environment.

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Challenges and Considerations:

While the potential benefits of VR in education are vast, there are also some challenges and considerations that need to be addressed:

1. **Cost:** Implementing VR technology can be expensive, including the initial setup costs for hardware and software as well as ongoing maintenance expenses.
2. **Technical Requirements:** VR requires specialized equipment, such as VR headsets and powerful computers, which may not be easily accessible to all students and schools.
3. **Content Development:** Creating high-quality and relevant VR educational content requires expertise and resources. Developing content that aligns with curriculum standards can be time-consuming.
4. **Health and Safety:** Extended use of VR may cause discomfort or motion sickness in some individuals, especially in younger children. Proper guidelines for usage and breaks should be established.
5. **Integration with Curriculum:** VR should complement existing teaching methods rather than replace them. Integrating VR seamlessly into the curriculum is essential for effective learning outcomes.
6. **Learning Outcomes:** More research is needed to understand the long-term impact of VR on learning outcomes and whether it significantly enhances academic performance.

Conclusion:-

Virtual Reality and Augmented Reality are transformative technologies that have revolutionized various industries, providing immersive experiences, enhancing education, improving healthcare, and transforming retail. These technologies have the potential to reshape the way we interact with digital content and each other. While the benefits are significant, challenges such as cost, technical limitations, and privacy concerns need to be addressed for widespread adoption. As VR and AR continue to advance, it is crucial to strike a balance between innovation and responsible implementation to ensure that these technologies positively impact society and enrich our lives.

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- a. *This classic book offers an in-depth exploration of VR technology, including its historical development, hardware, software, and applications in medicine, entertainment, and training.*



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Teaching, Learning and Pedagogy

Dr. Shiv Kumar Sahoo¹, Amit Kumar Singh², Ms Anjana Prasad³

^{1,2}Assistant Professor, Disha College, Raipur

³Assistant Professor AAFT University, Raipur

Introduction

Education is core subject for any developing societies. Education has a recurring impact, long after children become adults. The principles of teaching are constantly evolving; collaborative learning, flipped learning and deep learning are all a mainstay of the modern classroom. The principles and practices of teaching are both an art and a science. Education influences our youngest generations, it inspires children to think differently and it develops critical thinking in young, influence able minds. In school, children acquire language, science and mathematical skills that they can use later on in life.

What is pedagogy?

Pedagogy is coined from the Greek words ‘paidos’ (child) and ‘agogos’ (leader). So, pedagogy is the study of teaching and how the content is presented to students. It is the development of an educational process that helps learners gain knowledge. Pedagogy definition includes the teaching practices and theories deployed to teach. It stimulates the unique interaction between teachers and students. Pedagogy in education demonstrates teaching methods for both academic and theoretical aspects

If teaching is the act of encouraging learning activities through discovery and acquired knowledge, pedagogy is the method of teaching, both as an academic subject or theoretical concept.

Within pedagogy, there are four core learning profiles:

Auditory learners benefit from listening to the information presented to them in class. They learn orally from both listening to instruction from the teacher and audio recordings. Auditory learners listen to the information presented to them in classrooms, and they learn from verbal instructions or audio recordings.

Tactile/kinaesthetic learners absorb knowledge through touch and movement of objects or specimen. They prefer to works with hands-on devices and learning aids. Tactile learners acquire information ideas through the movement and touch. They prefer to learn via learning aids like educational devices.

Visual learners prefer to see information in order to visualize the relationship between ideas and concepts to understand them. It means visual learners see information like videos or actual problems and then visualize the relationship between concepts and ideas.

Reading and writing learners prefer to take on information by reading texts. These learners can further absorb information by condensing and rephrasing it. These learners prefer a traditional teaching approach. These learners read the text and write it to process information. Today, teachers

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have the many more advantage of utilizing traditional learning practices while incorporating new educational technologies to create a diverse, differentiated classroom, ready for mixed-ability pupils.

Why should learning be collaborative?

Collaborative learning is a method of active learning that relies on the principle of two or more students working together, towards a common goal. These activities vary widely, but most center on the learner's exploration or application of the curriculum, not simply on the teacher's point of view. Collaborative learning arms pupils with the confidence to teach and learn from their peers and teachers, too. In primary schools especially, collaborative learning will help develop soft skills at an earlier age, helping children become more effective communicators.

The differences between collaborative learning and cooperative learning can be interchangeable for educators; however, collaborative learning encourages students to make individual progress in tandem with others. Co-operative learning, meanwhile, promotes accountability with interdependence. Find out more about the benefits of collaborative learning.

Learn how a collaborative approach helps develop pupils' soft skills, and how to overcome the barriers to collaborative learning in our free guide.

Which is more effective — modern or traditional learning?

Today, school education often involves the use of technology and a variety of teaching styles. Many of today's modern teaching methods, however, are an evolution of more traditional learning techniques.

The key to enhanced and holistic learning is by taking principles from both traditional and modern teaching, and combining them for a fully immersive learning environment.

How teachers can boost pupil engagement:

Keeping the attention of pupils is a constant battle for teachers. With the right tools and techniques, however, pupil engagement is far more achievable. Student engagement can be measured on three levels:

- **Behavioural** engagement with demonstrating good behaviour in the classroom
- **Emotional** engagement by valuing what they are learning
- **Cognitive** engagement through displaying maximum effort to understand a subject

The more inspired and engaged pupils are, the more they will consider the subject matter carefully, facilitating a stronger learning experience. Younger generations are surrounded by technology, so tech can be a strong classroom differentiator to keep them engaged, but it must support the pupils' needs and learning outcomes. Ultimately, learning should be fun. It should inspire activity and stimulate discussion points among pupils. Quizzes, for example, can facilitate active participation by pupils. Pedagogy in education can impact learners and the learning process as follows:

1. Student-centered learning: Pedagogy is based on a student-centered approach. In this approach, students can learn at their own pace and take full responsibility for learning.

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2. Constant performance assessment: Pedagogy allows teachers to evaluate individual students' performance regularly. This will help teachers understand if a student is moving towards their target outcomes or not.
3. Fuel teamwork: This learning method encourages teamwork and collaborative learning among students. Pedagogy allows students to meet like-minded people and learn from their peers.
4. Boost cognitive skills: Pedagogy in education focuses on the evaluation, analysis, and compression that helps students develop cognitive skills.

Here are common pedagogy approaches that teachers can use:

1. Constructivist

This is an innovative pedagogy approach in education where students are present in the process of gaining and understanding knowledge. When students are involved in the academic curriculum creation process, they can receive information faster.

Constructivist approaches also nurture critical thinking capabilities among students. They can learn in a comfortable and familiar environment.

2. Collaborative

As the name suggests, the students form a group of like-minded pupils to learn together. They can build strategies, complete projects, solve problems, and brainstorm new ideas.

Collaborative pedagogy can enhance the intellectual efforts of students and help them gain fresh perceptions. This pedagogy also boosts team spirit and builds peer relationships.

3. Integrative

The integrative pedagogy approach allows students to learn by connecting their learning across horizons. Integrative teaching methods have four main objectives:

- Understand the learning process
- Divide problems based on relevancy
- Showing the use of the theoretical lessons in practical scenarios
- Incorporating concepts in normal routines

4. Reflective

This is an exciting approach in which students evaluate themselves. It means students will observe the activities of teachers and other students in the classroom. This will help students understand why they do certain things and how it works.

Reflective pedagogy is the best way for students to self-learn. In addition, it can develop analytical skills among students.

5. Inquiry-based Learning

This is an approach for educators. They answer not only questions of the students but also create a culture for students to explore, challenge, and refine themselves.



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The inquiry-based learning method aims to shift students from aimlessly questioning to understanding the answers and then raising questions. This strategy provides confidence to students to ask questions without any hesitation.

Pedagogy enables teachers to capture students' interests and create a progressive learning environment. Using different pedagogical methods, teachers can help students learn at their own pace. However, teachers have to use innovative strategies to leverage pedagogy in education:

1. Touch creativity

One of the most straightforward yet innovative pedagogy strategies is to use creativity to improve students' engagement levels. Using creative teaching methods, you can excite the artistry bone in your students.

Today, you have numerous creative tools available to teach your students, such as visual exercises, video games, interactive videos, and so on. Using digital creative tools, you can hold your students' interest for a more extended period and teach them different lessons easily.

2. Brainstorming

Brainstorming is an inclusive pedagogy in education to build the confident personality of students.

When students can share ideas with their teachers without fear or hesitation, it will boost their confidence. They will brainstorm more ideas and present them to teachers. This practice will build a confident character of students, but it will also challenge their brains to think of new ideas to approach the same problem.

3. Use audio and video teaching tools

The education sector has accepted technological advancements for a long time now. You can find various technologies in the educational sector today, such as artificial intelligence, machine learning, and more.

For pedagogical strengthening, audio and video tools are highly useful. These tools not only improve the listening and observing skills of students. But they can also enhance their imagination with visual effects, graphical interpretations, and brain mapping.

Students can understand concepts better with video and audio support. They can explore topics in-depth with proper teaching tools.

4. Outdoor classrooms

Taking your class outdoors can improve their imagination and senses. They can run through seeing things, experiencing new adventures, and interacting with real people. This pedagogy approach will strengthen the interaction and engagement of students in your class to a great extent.

5. Exploit hobbies

When you cannot teach a student with traditional teaching methods, you should take a personalized approach to understand the students first and then teach them. Under this method, you can use students' hobbies to teach them a new lesson.

For example, making students understand the life cycle of a butterfly is a bit tricky. But, if you organize a drawing competition in your classroom to draw a butterfly life cycle, this artistic approach will help you a lot.

The Future of Pedagogy in Education

The education sector has evolved a lot in the last few years. Many factors have contributed to this change, such as female empowerment, technology advancement, social changes, etc.



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Conclusion

Therefore, in teaching learning only teachers can't drive desired output from students using only traditional teaching methods. A student-centered approach is very necessary fact to the foundation of a new educational environment. On the other hand Teachers need to develop a personal relationship with students to understand their strengths and weaknesses to create a progressive school culture.

So, pedagogy plays very important role in education that offers meaningful teaching learning via educational concepts, competencies, content, and evaluation is paramount.

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Blue Ocean Strategy: Unleashing Innovation and Growth in Competitive Markets

Mrs. Kajal Pandey¹, Ms. Sumana Barman²

¹Assistant Professor, Disha College, Raipur

²Assistant Professor, AFT University, Raipur

Abstract

Blue Ocean Strategy is a transformative framework that advocates the creation of uncontested market spaces, enabling organizations to achieve innovation, growth, and competitive advantage. This article explores the concept of Blue Ocean Strategy and its relevance in unleashing innovation and driving growth in competitive markets. Moreover, it examines the role of multidisciplinary education in equipping individuals with the mindset and skill set necessary for successful implementation of Blue Ocean Strategy. By integrating knowledge and perspectives from various disciplines, such as marketing, strategy, innovation, psychology, and organizational behavior, multidisciplinary education cultivates a holistic understanding of market dynamics, fosters innovative thinking, and encourages collaboration. This article argues that multidisciplinary education plays a vital role in empowering individuals to unleash innovation and drive growth through the adoption of a Blue Ocean Strategy approach.

Introduction:

In today's highly competitive business landscape, organizations face challenges of market saturation and intense rivalry. Traditional strategies often focus on competing in existing markets, leading to cutthroat competition and limited growth opportunities. Blue Ocean Strategy offers a paradigm shift by advocating the creation of uncontested market spaces, where competition becomes irrelevant. This article aims to explore the concept of Blue Ocean Strategy and its potential to unleash innovation and drive growth in competitive markets. Moreover, it emphasizes the significance of multidisciplinary education in equipping individuals with the necessary mindset and skill set to effectively implement Blue Ocean Strategy.

The Concept of Blue Ocean Strategy:

Blue Ocean Strategy, coined by W. Chan Kim and Renée Mauborgne, proposes that organizations can break free from the constraints of red oceans (existing market spaces) by creating new market spaces, termed blue oceans, where competition is irrelevant. Blue Ocean Strategy entails the simultaneous pursuit of differentiation and low cost, enabling organizations to unlock new demand and realize untapped growth potential. By identifying uncontested market spaces and offering unique value propositions, organizations can achieve sustainable success.



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The Role of Multidisciplinary Education in Unleashing Innovation:

Multidisciplinary education plays a pivotal role in nurturing the mindset and skill set required to implement Blue Ocean Strategy effectively. By integrating knowledge from various disciplines, such as marketing, strategy, innovation, psychology, and organizational behavior, multidisciplinary education cultivates a holistic understanding of market dynamics and fosters innovative thinking. Furthermore, it encourages collaboration and provides individuals with the tools to challenge conventional wisdom, identify blue ocean opportunities, and create new market spaces.

1. Fostering a Market-Centric Mindset:

Multidisciplinary education helps individuals adopt a market-centric mindset, enabling them to identify and understand customer needs and preferences. By integrating insights from marketing, consumer behavior, and psychology, individuals gain a deep understanding of target markets and can anticipate future trends. This understanding facilitates the identification of blue ocean opportunities and the development of compelling value propositions.

2. Encouraging Strategic Thinking and Analysis:

Multidisciplinary education equips individuals with the strategic thinking skills necessary for successful implementation of Blue Ocean Strategy. By integrating knowledge from strategy, finance, economics, and market analysis, individuals can analyze industry dynamics, competitive forces, and value chains. This analysis helps identify avenues for differentiation and cost leadership, enabling organizations to create uncontested market spaces.

3. Nurturing Innovation and Creativity:

Multidisciplinary education fosters an environment conducive to innovation and creativity. By integrating insights from disciplines such as innovation, design thinking, and entrepreneurship, individuals develop the ability to generate and evaluate innovative ideas. This promotes a culture of innovation within organizations, facilitating the creation of blue oceans.

4. Developing Collaboration and Change Management Skills:

Multidisciplinary education emphasizes the importance of collaboration and change management in implementing Blue Ocean Strategy. By integrating knowledge from organizational behavior, leadership, and communication, individuals gain the skills necessary to build cross-functional teams, foster a culture of innovation, and navigate organizational change. Effective collaboration and change management are critical for successful adoption of Blue Ocean Strategy.

The Benefits of Multidisciplinary Education in Management:

Enhanced Decision-Making: Multidisciplinary education equips managers with a diverse toolkit of concepts, theories, and analytical frameworks. By drawing from different disciplines such as psychology, sociology, and economics, managers can make informed decisions that consider the broader implications and consequences. This integrative approach enhances critical thinking, problem-solving, and data-driven decision-making skills.



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Fostered Innovation: Multidisciplinary education encourages managers to think beyond their functional silos and embrace cross-disciplinary collaboration. By fostering a culture of innovation and creativity, multidisciplinary education enables managers to generate novel ideas and solutions to complex problems. By combining insights from diverse disciplines, managers can identify emerging trends, develop disruptive strategies, and lead organizations towards innovation.

Promote Sustainability: Multidisciplinary education in management addresses the urgent need for sustainable practices in organizations. By incorporating knowledge from fields such as environmental science, ethics, and social responsibility, managers can develop a holistic understanding of the environmental and social impact of business decisions. This understanding enables them to implement sustainable practices, drive corporate social responsibility initiatives, and create long-term value for stakeholders.

Adaptability to Change: In today's dynamic business environment, the ability to adapt to change is crucial. Multidisciplinary education equips managers with a flexible mindset, allowing them to navigate uncertainties, embrace emerging technologies, and capitalize on new opportunities. By integrating insights from technology, sociology, and economics, managers can understand the impact of disruptive technologies, anticipate industry shifts, and lead successful organizational transformations.

Ethical Leadership: Multidisciplinary education in management emphasizes the importance of ethical decision-making and responsible leadership. By incorporating ethical frameworks from philosophy, law, and psychology, managers can develop a strong ethical compass and navigate complex ethical dilemmas. This promotes integrity, trust, and ethical leadership in organizations, fostering a culture of responsible business practices.

Benefits of Multidisciplinary Education in Strategic Management

1. Enhanced problem-solving: When individuals from different disciplines come together, they bring unique perspectives and approaches to problem-solving. This diversity of thinking enables organizations to tackle complex strategic issues from various angles, leading to more innovative and effective solutions.

2. Holistic decision-making: Multidisciplinary education encourages a broader understanding of business issues by incorporating knowledge from diverse fields. This broader perspective allows organizations to make informed decisions that consider various aspects of the business, such as financial, marketing, operational, and human resources implications.

3. Improved strategic agility: In today's rapidly changing business environment, organizations must be able to adapt quickly to new opportunities and threats. The multidisciplinary approach provides organizations with the flexibility to respond rapidly and effectively to changes, as it enables them to tap into a wider range of skills and knowledge to understand market dynamics and identify emerging trends.



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4. Increased creativity and innovation: Combining expertise from different disciplines nurtures a culture of creativity and innovation within organizations. The exchange of ideas and cross-pollination of knowledge can lead to the generation of groundbreaking concepts and solutions, giving organizations a competitive advantage in the market.

5. Better risk management: By incorporating multiple perspectives and expertise, organizations can identify and assess risks more thoroughly. This comprehensive understanding allows them to develop strategies that mitigate risks effectively and increase the likelihood of success in uncertain environments.

6. Enhanced resource utilization: Multidisciplinary education enables organizations to leverage their resources more effectively. By breaking down silos and encouraging collaboration, organizations can optimize the utilization of their assets, capabilities, and human resources across various functional areas.

7. Cultivation of versatile talent: Multidisciplinary education equips employees with a broader skill set, enabling them to contribute to multiple areas of strategic management. This versatility not only enhances their value to the organization but also fosters a culture of continuous learning and development.

8. Improved communication and collaboration: Multidisciplinary teams foster better communication and collaboration, as individuals from different disciplines learn to work together towards common goals. This cross-functional cooperation promotes a sense of collective responsibility and encourages the sharing of insights and ideas, resulting in improved overall performance.

9. Greater customer focus: A multidisciplinary approach to strategic management helps organizations gain a deeper understanding of customer needs and wants. By incorporating knowledge from various disciplines, organizations can develop customer-centric strategies that address customer pain points and deliver value, leading to increased customer satisfaction and loyalty.

10. Competitive advantage: Incorporating multidisciplinary education in strategic management allows organizations to differentiate themselves from competitors. By harnessing diverse knowledge and skills, organizations can create unique and innovative strategies that are difficult for competitors to replicate, providing them with a sustained competitive advantage.

In summary, multidisciplinary education in strategic management offers numerous benefits to organizations, including enhanced problem-solving, holistic decision-making, improved strategic agility, increased creativity and innovation, better risk management, optimized resource utilization, versatile talent cultivation, improved communication and collaboration, greater customer focus, competitive advantage, improved organizational resilience, enhanced organizational learning, and

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effective integration of technology and data. By embracing this approach, organizations can position themselves for sustainable success in today's complex and dynamic business environment.

Conclusion:

Blue Ocean Strategy offers a compelling framework for organizations to break free from the confines of red oceans and unlock new market spaces for growth. Multidisciplinary education plays a crucial role in equipping individuals with the necessary mindset and skill set to effectively implement Blue Ocean Strategy. By integrating knowledge and perspectives from various disciplines, multidisciplinary education fosters a market-centric mindset, strategic thinking, innovation, collaboration, and change management skills. This article highlights the importance of multidisciplinary education in unleashing innovation and driving growth through Blue Ocean Strategy, positioning individuals and organizations to successfully navigate competitive markets and create uncontested market spaces.

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Fundamentals of Partnership

Mr. Vimal Yadav¹, Ms. Ankisha Mishra²

¹Assistant Professor, Disha College, Raipur

²Assistant Professor AAFT University, Raipur

Abstract

The concept of partnership is a fundamental aspect of business collaboration, allowing two or more individuals or entities to come together and pool their resources, skills, and expertise to achieve common objectives. This article delves into the fundamental principles of partnership, exploring its definition, characteristics, and types. It examines the advantages and disadvantages of partnership as a business structure and highlights the essential elements that constitute a comprehensive partnership agreement. Furthermore, the roles and responsibilities of partners within a partnership are analyzed, along with a comparison of partnership with other business structures like sole proprietorship, corporation, and limited liability company (LLC). By understanding the fundamentals of partnership, aspiring entrepreneurs and existing businesses can make informed decisions when forming partnerships and fostering successful and collaborative ventures

Introduction, Definition and Types of Partnerships

- **Introduction:** Partnership is a popular form of business structure wherein two or more individuals or entities collaborate to operate a business and share its profits and losses. It offers flexibility, shared responsibilities, and a collective pool of resources to drive success. Understanding the concept and various types of partnerships is essential for aspiring entrepreneurs and existing businesses seeking new collaborations. In this article, we will delve into the definition of partnership and explore different types of partnerships that exist in the business world.
- **Definition of Partnership:** A partnership is a legal form of business organization where two or more individuals, known as partners, come together to carry out a common business venture. The partners pool their financial resources, skills, expertise, and efforts to achieve common business goals and share the resulting profits and losses. Partnerships can be formed with a formal written agreement or even be implied through the actions and conduct of the parties involved.
- **General Partnership:** A general partnership is the most common type of partnership. In this form, all partners actively participate in the management and decision-making processes of the business. Each partner shares equal rights and responsibilities, and all partners are jointly and severally liable for the debts and obligations of the partnership.
- **Limited Partnership (LP):** In a limited partnership, there are two types of partners: general partners and limited partners. General partners have active roles and bear personal liability for



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the partnership's debts. On the other hand, limited partners are passive investors who contribute capital but have limited liability, meaning they are not personally responsible for the partnership's debts beyond their investment.

- **Limited Liability Partnership (LLP):** A Limited Liability Partnership (LLP) is a variation of the traditional partnership that offers limited liability protection to all partners. This means that partners are not personally liable for the debts and liabilities of the LLP beyond their investment and misconduct. LLPs are often preferred in professions where personal liability risks are higher, such as legal and accounting firms.
- **Joint Venture:** A joint venture is a partnership formed for a specific project or venture. It involves two or more businesses collaborating to achieve a common goal while retaining their separate legal identities. Joint ventures are often used to share risks, resources, and expertise for mutual benefit in a particular undertaking.

1. Advantages and Disadvantages of Partnership

Partnership is a popular form of business structure that offers several advantages and disadvantages to individuals and entities considering this collaborative model. Before entering into a partnership, it is essential to weigh the pros and cons to make informed decisions. In this article, we explore the advantages and disadvantages of partnerships:

Advantages:

- a. Shared Expertise and Resources:** Partnerships bring together individuals or entities with diverse skills, expertise, and resources. Each partner contributes their unique strengths, enhancing the overall capabilities of the business. This shared knowledge and pooled resources can lead to improved decision-making and innovative solutions.
- b. Shared Financial Burden:** In a partnership, the financial burden of starting and running the business is distributed among the partners. This allows the business to access more significant funds and capital than an individual might have on their own. It also helps in mitigating financial risks as partners share the losses.
- c. Collective Decision-Making:** Partnerships offer a democratic decision-making process. All partners have an equal say in the management and direction of the business. This collaborative decision-making can lead to better-informed choices and a balanced approach to problem-solving.
- d. Tax Advantages:** In many jurisdictions, partnerships enjoy tax benefits. Unlike corporations, partnerships are not subject to double taxation. Instead, profits and losses pass through to individual partners, who report them on their personal tax returns.



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- e. **Flexibility and Adaptability:** Partnerships are relatively easy to form and dissolve compared to other business structures like corporations. This flexibility allows partners to adapt quickly to market changes and capitalize on emerging opportunities.

Disadvantages:

- a. **Unlimited Liability:** One of the most significant disadvantages of partnerships is that all partners have unlimited personal liability for the debts and obligations of the business. This means that if the business incurs significant losses or debts, partners' personal assets could be at risk.
- b. **Potential for Conflict:** Partnerships are built on collaboration, but disagreements among partners can arise. Disagreements over business decisions, profit sharing, or management responsibilities can lead to conflicts that may adversely affect the business's operations.
- c. **Shared Profits:** While sharing profits can be an advantage, it can also be a disadvantage if partners feel that their efforts are not being adequately rewarded. A partner may perceive their contribution as more significant than others, leading to feelings of inequity.
- d. **Joint and Several Liability:** In general partnerships, partners may be held jointly and severally liable for the actions of their partners. This means that partners can be held responsible for the wrongful acts or negligence of their co-partners, even if they were not directly involved.
- e. **Limited Growth Potential:** Compared to corporations, partnerships may face challenges in accessing significant capital for rapid expansion. The ability to attract investors or issue shares may be limited in a partnership structure.

2. Essential Elements of a Partnership Agreement as per Indian Partnership Act, 1932.

A partnership agreement is a legally binding document that outlines the terms and conditions governing the relationship between partners in a partnership. In India, partnerships are governed by the Indian Partnership Act, 1932. While there is no specific format for a partnership agreement, certain essential elements should be included to ensure clarity and prevent disputes among partners. Here are the key elements that should be included in a partnership agreement in India:

- a. **Name and Address of the Partnership:** The partnership agreement should clearly state the name of the partnership, which should not be similar to an existing business entity. Additionally, the address of the principal place of business and any branch offices should be specified.



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- b. **Name and Details of Partners:** The agreement must identify all partners involved in the partnership, along with their full names, addresses, and contributions to the business. It should also mention whether partners are active or silent (sleeping) partners.
- c. **Nature of Business:** The partnership agreement should define the nature and scope of the business activities that the partnership intends to undertake. It should also specify if there are any restrictions on engaging in certain activities.
- d. **Capital Contribution:** Each partner's capital contribution to the partnership should be clearly stated in the agreement. This includes both initial contributions and any future contributions as agreed upon.
- e. **Profit and Loss Sharing:** The agreement should outline the percentage or ratio at which profits and losses will be shared among the partners. This distribution should be in accordance with the capital contribution or any other mutually agreed-upon arrangement.
- f. **Management and Decision-Making:** The partnership agreement should specify the roles, responsibilities, and decision-making authority of each partner. It should also define the process for making significant business decisions and resolving disputes.
- g. **Duration of Partnership:** The agreement should state the duration of the partnership, whether it is for a fixed term or an indefinite period. In case of a fixed term, the agreement should outline the procedure for renewal or termination.
- h. **Interest on Capital and Drawings:** The agreement should specify whether partners are entitled to receive interest on their capital contributions and the rules governing partner drawings (withdrawals) from the partnership.
- i. **Salaries and Remuneration:** If partners are entitled to receive salaries or remuneration for their services to the partnership, the agreement should clearly state the amounts and terms of payment.
- j. **Admission and Retirement of Partners:** The partnership agreement should outline the process for admitting new partners to the partnership and the terms under which existing partners can retire from the business.
- k. **Dissolution and Winding-Up:** In the event of the partnership's dissolution, the agreement should provide guidelines for the distribution of assets, liabilities, and settlement of accounts.
- l. **Arbitration Clause:** To avoid lengthy legal disputes, the partnership agreement may include an arbitration clause that mandates the resolution of any disagreements through arbitration instead of going to court.



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3. Roles and Responsibilities of Partners in a Partnership

In a partnership, each partner plays a vital role in the success and growth of the business. Clearly defining the roles and responsibilities of partners is crucial to ensure efficient operations, effective decision-making, and harmonious collaboration. Here are the primary roles and responsibilities of partners in a partnership:

- a. **Contributing Capital:** One of the fundamental responsibilities of partners is to contribute capital to the partnership. Capital contributions can be in the form of cash, assets, or property and are used to finance the business's operations and initial setup.
- b. **Active Participation:** In a general partnership, all partners are expected to actively participate in the day-to-day operations and management of the business. They are involved in making strategic decisions, overseeing business activities, and contributing their skills and expertise.
- c. **Decision-Making:** Partners collectively participate in decision-making processes concerning business operations, financial matters, and strategic planning. Major decisions, such as entering into contracts, expanding the business, or acquiring assets, often require unanimous or majority agreement among partners.
- d. **Sharing Profits and Losses:** Partners share the profits and losses of the business based on the agreed-upon profit-sharing ratio mentioned in the partnership agreement. Each partner's contribution, effort, and involvement determine their share in the profits.
- e. **Accountability and Transparency:** Partners have a fiduciary duty to act in the best interest of the partnership. They are accountable for their actions and must maintain transparency in financial matters, including maintaining accurate accounting records and financial statements.
- f. **Managing Business Relationships:** Partners often interact with suppliers, customers, and other stakeholders, representing the business. Maintaining positive and professional relationships with these parties is essential for the partnership's reputation and growth.
- g. **Compliance with Legal and Regulatory Requirements:** Partners are responsible for ensuring that the partnership complies with all relevant laws, regulations, and taxation requirements. This includes obtaining licenses, filing tax returns, and adhering to industry-specific regulations.
- h. **Resolving Disputes:** Partners should strive to resolve any disagreements or conflicts that may arise within the partnership amicably. Open communication and a willingness to compromise are essential in handling disputes effectively.



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- i. **Adhering to Partnership Agreement** Partners are bound by the terms and conditions outlined in the partnership agreement. They must respect the provisions related to capital contributions, profit sharing, decision-making, and other aspects agreed upon in the document.
- j. **Representing the Partnership:** Partners are considered agents of the partnership and have the authority to bind the business in contracts and agreements with third parties. Therefore, it is vital that partners act responsibly and within the scope of their authority.
- k. **Continuous Improvement:** Partners should actively contribute to the growth and improvement of the business. They can bring in new ideas, innovations, and strategies to stay competitive and adapt to changing market conditions.

4. Comparing Partnership with Other Business Structures

When entrepreneurs decide to start a business, they have several options for structuring their venture. Each business structure comes with its own set of advantages, disadvantages, legal implications, and tax considerations. In this article, we will compare a partnership with other common business structures, including sole proprietorship, corporation, and limited liability company (LLC), to help entrepreneurs make informed decisions about which structure best suits their needs and goals.

1. Partnership vs. Sole Proprietorship:

- a. **Ownership:** In a partnership, the business is co-owned by two or more individuals or entities, known as partners. In contrast, a sole proprietorship is owned and operated by a single individual.
- b. **Liability:** Partnerships have unlimited personal liability for business debts and legal obligations. In a sole proprietorship, the owner is personally liable for all business liabilities.
- c. **Decision-Making:** Partnerships involve shared decision-making among the partners, while a sole proprietor has complete autonomy in making business decisions.
- d. **Taxes:** Both partnerships and sole proprietorships are pass-through entities for tax purposes. This means that business income is passed through to the owners' personal tax returns.

2. Partnership vs. Corporation:

- a. **Ownership:** Partnerships are typically smaller and privately owned by the partners. Corporations, on the other hand, can have many shareholders and can be publicly traded on stock exchanges.
- b. **Liability:** In a partnership, partners have unlimited personal liability, while in a corporation, shareholders' liability is limited to the amount of their investment in the company.



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- c. **Taxes:** Partnerships are pass-through entities, meaning profits and losses flow through to the partners' personal tax returns. Corporations face double taxation, as the corporation pays taxes on its profits, and shareholders are taxed on dividends received.
- d. **Management:** In a partnership, partners are usually involved in the day-to-day management of the business. In a corporation, management is typically separated from ownership, with a board of directors and officers overseeing operations.

3. Partnership vs. Limited Liability Company (LLC):

- a. **Liability:** Both partnerships and LLCs offer limited liability protection for their owners. This means that personal assets of owners are generally protected from business debts and liabilities.
- b. **Taxes:** Both partnerships and LLCs are pass-through entities for tax purposes, ensuring that profits and losses pass through to the individual owners' tax returns.
- c. **Flexibility:** LLCs offer more flexibility in terms of ownership structure, management, and profit-sharing arrangements compared to traditional partnerships.
- d. **Formalities:** Partnerships are generally less formal in structure and operation. LLCs may have fewer formalities than corporations but provide a more structured framework for business governance.

Forming a Successful Partnership: Key Considerations

A successful partnership can be a powerful business arrangement, combining the strengths, resources, and expertise of multiple individuals or entities. However, creating a fruitful and harmonious partnership requires careful planning, clear communication, and a shared vision. In this article, we will explore the key considerations for forming a successful partnership:

1. **Shared Goals and Vision:** Partners should have a common vision for the business and shared long-term goals. Before forming the partnership, it is essential to discuss and align on the mission, objectives, and desired outcomes for the venture.
2. **Complementary Skills and Expertise:** Partners should bring diverse and complementary skills to the partnership. By leveraging each other's strengths, partners can enhance the overall capabilities of the business, leading to improved problem-solving and decision-making.
3. **Trust and Communication:** Open and transparent communication is the foundation of a successful partnership. Partners should trust each other and foster an environment where ideas, concerns, and feedback can be freely exchanged.

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4. **Defining Roles and Responsibilities:** Clearly defining the roles and responsibilities of each partner is crucial to avoid misunderstandings and conflicts. Partners should understand their specific areas of focus and authority within the business.
5. **Partnership Agreement:** Drafting a comprehensive partnership agreement is essential to formalize the terms and conditions of the partnership. The agreement should include details about capital contributions, profit sharing, decision-making, dispute resolution, admission of new partners, and other important aspects.
6. **Financial Planning and Capital Contributions:** Partners should discuss and agree on the financial aspects of the partnership, including each partner's capital contribution, how profits and losses will be shared, and how additional funds will be raised if needed.
7. **Exit Strategies:** Considering potential exit strategies at the outset is prudent. Partners should agree on procedures for handling partner retirements, buyouts, or dissolving the partnership if necessary.
8. **Conflict Resolution:** Partners should establish a process for resolving conflicts that may arise during the course of the partnership. Mediation or arbitration clauses in the partnership agreement can help prevent disputes from escalating.
9. **Legal and Regulatory Compliance:** Understanding and adhering to legal and regulatory requirements is vital. Partners should ensure that the partnership is properly registered and compliant with all applicable laws and regulations.
10. **Communication with Stakeholders:** Partners should maintain open communication with stakeholders, including employees, customers, suppliers, and investors. Keeping all stakeholders informed about the partnership's progress and decisions is essential for building trust and support.
11. **Continuous Evaluation and Improvement:** Partnerships should be subject to regular evaluation to assess performance, identify areas for improvement, and adjust strategies as needed to adapt to changing market conditions.



Importance of Awareness of Direct Tax & Indirect Tax to an Indian Citizen

Mr. Bhupati Sarpa¹, Dr. Sadhana Bakchi²

¹Assistant Professor Disha College, Raipur

²Associate Professor AAFT University, Raipur

Abstract

The article "Awareness of Direct Tax and Indirect Tax for an Indian Citizen" sheds light on the significance of understanding the Indian tax system, encompassing direct and indirect taxes, for every citizen. It delves into the complexities of direct taxes, such as income tax and corporate tax, elucidating the tax slabs, deductions, and tax planning options available. The article also elucidates the concept of indirect taxes, primarily Goods and Services Tax (GST) and customs duties, emphasizing their impact on individuals and businesses.

The article underscores the importance of tax awareness for Indian citizens, highlighting the legal obligations and penalties associated with income tax return filing. It elucidates the numerous benefits of being informed about income tax return filing, including claiming tax refunds, building financial credibility, and complying with financial institutions. Additionally, the positive impact of GST on citizens is explored, encompassing simplified tax structures, elimination of cascading taxes, and competitive pricing.

Ultimately, the article portrays tax awareness as a vital component in the growth and welfare of the nation. By fostering informed financial decisions and responsible tax compliance, citizens actively contribute to India's economic development and overall progress.

Awareness of Direct Tax and Indirect Tax for Indian Citizens

Introduction: Taxes play a crucial role in the functioning of any nation's economy, and India is no exception. The Indian tax system comprises two main types of taxes: direct taxes and indirect taxes. Understanding the concepts and implications of these taxes is essential for every Indian citizen. In this chapter, we will explore the awareness and significance of direct and indirect taxes, empowering citizens with knowledge to navigate their financial responsibilities.

Section 1: Direct Tax

1.1 Definition and Types: Direct taxes are levied directly on individuals and entities based on their income, wealth, or property. The primary direct taxes in India are income tax, corporate tax, and wealth tax (abolished in 2015). Explain each tax briefly and its relevance to individuals and businesses.

1.2 Income Tax: Income tax is a tax imposed on an individual's income earned during a financial year. Explain the various sources of income that are subject to taxation, such as salaries, business

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profits, capital gains, and rental income. Discuss the importance of filing income tax returns and the penalties for non-compliance.

1.3 Tax Slabs and Deductions: Discuss the income tax slabs applicable to individuals based on their income levels, along with the corresponding tax rates. Explain the concept of deductions and exemptions available to taxpayers, such as deductions for investments in provident funds, insurance premiums, and educational expenses.

1.4 Tax Planning and Compliance: Highlight the significance of tax planning to optimize tax liability legally. Discuss popular tax-saving options available under various sections of the Income Tax Act, such as Section 80C, 80D, and 80G. Emphasize the importance of maintaining proper financial records and compliance with tax laws to avoid penalties and legal consequences.

Section 2: Indirect Tax

2.1 Definition and Types: Indirect taxes are levied on the manufacture, sale, or provision of goods and services. Discuss the two primary types of indirect taxes in India: Goods and Services Tax (GST) and customs duties.

2.2 Goods and Services Tax (GST): Explain the concept and significance of GST, which replaced multiple indirect taxes in India. Discuss the structure of GST, including different tax slabs and their implications on various goods and services. Elaborate on the benefits of GST, such as the elimination of cascading taxes, increased tax compliance, and the ease of doing business.

2.3 Custom Duties: Explain the concept of custom duties, which are levied on the import and export of goods. Discuss the types of custom duties, such as basic customs duty, countervailing duty, and anti-dumping duty. Highlight the importance of custom duties in protecting domestic industries, controlling imports, and generating revenue for the government.

2.4 Indirect Tax Compliance: Discuss the responsibilities of individuals and businesses regarding indirect taxes, such as maintaining proper records, filing periodic returns, and collecting and remitting taxes. Explain the consequences of non-compliance, including penalties, interest, and legal actions.

Section 3: Importance of Tax Awareness

3.1 Economic Development and Public Services: Explain how tax revenues are essential for the economic development of a nation. Discuss how taxes fund public services such as infrastructure development, healthcare, education, defense, and social welfare programs.

3.2 Citizen's Role in Nation-Building: Highlight the significance of tax compliance and its direct impact on the nation's progress. Emphasize that by fulfilling their tax obligations, citizens contribute to the overall development and welfare of the country.

3.3 Financial Planning and Responsibility: Encourage citizens to be aware of tax laws and plan their finances accordingly. Discuss the benefits of tax knowledge in making informed investment decisions, availing tax deductions, and minimizing tax liabilities.

Section 4: Why should a citizen should know about Income Tax Return Filing in India?

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Knowing about income tax return filing in India is essential for several reasons. Here are some key reasons why individuals should be aware of income tax return filing:

1. **Legal Obligation:** Filing income tax returns is a legal requirement for individuals whose total income exceeds the threshold limit specified by the government. By understanding the income tax return filing process, individuals can fulfill their legal obligations and avoid any penalties or legal consequences.
2. **Avoid Penalties:** Non-compliance with income tax return filing can lead to penalties imposed by the tax authorities. Being aware of the filing deadlines, procedures, and necessary documentation helps individuals avoid these penalties and maintain a clean tax record.
3. **Claiming Tax Refunds:** Filing income tax returns is necessary to claim any tax refunds owed to individuals. If taxes have been deducted at source or if excess taxes have been paid, filing a return allows individuals to claim the refund from the tax department.
4. **Building Financial Credibility:** Regularly filing income tax returns helps individuals establish and maintain a credible financial record. This can be beneficial when applying for loans, credit cards, or other financial transactions, as it demonstrates financial responsibility and stability.
5. **Compliance with Financial Institutions:** Various financial institutions, such as banks, may require income tax return filings as supporting documents for loan applications, opening bank accounts, or carrying out high-value financial transactions. Having knowledge of the income tax return filing process ensures compliance with such requirements.
6. **Assessing Financial Position:** Filing income tax returns provides individuals with a comprehensive overview of their financial position. It helps in assessing their income, expenses, and investments, allowing them to evaluate their financial health, plan for the future, and make informed financial decisions.
7. **Availing Tax Benefits:** By filing income tax returns, individuals can take advantage of various tax benefits and deductions provided by the government. These deductions can include investments in specific financial instruments, contributions to retirement funds, medical expenses, and education-related expenses. Understanding the filing process helps individuals maximize their tax benefits and reduce their overall tax liability.
8. **Contributing to the Nation's Development:** Income tax is a significant source of revenue for the government, enabling the funding of public infrastructure, healthcare, education, and welfare programs. By filing income tax returns and paying their fair share of taxes, individuals actively contribute to the nation's development and welfare.

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Section 4: Positive Impacts of introduction of GST.

The Goods and Services Tax (GST) has had several positive impacts on citizens of India. Here are some key benefits of GST:

1. **Simplified Tax Structure:** GST replaced multiple indirect taxes, such as excise duty, service tax, and value-added tax (VAT), with a single tax structure. This simplified tax regime has made it easier for citizens to understand and comply with tax obligations. It has reduced the complexity of the tax system, eliminating the need to navigate through various taxes and their corresponding rules and rates.
2. **Elimination of Cascading Taxes:** Cascading taxes, also known as tax-on-tax, occurred under the previous tax system, where taxes were levied at each stage of production and distribution. GST has eliminated cascading taxes by allowing businesses to claim input tax credits for the taxes paid on purchases. This has resulted in reduced tax burdens and the final price of goods and services for consumers.
3. **Lower Tax Burden on Essential Items:** GST has categorized goods and services into different tax slabs, including 0%, 5%, 12%, 18%, and 28%. Essential items like food grains, healthcare services, education, and transportation have been placed in lower tax slabs or exempted from GST, reducing the tax burden on essential goods and services consumed by citizens.
4. **Increased Transparency and Compliance:** GST has introduced a robust digital infrastructure and online portals for tax registration, return filing, and payment. This has increased transparency in tax transactions and reduced opportunities for tax evasion. With a centralized system, the government can track transactions and ensure better compliance, contributing to a fair and equitable tax system.
5. **Ease of Doing Business:** GST has simplified the process of starting and operating businesses in India. The unified tax system eliminates the complexities of multiple state-level taxes, reducing the compliance burden on businesses. This has encouraged entrepreneurship, promoted investments, and facilitated the growth of small and medium-sized enterprises (SMEs), ultimately leading to job creation and economic development.
6. **Reduced Interstate Barriers:** Prior to GST, interstate movement of goods was subject to various entry taxes, octroi, and checkpoints, causing delays and increasing logistical costs. With the implementation of GST, seamless movement of goods across state borders has become more efficient. This has reduced transportation time, costs, and improved the overall logistics infrastructure.

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7. **Competitive Pricing and Consumer Benefits:** GST has brought greater uniformity in tax rates across states and sectors, resulting in competitive pricing for goods and services. With reduced tax burdens and improved input tax credits, businesses can offer competitive prices to consumers. This has contributed to lower costs of goods and services, benefitting citizens through increased affordability and better purchasing power.
8. **Positive Impact on the Economy:** The introduction of GST has had a positive impact on India's economy as a whole. It has contributed to increased tax collections, formalization of the economy, and a broader tax base. This additional revenue can be utilized for developmental initiatives, public services, and welfare programs, ultimately benefiting citizens.

Conclusion: Understanding direct and indirect taxes is crucial for every Indian citizen. This chapter aimed to increase awareness and knowledge about these taxes, their implications, and the importance of tax compliance. By being well-informed about their tax responsibilities, citizens can contribute to the nation's growth and make informed financial decisions. Also knowledge about income tax return filing in India is vital to fulfill legal obligations, avoid penalties, claim tax refunds, establish financial credibility, comply with financial institutions, assess financial position, avail tax benefits, and contribute to the nation's development. It empowers individuals to effectively manage their finances and play an active role in the country's economy. Moreover, the implementation of GST in India has had several positive impacts on citizens. It has simplified the tax structure, reduced tax burdens on essential items, increased transparency and compliance, eased doing business, reduced interstate barriers, enabled competitive pricing, and had a positive impact on the overall economy. GST has enhanced the efficiency and effectiveness of the tax system, ultimately benefiting citizens through a more transparent, simplified, and equitable tax regime.

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"Emerging Paradigms in Multidisciplinary Management Education"

Ms. Harman Jot Kaur¹, Mr. Birju Rajak²

¹Assistant Professor, Disha College, Raipur

²Assistant Professor AAFT University, Raipur

Abstract

This paper explores the new trends and emerging paradigms in multidisciplinary education within the field of management. Traditionally, management education has focused on specialized knowledge and skills within specific domains such as finance, marketing, or human resources. However, with the rapidly evolving business landscape and the need for holistic decision-making, there is a growing recognition of the importance of multidisciplinary approaches in management education.

The abstract presents an overview of the paper's focus and highlights the key points discussed. It mentions the traditional approach to management education and acknowledges the need for a shift towards multidisciplinary approaches. However, it does not delve into specific details or findings from the paper.

Introduction

The main goal of education is to develop knowledge about a certain discipline that can engender in students the capacity to analyse information and apply it to real life cases. To improve student's understanding and make the learning process more productive and enjoyable, they need to experience the connection between different subjects of the respective curriculum.

Multidisciplinary curriculum is studying a topic from the viewpoint of more than one discipline and solving a problem using a different disciplinary approach. For example, reducing the CO₂ emissions from a car can be achieved by studying how to develop fuel chemistry or by studying how to improve car engine performance.

Multidisciplinary learning is a wonderful way to totally integrate your education into a comprehensive unit rather than scrambling to draw connections between seemingly unrelated parts. It empowers you to see tangible correlations across subject matters rather than view each in a silo. Multidisciplinary learning is not your average school experience. A multidisciplinary curriculum is one in which a single topic is studied from the viewpoint of more than one discipline. Institutions like Radboud University's Nijmegen School of Management see advantages of multidisciplinary education, and have gone above and beyond to integrate it into their education platform.

If you need some multidisciplinary examples to better understand, think about a business degree. Instead of just studying Economics and Political Science separately, you would have professors from

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each department drawing on their specialty to provide a well-rounded understanding of the subject matter. (i.e. Your Econ professor and your PoliSci professor cross pollinate their teachings so you have a better understanding of how Econ and PoliSci work together in the grand scheme of things.) The multidisciplinary approach relies on people crossing disciplines to share knowledge, thereby enhancing your scope and depth of learning.

2. Advantages of a multidisciplinary curriculum

a. Holistic understanding

One of the benefits of a multidisciplinary approach in education is you get a more holistic understanding of the world. Rather than looking at individual departments and their subject matters separately, a multidisciplinary approach integrates parts of each department into the study programs of the other.

For example, the Nijmegen School of Management weaves Business Administration into the Economics program, and looks at Business Administration and Political Science as part of the Geography, Planning, and Environment program.

b. Different perspectives

Have you ever been trying to solve a puzzle by yourself and have one section that totally defeats you? You stare at it for hours, but can't figure it out for the life of you. Then, one day, a friend saunters by and picks up that pivotal piece and places it perfectly. Ah, the magic of different perspectives!

A multidisciplinary approach is kind of like that. With different professors integrating subject matters, you get Dr. Cortez's perspective on organic chemistry one day, and Dr. Sahib's the next. It opens the doors to different ideas and ways of understanding.

c. Real world approach

Multidisciplinary learning isn't just an educational philosophy—it's a tangible way of understanding the world. When you graduate, you'll be working with people from across disciplines IRL, so why should school be different? Being able to compile and collaborate with people from across the spectrum will help you function in the professional world.

d. Collaboration skills

Hopefully, any education route you take emphasizes the importance of collaboration. However, one of the most important advantages of multidisciplinary curriculum is the idea of coming together to create a better whole.

Being able to communicate effectively with people across disciplines is integral to multidisciplinary learning. You learn the same vocabulary, you understand their values, and you know what motivates them. These skills will help you make connections, solve big problems, and work synergistically with your peers.

Have you ever been trying to solve a puzzle by yourself and have one section that totally defeats you? You stare at it for hours, but can't figure it out for the life of you. Then, one day, a friend saunters by and picks up that pivotal piece and places it perfectly. Ah, the magic of different perspectives!

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A multidisciplinary approach is kind of like that. With different professors integrating subject matters, you get Dr. Cortez's perspective on organic chemistry one day, and Dr. Sahib's the next. It opens the doors to different ideas and ways of understanding.

3. Some new trends on multidisciplinary education:

Interactive Learning – Interactive learning has long been used to improve learning experience and enhance knowledge retention among students. It takes place in form of story telling, peer feed back social learning, micro learning and experiential learning is forms of interactive learning experiential learning simply means learning through experience. It focuses on students reflexing on their bands-on experience doing something, to gain practical expertise. Due to this approach learning immerses students into real world situation where decisions, behavior skills are developed.

Project based learning-It is a teaching method in which student working for on extended period of time to investigate and response to authentic problem or challenge student can do project on different things like presentations , news letters posters, resumes, mind maps , developing a news product or service implementing a news business process, renovating the rooms.

Collaborative approach- in which two or more people learn or attempt to learn some together. People or student engage in collaborative learning capitalize on one another's resources and skills through information, idea, work. It is based on model that knowledge can be created with in population where students actively interact by sharing experiences.

Constructivist approach- is effective in global trends. It develops advance skills critical thinking, synthesis, analysis, evaluation and creation. It promotes student to reflect, evaluate their work and identify intermediary skills to acquire based on their needs.

Moocs – massive open online courses Moocs are free online course available for anyone to enroll moocs provide flexible way to learn new skills advance your career and deliver quality educational experiences at scale moocs courses are available in all subjects humanities, education ,engineering education & teaching.

Nano learning - is program designed to permit a participant to learn a given subject in ten minute time frame through the use of electronic media without interaction with real time instructor. It provides unique opportunity to tackle new subjects, presented in bite size learning modules. It includes video, audio, scenario examples ranges from 2 minutes to maximum of 10 minutes. It covers single learning objective and provides focused learning on the single topic, most nano learning course has links related materials for training, practice aids or other additional resources, to expand the knowledge base of learner.

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Conclusions

First, almost all affiliating universities in India have large number of colleges which are single discipline colleges. For example, medical college, engineering college, education college, etc. It is a huge task to convert them into multi-disciplinary college. These institutions are government owned and private. It may be difficult to convince private managed colleges to add new departments and recruit additional teachers. The author estimated the additional cost of adding departments, teachers and infrastructure for the top 50 National Institutional Ranking Framework (NIRF) ranked colleges based on certain norm of model multidisciplinary college. Rs. 2500 million per college in the next 10 years would be additional cost.

Neither government nor private management will be ready to invest money of such a high order. Many state, private and deemed universities and institutions of national importance are single discipline universities. To restructure them into multidisciplinary universities would also amount to large investment. In fact, there are many non-viable colleges in rural areas. They may have to be closed down. Under above circumstances, there may be a very small group of colleges and universities which can be restructured into multidisciplinary institution. However, so far as curricular change is concerned there have been government initiatives to add multidisciplinary centers/ departments in existing central and state universities. These initiatives need to be promoted. Besides, multidisciplinary teaching and research also may be promoted.

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A Study on Educational Management and Administration

Mrs. Vidya Nair¹, Mr. Bhanu Prakash Jaiswal², Mr. Qmar Ali Mir³

¹Assistant Professor, Disha College, Raipur
^{2,3}Assistant Professor, AAFT University, Raipur

Abstract:

Educational management and administration is very important activity of the educational institution. It is a key factor for the development of an organisation and there is no substitute to an efficient management and administration. The economic progress of western countries is not just due to rich material resources but because they are efficiently managed and utilised. The importance of management & administration is not fully realised in many developing countries. Management and administration system of an organisation must be analysed and efficient methods must be adopted to get success.

Key Words: Education, Management, Administration

Introduction

Educational management is a field of study and practice concerned with the operation of educational organizations. Educational management is centrally concerned with the purpose or aims of education. These purposes or goals provide the crucial sense of direction to underpin the management of educational institutions.

Educational management operates in educational organizations. As Tony Bush (1986), puts it, "Most of the definitions of educational management which have been offered by writers are partial because they reflect the particular sense of author. Those which attempt a broader approach are often bland." "School management, as a body of educational doctrine, comprises a number of principles and precepts relating primarily to the technique of classroom procedure and derived largely from the practice of successful teachers. The writers in the field have interpreted these principles and precepts in various ways, usually by reference to larger and more fundamental principles of psychology, sociology and ethics." -Paul Monroe: (1913) "Management implies an orderly way of thinking. It describes in operational terms what is to be done, how it is to be done, and how we know when we have done. Management is not an arcane mystique. It is a method of operation. Good management should result in an orderly integration of education and society -Shelley Umana : (1972)

What is Management?

Management in business and organizations is the function that coordinates the efforts of people to accomplish goals and objectives using available resources efficiently and effectively. Management

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comprises planning, organizing, staffing, leading or directing, and controlling an organization or initiative to accomplish a goal.

Management as an art As an art, management is about carrying out organisational functions and tasks through people. This art involves the application of techniques in: • human and public relations • the delegation of an authority: assigning and sharing responsibilities and duties • communication: including decision-making and problem-solving. • Managing change.

Management as a science Management here is concerned with establishing a philosophy, laws, theories, principles, processes and practices which can be applied in various situations, including schools. **Management as an organisation** As an organisation, management is about creating formal structures and an establishment based on a mission (or goals), objectives, targets, functions and tasks. For example, social and welfare organisations in government management can refer to education and health services, whilst public security management services could refer to the police and military.

Management as a person Managements may be seen as a person or a group of people. For example, a teacher could say 'The school management has changed the timetable in the middle of the term'. This could be referring to the head alone, or to all the senior staff, or it could refer to the members of the board of governors or school committee. In schools with several promoted staff a 'senior management team' might be formed in much the same way as a government has a cabinet of ministers.

Management as a discipline In this sense, management is a field of study with various subjects and topics. Knowledge, skills and attitudes in management can be acquired through learning, from experience and from certified courses. Management is a collection of processes, including such things as decision-making, problem solving and action-planning. These processes involve the management of resources including human, material, financial and time. These processes are also known as the functions of managers.

What is Educational Management?

Meaning:

While Education is the provision of a series of learning experiences to students in order to impart knowledge, values, attitudes and skills with the ultimate aim of making them productive members of society, Educational Management is the process of planning, organising, directing and controlling the activities of an institution by utilising human and material resources so as to effectively and efficiently accomplish functions of teaching, extension work and research.

Nature and Scope:

The National Policies on Education seek to bring about a social, economic and cultural development in society by focusing on human resource development through education. Education, therefore, must have more relevant curricula, be dynamic, and empower students to bring about desirable social changes while preserving the desirable aspects of our existing culture

The national developmental goals require the professional management of education to bring about the effective and efficient functioning of educational institutions. The scope of Educational

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Management is wide and includes the history and theories of management science, roles and responsibilities of an educational manager along with the requisite managerial skills.

Educational Management focuses on:

The study of theories of management science which define and describe the roles and responsibilities of the educational manager and the development of managerial skills. the study of educational planning at macro levels, its goals, principles, approaches and processes and on institutional planning and educational administration at the micro level.

Decision making, problem solving, communication, information management and effective team building. Planning of curricular and co-curricular activities, curriculum and academic calendar Maintenance of school records, evaluation of students' achievement Effective allocation of financial resources and the planning of the budgets of institutions.

Educational Management aims at:

Achieving an institution's objectives Improving the processes of planning, organising and implementing within the institution Creating, enhancing and maintaining a positive public image of the institution. Optimal utilisation of human resources (administrators, non-teaching staff, teaching staff and students) Enhancing the efficiency and effectiveness of infrastructure Enabling job satisfaction Creating and maintaining a congenial and cohesive atmosphere Managing interpersonal conflicts, stress 5 Improving interpersonal communication. Building a relationship with the community.

The functions of Educational Management are largely based on Henry Fayol's 14 Principles of Management, namely,

- Division of work Authority
- Discipline
- Unity of command
- Unity of direction
- Subordination of individual interests
- Remuneration
- Centralisation
- Scalar chain
- Order
- Equity
- Stability
- Initiative
- Esprit de corps

Scope of Educational Management

By scope, we mean the area within which functioning of educational management takes place. The scope of educational management today is as vast as that of education itself. Any activity conducive

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to the, achievement of educational goal, is a part of educational management. Such activities could be at the school level, at the college level, at the university level or at the control level. Anything done to improve the quality of education at any stage may be ranging from the supply of material, human and financial resources to the highest cultural or academic needs-comes under the scope of educational management. Hence we shall consider the scope of educational management under the following heads.

Goal Development: The educational system is a sub-system of a society, and therefore the society not only provides human and non-human resources but also certain expectations that the system of education will achieve certain goal. Since society is in a constant process of change, needs of the society change and so do the goal specifications. It is necessary for the educative process to be responsive to these changing expectations and it is through the educational management system that persons involved in the process of management can continuously examine, evaluate and change (if appropriate) the goals of education.

Programme Planning and Actualization: According to the Oxford English Dictionary, Planning is “to design some actions to be done before hand”. Philips regards it is “the process of setting in advance a pattern of action to bring about overall national policies by the closest possible means and end.” Thus we can say that planning is the process of preparing a set of decisions.

Organization: Organization has been a problem in the field of education. The debate over the control of education has over and again raised the salient issue of how educational machinery should be best organised, politically, professionally and administratively. Here too, as in several other vital areas, education is handicapped by tradition. If conventional biases and prejudices can be replaced by decisions made logically and scientifically, with the achievement of objectives as the only consideration modern principles and techniques of organization will provide a basis for effective distribution and co-ordination of functions.

Importance of Educational Management & Administration:

The importance of educational management & administration is not fully realised in many developing countries. The economic progress of western countries is not merely due to abundant material resources but because they are efficiently managed and utilised. In some countries, resources are not utilised fully and properly due to lack of managerial skills. This suggests that efficient management & administration is the key factor for development of an organisation. The importance of management and administration may be pointed as below (E-Book, 2012). • Management facilitates optimum utilisation of available human and physical resources, which leads to progress and prosperity of a business enterprise. • This enables an organization to develop and expand its assets and profits. It develops cordial industrial relations, ensures better life and welfare to employees and raises their morale through suitable incentives. • It motivates employees to take more interest and initiatives in the work assigned and contribute for raising productivity and profitability of the enterprise. • It facilitates the introduction of new machines, new methods and new technology

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for the development of organisation. • Society gets the benefits of efficient management in terms of organisational development, justice to different social groups, consumer satisfaction and welfare and proper discharge of social responsibilities. • Expansion, growth and diversification of an organisation are possible through efficient management. • Efficient management brings success, stability and prosperity to an organisation through cooperation among employees. • It develops team spirit and raises overall efficiency of an organisation. • A dynamic and progressive management and administration assures development of sound organisation, which can face any difficult situations with ease and confidence.

Effective Educational Management & Administration methods to lead the Higher Education Institutions successfully:

Some best methods to lead any higher education institutions may be adopted as described below: • Participative leadership style may be adopted by the head of the institution with sharing information among the teachers/functionaries in order to can motivate them to achieve academic excellence. • The interest of the students should be taken care of if the inputs of teachers are sought while taking decision of the institution. • Better learning inputs should be provided to the students. • Faculty Development Programs and workshops for the teachers must be focused for enhancing the desired skill of the faculties. • The morale of the teachers must be taken care of. Constant motivational programs and interaction with teachers will definitely boost the morale of the teachers. • Sound relationship with parents and community must be maintained.

Conclusion:

Educational Administration has a vast area of operation ranging from Planning to Budgeting in an effort to make the educational process purposive and functional. An important tool it is effective, systematic and has a definite purpose. It focuses upon the attitude towards work and adopts practical measures to ensure that that the system of work functions efficiently and assists in the achievement of the aims of education thus benefiting the learners who are the main stakeholders in the educational system.

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Impact of the Covid-19 on Multidisciplinary Education during Pandemic in India

Mr. Sudhansu Sekhar Gantayat¹, Dr. Ashok Bairagi²

¹Assistant Professor, Disha College, Raipur

²Assistant Professor, AAFT University, Raipur

Abstract

The outbreak of COVID 19 made many poor communities in different places of the world face very challenging socio-economic and livelihood consequences. This paper targets to analyze this socio-economic impact to determine how the pandemic is causing various problems to the impoverished. An integrative literature review was carried out to sample the consequences of the global pandemic economic crisis on the poor communities in four different continents. The research points out how it is hard on the poor to adhere to the restrictive measures of social isolation or the lockdown. Immediate strategies that minimize the pandemic impact on the livelihood and the socio-economic activities of the poor are suggested. The research opens future research about more specialized programs for the poor during any future lockdowns.

Keywords- Poverty, Poor Community, Socio-economic, COVID-19, Global Crisis, Pandemic Impact, Integrative Review, Asia, India

Introduction

The COVID-19 pandemic has had a profound impact on education worldwide, including in India, where it brought significant changes to multidisciplinary education. Multidisciplinary education refers to an approach that integrates knowledge and methodologies from various disciplines to address complex real-world challenges. Here are some of the key impacts of COVID-19 on multidisciplinary education in India:

The emergence of the current global pandemic, Covid-19, has so far been a threat to the worldwide community. COVID-19 or novel coronavirus is a variant of the corona family of viruses which causes SARS on the people they infect. The virus is chiefly transmitted through coughing or sneezing on people. With the lack of any suitable vaccine, most governments have imposed lockdowns to curb the growth of the virus.

Several countries have adopted aggressive health policies and geared their resources to the reality of this global health emergency, based on the experiences of countries that suffered the early attacks of this zoonotic fierce-full virus.



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Multidimensional Poverty and the Challenges of COVID-19 Pandemic

What makes COVID-19 pandemic very unique human experience is that due it is for the first time that the world has collectively experienced such a mass disease transmission in the modern era, where technology has vastly improved since the last 100 years. With the speed of spread of the deadly COVID-19 disease and the slow reach of vaccination, inflation of food and deterioration of other related livelihoods would push many people towards famine and starvation, besides the spread of corruption, crime and terrorist power expansion are highly expected. This would enhance absolute and relative poverty all over the world and specifically the efforts to end illiteracy and low education are going to be affected.

There are three main types of poverty that would be affected by the challenge of COVID-19. Relative poverty would be the most affected type of poverty. Many middle classes would feel the punch of the deterioration of the socio-economic living standard compared to what they used to access freely. The income inequality would increase due to the total instability. The absolute poverty is the second affected type of poverty where many would come just under the line of poverty due to the amount of unemployment and difficulty of finding full-time jobs. The least affected type would be the extreme poverty where the percentage of people who have a scarcity of essential food, clean water, health shelter, education and information would approximately stay the same.

Positive impact of COVID-19 on education:

Though the outbreak of COVID-19 has created many negative impacts on education, educational Institutions of India have accepted the challenges and trying their best to provide seamless support Services to the students during the pandemic. Indian education system got the opportunity for transformation from traditional system to a new era. The following points may be considered as the **positive impacts**.

- **Move towards Blended Learning:** COVID-19 has accelerated adoption of digital technologies to deliver education. Educational institutions moved towards blended mode of learning. It encouraged all teachers and students to become more technology savvy. New ways of delivery and assessments of learning opened immense opportunities for a major transformation in the area of curriculum development and pedagogy. It also gives access to large pools of learners at a time.
- **Rise in use of Learning Management Systems:** Use of learning management systems by educational institutions became a great demand. It opened a great opportunity for the companies those have been developing and strengthening learning management systems for use educational institutions
- **Enhance the use of soft copy of learning material:** In lockdown situation students were not able to collect the hard copies of study materials and hence most of the students used of soft copies materials for reference.
- **Improvement in collaborative work-**There is a new opportunity where collaborative teaching and



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Learning can take on new forms. Collaborations can also happen among faculty/teachers across the world to benefit from each other.

- Rise in online meetings**-The pandemic has created massive rise in teleconferencing, virtual meetings, and webinars and e-conferencing opportunities
- Enhanced Digital Literacy**: The pandemic situation induced people to learn and use digital technology and resulted in increasing the digital literacy.
- Improved the use of electronic media for sharing information**: Learning materials are shared among the students easily and the related queries are resolved through e-mail, SMS, phone calls and using different social Medias like What Sapp or Facebook.
- Worldwide exposure**: Educators and learners are getting opportunities to interact with peers from around the world. Learners adapted to an international community.
- Better time management**: Students are able to manage their time more efficiently in online education during pandemics.
- Demand for Open and Distance Learning (ODL)**:During the pandemic situation most of the students preferred ODL mode as it encourages self-learning providing opportunities to learn from diverse resources and customized learning as per their needs.

Negative impact of COVID-19 on education:

Education sector has suffered a lot due to the outbreak of COVID-19. It has created many negative impacts on education and some of them are as pointed below:

- Educational activity hampered**: Classes have been suspended and exams at different levels postponed. Different boards have already postponed the annual examinations and entrance tests. Admission process got delayed. Due to continuity in lockdown, student suffered a loss of nearly 3 months of the full academic year of 2020-21 which is going to further deteriorate the situation of continuity in education and the as students would face much difficulty in resuming schooling again after a huge gap.
- Impact on employment**: Most of the recruitment got postponed due to COVID-19 Placements for students may also be affected with companies delaying the on board of students. Unemployment rate is expected to be increased due to this pandemic. In India, there is no recruitment in Govt. sector and fresh graduates fear withdrawal of their job offers from private sectors because of the current situation. The Centre for Monitoring Indian Economy's estimates on unemployment shot up from 8.4% inmid-March to 23% in early April and the urban unemployment rate to 30.9% (Educationasia.in). When the unemployment increases then the education gradually decreases as people struggle for food rather than education.
- Unprepared teachers/students for online education**-Not all teachers/students are good at it or at least not all of them were ready for this sudden transition from face to face learning to online learning. Most of the teachers are just conducting lectures on video platforms such as Zoom, Google meet etc. which may not be real online learning without any dedicated online learning platform.
- Reduced global employment opportunity**-Some may lose their jobs from other countries and the pass out students may not get their job outside India due to restrictions caused by COVID-19. Many

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Indians might have returned home after losing their jobs overseas due to COVID-19. Hence, the fresh students who are likely to enter the job market shortly may face difficulty in getting suitable employment. Many students who have already got jobs through campus interviews may not be able to join their jobs due to lockdown. The Indians who have been doing their jobs abroad may lose their Jobs. Recent graduates in India are of also fearing for withdrawal of job offers from corporate sectors because of movement restriction in the current pandemic situation

•**Increased responsibility of parents to educate their wards:** Some educated parents are able to guide but some may not have the adequate level of education needed to teach children in the house.

•**Loss of nutrition due to school closure:** Mid-day meals is a school meal programme of the Government of India which is designed to provide better the nutritional food to school-age children nationwide. The closure of schools has serious implications on the daily nutrition of students as the mid-day meal schemes have temporarily been shut. Various studies have pointed out that mid-day meals are also an important contributing factor for increased enrolment in the schools

•**Access to digital world:** As many students have limited or no internet access and many students may not be able to afford computer, laptop or supporting mobile phones in their homes, online teaching-learning may create a digital divide among students. The lockdown has hit the poor students very hard in India as most of them are unable to explore online learning according to various reports. Thus the online teaching-learning method during pandemic COVID-19 may enhance the gap between rich/poor and urban/rural.

•**Access to global education:** The pandemic has significantly disrupted the higher education sector. A large number of Indian students who are enrolled in many Universities abroad, especially in worst affected countries are now leaving those countries and if the situation persists, in the long run, a there will be a significant decline in the demand for international higher education.

•**Payment of Schools, Colleges fee got delayed:** During this lockdown most of the parents will be facing the unemployment situation so they may not be able to pay the fee for that particular time periods which may affect the private institutes. Integrated with a present-day mainstream higher education system.

• Govt and educational institutes should plan to continue the educational activities maintaining social distancing. 30-40% students and teachers may attend schools/colleges in two shifts per day to carry on educational activities by obeying guidelines for COVID-19.

•At current times, access to technology and internet isan urgent requirement. So, the digital capabilities and the required infrastructure must reach to the remotest and poorest communities to facilitate the students to continue their education during the pandemics. There is a need to deploy public funds to fix the internet gap and ensure that students continue to learn digitally. The state governments/private organizations should come up with ideas to address this issue of digital education.

•Some significant issues associated with distance learning strategies like the availability and access to digital devices with internet connectivity, the need for safe learning spaces, creating capabilities for teachers, families and students to operate and navigate digital devices, and engaging lesson plans for disabled students and other marginalized groups should be addressed by Govt.and the stakeholders.

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Conclusion:

Overall, the COVID-19 pandemic accelerated the adoption of technology and innovative teaching methods, fostering a more interconnected and multidisciplinary approach to education in India. While the challenges were substantial, the crisis also opened up new opportunities for collaboration, research, and preparing students to face future global challenges more effectively.

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"Exploring the Era of Electronic Audit: Revolutionizing Financial Assurance and Efficiency"

Ms. Pragati Parganiha¹, Ms. Akriti Upadhyay²

¹Assistant Professor, Disha College, Raipur

²Assistant Professor AAFT University, Raipur

Abstract

The concept of electronic audit signifies a transformative shift in traditional audit practices. Leveraging technology, data analytics, and automation, electronic audit enhances the efficiency, accuracy, and transparency of financial assurance. It enables auditors to analyze vast datasets swiftly, provide real-time insights, and conduct audits remotely, revolutionizing the audit process in the digital age. Despite its benefits, auditors must address cyber security risks and maintain professional judgment to fully leverage the potential of electronic audit in delivering value and confidence in financial reporting.

Introduction to Electronic Audit: Revolutionizing Financial Assurance

The era of electronic audit represents a transformative journey in the field of auditing, propelled by technological advancements and the increasing digitalization of business processes. This article delves into the concept of electronic audit, its principles, and the profound impact it has on financial assurance and audit efficiency. By embracing digital tools, data analytics, and automation, auditors are revolutionizing the audit process, enhancing accuracy, speed, and transparency. Real-time data insights, remote auditing capabilities, and continuous monitoring are among the key advantages offered by electronic audit methodologies. However, auditors must address cyber security risks and maintain professional judgment to fully leverage the potential of electronic audit in delivering value and confidence in financial reporting. The exploration of the era of electronic audit unveils its transformative power in redefining financial assurance practices, enabling auditors and businesses to thrive in an increasingly data-centric and interconnected world.

The Evolution of Auditing: Embracing the Digital Era with Electronic Audit

Auditing, as a practice, has evolved significantly over the years, adapting to the changing business landscape and technological advancements. From manual ledger inspections to the integration of electronic audit methodologies, the evolution of auditing has been driven by the need for greater efficiency, accuracy, and transparency in financial reporting. In this article, we explore the journey of auditing and how it has embraced the digital era with the advent of electronic audit.

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1. Manual Auditing: The Early Days

In the early days, auditing was a manual and labor-intensive process. Auditors would meticulously examine paper-based financial records and ledgers to verify transactions and ensure compliance with accounting principles. While this method served its purpose, it was time-consuming and prone to human errors.

2. Introduction of Computerized Auditing

With the introduction of computers in the mid-20th century, auditing began to undergo significant changes. Auditors transitioned from manual ledger inspections to computerized systems, which facilitated faster data processing and analysis. Computerized auditing improved audit efficiency and reduced the risk of errors associated with manual calculations.

3. Data Analytics and Auditing

The integration of data analytics into auditing practices marked a crucial milestone in the evolution of the profession. Auditors began leveraging data analysis tools to scrutinize large volumes of financial data, identifying patterns, anomalies, and potential risks. Data analytics empowered auditors to make more informed decisions and gain deeper insights into an organization's financial health.

4. Electronic Audit: The Digital Transformation

As the digital era unfolded, auditors embraced electronic audit methodologies to harness the full potential of technology. Electronic audit involves the use of advanced software, automation, and artificial intelligence to streamline audit procedures. Auditors can now extract data electronically from various sources, such as accounting systems, bank statements, and invoices, significantly reducing manual data entry and increasing audit efficiency.

5. Real-Time Insights and Remote Auditing

Electronic audit enables auditors to obtain real-time insights into an organization's financial performance. By analyzing up-to-date financial data, auditors can provide timely recommendations and feedback, enabling businesses to make informed decisions promptly. Additionally, electronic audit facilitates remote auditing capabilities, allowing auditors to conduct audits from anywhere, making the audit process more flexible and convenient.

6. Improved Risk Assessment and Assurance

Electronic audit methodologies enhance risk assessment capabilities, enabling auditors to identify potential red flags and areas of concern more effectively. By analyzing vast datasets and using sophisticated algorithms, auditors can perform rigorous risk assessments, leading to a more robust and reliable audit process.

7. Addressing Cyber security Risks

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As auditing embraces the digital era, auditors must also address the challenges posed by cyber security risks. Electronic audit requires stringent measures to safeguard sensitive financial information and prevent data breaches, ensuring the integrity and confidentiality of audit data.

Benefits and Advantages of Electronic Auditing in the Digital Age

Electronic auditing, also known as e-auditing, represents a paradigm shift in the field of auditing, driven by technological advancements and the increasing digitization of business processes. Electronic auditing leverages digital tools, data analytics, and automation to enhance the efficiency, accuracy, and effectiveness of the audit process. In the digital age, electronic auditing offers numerous benefits and advantages for auditors, businesses, and stakeholders. Here are some of the key benefits:

1. Increased Audit Efficiency:

One of the primary advantages of electronic auditing is the significant improvement in audit efficiency. Electronic audit tools and software automate various audit procedures, such as data extraction, analysis, and testing. Auditors can process large volumes of financial data more quickly, enabling them to focus on high-value audit activities and providing more comprehensive insights into the business.

2. Real-Time Data Insights:

Electronic auditing allows auditors to access real-time financial data. As businesses increasingly adopt digital accounting systems and cloud-based solutions, auditors can access up-to-date financial information, leading to more timely and accurate assessments of the organization's financial health. Real-time data insights facilitate proactive decision-making and risk management for businesses.

3. Enhanced Audit Accuracy:

Electronic audit methodologies significantly reduce the risk of errors and inconsistencies associated with manual auditing processes. Automation minimizes the chances of human error in data entry and calculations, leading to more accurate and reliable audit results. Data analytics tools enable auditors to identify patterns, anomalies, and potential risks with greater precision.

4. Streamlined Data Analysis:

Data analytics is a key component of electronic auditing. Advanced data analysis tools allow auditors to process and analyze vast datasets efficiently. By using sophisticated algorithms, auditors can perform in-depth assessments of financial transactions and identify irregularities, enabling them to focus on areas with the highest risk and potential impact on financial reporting.

5. Increased Audit Coverage:

With the efficiency of electronic auditing, auditors can expand their audit coverage to include a more extensive sample size of financial transactions. This increased coverage enhances the audit's reliability and gives stakeholders greater confidence in the accuracy of financial statements.

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6. Remote Auditing Capabilities:

Electronic auditing enables remote auditing capabilities, which have become particularly valuable in today's global business environment. Auditors can conduct audits from anywhere, reducing travel costs and time, while still maintaining effective communication and collaboration with clients and team members.

7. Data Integration and Visualization:

Electronic auditing tools often integrate with various data sources and accounting systems, streamlining data gathering and analysis. Additionally, data visualization tools allow auditors to present complex financial information in a clear and understandable format, facilitating better communication with clients and stakeholders.

8. Continuous Monitoring and Assurance:

Electronic auditing allows for continuous monitoring of financial data throughout the year, rather than just during the traditional annual audit. This continuous assurance approach provides stakeholders with ongoing insights into the organization's financial performance and helps identify potential issues or trends early on.

9. Improved Risk Assessment:

By analyzing large datasets and employing data analytics, auditors can conduct more robust risk assessments. This enhanced risk assessment process allows auditors to identify potential red flags and areas of concern, enabling businesses to implement necessary controls and risk management strategies.

Enhancing Audit Efficiency with Electronic Tools and Software

In the realm of modern auditing, embracing electronic tools and software has become essential to optimize efficiency and effectiveness throughout the audit process. Electronic tools, often integrated with data analytics and automation capabilities, revolutionize the way auditors conduct their work, offering numerous advantages to enhance audit efficiency. This article explores the key ways in which electronic tools and software contribute to streamlining the audit process and improving overall efficiency.

1. Automated Data Extraction:

Manual data entry is time-consuming and prone to errors. Electronic tools facilitate automated data extraction from various sources, such as accounting systems, spreadsheets, and databases. By automating this process, auditors can save valuable time, reduce the risk of errors, and focus on more critical aspects of the audit.

2. Efficient Data Analysis:

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Data analytics software allows auditors to analyze large volumes of financial data swiftly and comprehensively. With powerful algorithms, auditors can identify patterns, trends, and anomalies in the data, facilitating more in-depth risk assessments and insightful findings.

3. Streamlined Sampling Techniques:

Electronic tools enable auditors to implement sophisticated sampling techniques to assess large datasets efficiently. By leveraging random sampling or stratified sampling methods, auditors can draw meaningful conclusions about the entire population without examining every individual transaction.

4. Automated Audit Tests:

Electronic tools and software facilitate automated audit testing, especially for routine procedures. For instance, auditors can automate tests for internal controls, compliance, and analytical reviews, saving time and resources while maintaining accuracy and consistency.

5. Improved Communication and Collaboration:

Electronic audit tools enhance communication and collaboration among audit team members. Shared access to electronic files and audit documentation allows team members to work collaboratively in real-time, regardless of their physical locations.

6. Real-Time Updates:

Electronic audit software enables real-time updates to audit files and documentation. This feature ensures that all team members have access to the latest information and changes, promoting seamless collaboration and reducing the risk of discrepancies.

7. Customizable Workflows:

Auditors can customize electronic audit tools to fit the specific requirements of each engagement. Tailored workflows allow auditors to adapt the audit approach to the unique characteristics of the client's business, further improving efficiency and relevance.

8. Enhanced Reporting Capabilities:

Electronic audit tools offer advanced reporting functionalities, enabling auditors to present audit findings in a clear and concise manner. Data visualization tools can transform complex financial data into visually engaging charts and graphs, facilitating better communication with clients and stakeholders.

9. Integration with External Data:

Many electronic audit tools have the ability to integrate with external data sources, such as regulatory databases or market information. This integration allows auditors to access external data directly, enhancing the completeness and accuracy of their analysis.

10. Continuous Monitoring:

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Electronic tools facilitate continuous monitoring of financial data, allowing auditors to perform interim testing and obtain real-time insights throughout the year. This approach reduces the pressure associated with traditional year-end audits and enables auditors to identify and address potential issues promptly.

Ensuring Data Integrity and Security in Electronic Audits

Electronic audits, with their reliance on digital tools and data analytics, bring numerous benefits to the auditing process. However, they also introduce unique challenges related to data integrity and security. Safeguarding the integrity and confidentiality of audit data is crucial to maintaining the trust of clients and stakeholders and upholding the credibility of the audit profession. In this article, we explore the importance of ensuring data integrity and security in electronic audits and the measures auditors can implement to mitigate risks effectively.

1. Data Encryption and Access Controls:

Implementing robust data encryption techniques is essential to protect sensitive audit data from unauthorized access during transmission and storage. Access controls should be established to limit access to audit files and information only to authorized personnel with a need-to-know basis.

2. Secure Communication Channels:

Auditors should use secure communication channels, such as encrypted email and file-sharing platforms, to exchange sensitive audit information with clients and team members. Avoiding public or unsecured networks further reduces the risk of data interception.

3. Authentication and User Verification:

Implementing strong authentication measures, such as multi-factor authentication (MFA), ensures that only authorized individuals can access audit data and systems. This adds an extra layer of security beyond passwords, reducing the risk of unauthorized access.

4. Data Backup and Recovery:

Regular data backups are essential to safeguard against data loss due to hardware failures, cyber-attacks, or other unforeseen events. A robust data backup and recovery plan ensures that audit data remains accessible and protected, even in the face of potential disruptions.

5. Role-Based Access:

Adopting role-based access controls restricts users' access to only the data and functionalities necessary for their specific roles in the audit process. This minimizes the risk of accidental or intentional data breaches and unauthorized access.

6. Secure Data Transmission:

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Auditors should use secure file transfer protocols (e.g., SFTP or HTTPS) when exchanging audit files with clients and other stakeholders. Encryption during data transmission prevents interception and ensures data integrity.

7. Data Privacy Compliance:

Adhering to relevant data privacy regulations and industry-specific requirements is critical in electronic audits. Auditors must ensure compliance with data protection laws, such as the General Data Protection Regulation (GDPR) or the Health Insurance Portability and Accountability Act (HIPAA), when handling sensitive personal or confidential data.

8. Regular Security Audits and Testing:

Conducting regular security audits and vulnerability assessments helps identify potential weaknesses in the audit system and infrastructure. Penetration testing can be utilized to simulate cyber-attacks and assess the system's resilience to potential threats.

9. Secure Data Destruction:

Properly disposing of sensitive audit data is equally important as safeguarding its confidentiality. Implementing secure data destruction practices ensures that audit data is permanently deleted and cannot be recovered after its intended use.

10. Training and Awareness:

Ensuring that all team members, including auditors and support staff, undergo comprehensive training on data security best practices is crucial. Raising awareness about potential cyber threats and the importance of data security helps create a culture of vigilance and responsibility within the audit team.

Conclusion:

In the digital age, data integrity and security are paramount in electronic audits. The adoption of strong encryption, access controls, secure communication channels, and data privacy compliance measures helps safeguard sensitive audit data from unauthorized access and cyber threats. By implementing robust data security measures and fostering a culture of data protection and awareness, auditors can ensure the trust and confidence of their clients and stakeholders while embracing the benefits of electronic audits. Prioritizing data integrity and security in electronic audits is essential in maintaining the credibility and reputation of the audit profession in an increasingly interconnected and data-driven world.



New Trends in the Elements of Cost

Mr. Mohammed Shoaib Pasha¹, Mr. R. Raghavan²

¹Assistant Professor, Disha College, Raipur

²Assistant Professor AAFT University, Raipur

Abstract

Elements of cost mean all those expenses which contribute in the production of goods or services. These expenses may also be said as components or essential parts of cost of a product. As a matter of fact, elements of cost are the primary classifications of cost according to the factors upon which expenditure is incurred. The various elements of cost may be conveniently divided into three parts viz.: (1) Material, (2) Labour and (3) Expenses. Each of these can be direct or indirect.

Material: In the elements of cost, material has an important place because no goods can be produced without material. Material cost is usually a larger part of the total cost of a product. It can be direct as well as indirect.

1. Direct Material:

The material which is directly used in Production and which becomes an integral part of the finished goods is termed as direct material. Direct material has physical existence in the goods produced. In simple words, it is the material with which the goods are manufactured. For example sugar is manufactured by sugarcane, furniture by timber, cloth by yarn, etc. Some examples of direct material are given below:

1. The material which is used directly in production like sugarcane in sugar industry, timber in chair or table, cloth in shirt.
2. Material purchases for specific job or order. For example, bricks and cement are purchased for construction work.
3. The product of a process which becomes the raw material for the next process. For example, in a cloth mill, the product of the spinning process becomes the direct material of the weaving process.
4. Material which is issued from the store for completing the production work.

2. Indirect Material:

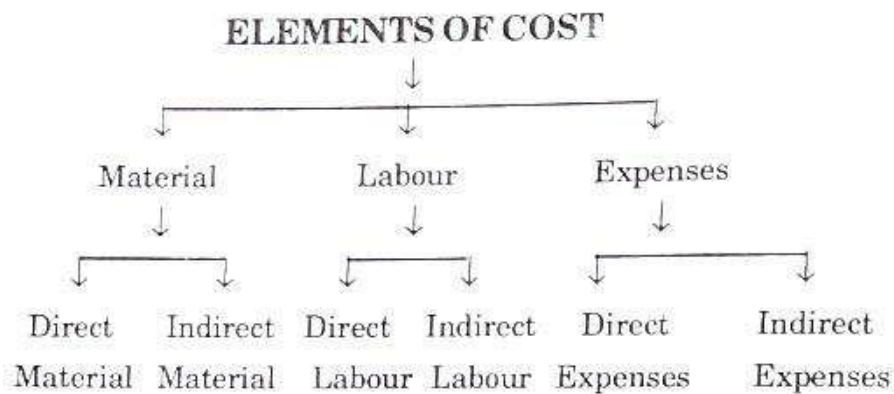
Material which is used indirectly in production is termed as indirect material. In other words, a material which is neither directly used in production nor becomes the integral part of the finished goods is termed as indirect material. The oil is used to keep the machinery in working order, the cloth is used for cleaning the machinery parts, etc. are the examples of indirect material. However, in some cases, though material forms a part of finished product yet it is treated as indirect material, e.g., thread used in shirt stitching, nails in shoes. This is because value of such materials is small and it is quite difficult and futile to measure them. According to ICMA, “Indirect material cost means



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material cost which cannot be allocated but which can be apportioned to or absorbed by cost centres or cost units.”

2. **Labor :** Labor is another important element of cost. The wages paid to the labour, employed in production, are included in the production cost as labour cost. Like material, labour can be divided into two parts viz., (i) direct labour and (ii) indirect labour.
 1. **Direct Labour :** Labour which are directly engaged in production or manufacture of goods is termed as direct labour. In simple words, it is the labour which can be specifically related to particular product, job work or process. For example, labour employed to manufacture furniture or to work on machines is direct labour. Direct labour is also termed as productive labour, factory labour, operating labour, etc. According to ICMA, “Direct wages : Wages which can be allocated to cost centres or cost units.’
 2. **Indirect Labour :** Labour which are not directly engaged in production operations but which helps in production operations is indirect labour. Such labour does not alter the condition or composition of the product. Wages paid to foremen, inspectors, time-keeper, store-keeper, gate-keeper, etc. are the examples of indirect labour cost. According to ICMA, “Indirect wages : Wages which cannot be allocated but which can be apportioned or absorbed by cost centres or cost units. “
3. **Expenses:** All expenses other than material and labour which are incurred in production, administration, selling and distribution are termed as expenses. These expenses can also be direct or indirect.



1. **Direct Expenses:** All expenses other than direct material and direct labour which are directly incurred on a specific product, job or process are called as direct expenses. In other words, expenses which can be directly related to the cost of a particular product are termed as direct expenses. Payment of royalty for extracting minerals from mines, excise duty, rent for equipments used in a specific production, fee for drawing designs and charts for a specific job, etc. are the few examples of direct expenses.
2. **Indirect Expenses:** Expenses which cannot related to specific work, job or process but which are related to the whole production, several jobs or processes, are termed as indirect expenses. The benefit of indirect expenses goes to more than one cost centres or units. The remuneration paid to the expert for repairing the machines of all the



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departments, is an example of indirect expenses. The different elements of cost can be presented in the form of the following chart :

Difference between Direct Cost and Indirect Cost

Direct costs: - are those costs which are incurred for and may easily and conveniently be identified with a particular cost unit or cost centre (i.e., particular product, particular job, particular contract, and particular process). Direct costs include direct material cost, direct labour cost and other direct expenses.

Indirect costs:- on the other hand, represent the costs which are of general nature and which cannot easily and conveniently be identified with a particular cost unit or cost centre. They include indirect material cost, indirect labour cost and other indirect expenses. Indirect costs are also called overheads. They need to be distributed to various cost centres and/or cost units on some reasonable basis. These indirect costs can further be divided into three sub-categories as factory overheads, administration overheads and selling and distribution overheads.

Thus, direct costs of a product or activity can be accurately determined while the indirect costs have to be apportioned to various cost units on some arbitrary basis since these costs cannot be accurately ascertained.

Classification of Cost or Components of Total Cost

A cost statement is prepared to • know the total cost of production. In this statement, the total cost is classified on the basis of elements of cost, as follows:

(1) Prime Cost: Prime cost is also called as direct cost, first cost or flat cost. The main objective of knowing the prime cost is to divide the total cost into direct and indirect costs. The total of all direct costs is known by the sum of direct material, direct labour and direct expenses and is called as prime cost.

Prime cost = Direct material + Direct wages + Direct expenses

(2) Works Cost or Factory Cost: The objective of knowing the works or factory cost is to control the factory cost and to know the efficiency of the factory. Works cost is also known as production cost or manufacturing cost. If costs of indirect material, indirect labour and indirect expenses of the factory are added to prime cost, works cost is arrived at.

Works cost = Prime cost + Indirect material + Indirect wages + Indirect expenses of the factory



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(3) Office Cost: If administrative and office overheads are added to factory or works cost, office cost is arrived at. This cost is also termed as administrative cost or the total cost of production.

Office Cost + Works cost + Office overheads

(4) Total Cost: If selling and distribution overheads are added to office cost, the total cost is arrived at. It is also termed as cost of sales.

Total Cost = Office cost + Selling and distribution expenses

(5) Selling Price: If the desired profit is added to the total cost or cost of sales, the selling price is arrived at. The difference between the selling price and the total cost shall be the profit or loss.

Selling Price = Total Cost + Profit

Profit = Sales — Total Cost



Emergence of Entrepreneurship in Rural Areas

Ms. S Elishiba Thomas¹, Mr. Pritesh Pandey²

¹Assistant Professor, Disha College, Raipur

²Assistant Professor AAFT University, Raipur

Abstract:

The rapid growth of entrepreneurship is not hidden. It has become a buzzword these days and it is not confined to the urban areas only. In fact, entrepreneurship development has been encouraged in rural areas to provide employment opportunities, improve the standard of living and foster economic growth. This chapter aims to shed light on the emergence of entrepreneurship in rural areas, its advantages and disadvantages, scope and conclude with some recommendations for the future development of entrepreneurship in rural areas.

Introduction:

Entrepreneurship has been recognized as a crucial factor for economic growth and development across the world. The growth and development of entrepreneurship do not cease in urban areas only. Entrepreneurs in rural areas are also emerging as important players in the global economy, providing employment opportunities and improving the standard of living in these regions.

The development of entrepreneurship in rural areas has been encouraged through various government initiatives and schemes such as Make in India, Start-up India, Stand-up India, etc. Such initiatives have led to the emergence of rural entrepreneurship, which has opened up opportunities for people in rural areas and has led to the development of new businesses.

Advantages and Disadvantages:

The emergence of entrepreneurship in rural areas has its advantages and disadvantages. The advantages of entrepreneurship in rural areas include the creation of employment opportunities for rural youth, increasing the income of farmers, enhancing the standard of living of rural areas, generation of new ideas, improvement of social status and increasing GDP.

However, one of the main disadvantages of entrepreneurship in rural areas is the lack of infrastructure, such as roads, power, internet connectivity, etc., which makes it difficult for entrepreneurs to set up their business. Similarly, the education level and skills of the rural workforce are often limited, making it difficult for entrepreneurs to find suitable employees. Additionally, the lack of financial resources also acts as a hurdle in the growth of rural entrepreneurship.

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Scope:

The scope of entrepreneurship in rural areas is vast and has tremendous potential. The agricultural sector has always been a major component of the rural economy, and with the advancement of technology, it is now possible to use it more efficiently. Rural entrepreneurs can make use of the latest technologies such as biotechnology, nanotechnology, artificial intelligence, robotics, and others to bring about a revolution in the agriculture sector in rural areas.

Furthermore, rural areas have a rich potential of resources that can be utilized for entrepreneurial activities. Entrepreneurs can leverage the local resources to set up business in areas such as handicrafts, textiles, pottery, toys, food products, etc. These industries can be promoted through the government's schemes such as 'One District, One Product' and 'Village and Small Enterprises Clusters.'

According to the 2019-2020 annual report of the Ministry of Rural Development, there has been a significant increase in the number of entrepreneurship ventures in rural areas over the past four years. The report states that under the Deen Dayal Upadhyaya Grameen Kaushalya Yojana (DDU-GKY) and Rural Self Employment Training Institutes (RSETIs) programs, over 3.5 million candidates were trained and more than 1.7 million were placed in various jobs between 2016-2017 to 2019-2020.

The report also emphasizes that the Pradhan Mantri Mudra Yojana (PMMY) scheme has played a critical role in providing financial assistance to rural entrepreneurs. Under the scheme, over 19 million beneficiaries from rural areas have been provided loans worth around Rs 7.23 trillion (\$99 billion) between 2016 to 2020. The scheme has also supported the growth of 25.1 million jobs during this period.

Furthermore, according to the India Entrepreneurship Report 2020 published by NASSCOM, rural entrepreneurship has witnessed a remarkable growth rate of 25% over the past four years. The report highlights that rural entrepreneurship has the potential to generate an additional revenue of around USD 88 billion by 2025 and create 25 million new jobs in rural areas of India.

Conclusion:

In a nutshell, entrepreneurship has emerged as a powerful tool for economic growth and development not only in urban but also in rural areas. Rural entrepreneurship has the potential to provide employment opportunities, enhance the standard of living, and generate wealth. However, for rural entrepreneurship to be successful, there is a need to develop the right infrastructural facilities, provide education and skills training, and provide financial support to entrepreneurs.

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Resources for Knowledge Management And Workforce Development

Mr. Sidhant Baliya¹, Mr. Mahendra Rao²

¹Assistant Professor, Disha College, Raipur

²Assistant Professor AAFT University, Raipur

Abstract

Knowledge management (KM) is the practice of developing, retaining, and seeking support within an organization. Organizations understand that knowledge is an important resource for organizations and should be managed fairly. Organizations need to develop knowledge to be competitive. KM requires a major change in organizational culture and commitment at all levels of the company to make it work. Ideally, through effective KM, an organization can bring all organizational learning and knowledge to bear any problem.

Keywords - *Knowledge management is a collection of facts, ideas, studies and policies, practices*

1. Introduction

The ability to create, share, use and manage knowledge and information within an organization is defined as knowledge management (KM). A multifaceted approach that helps organizations achieve their stated goals by using knowledge effectively and efficiently can also be called knowledge management. The use of knowledge management increases organizational effectiveness, productivity and learning (Scarborough et al. 1999).

Knowledge management provides strength and stability to organizations. The effective use and reuse of data and intellectual assets of a company is called knowledge management. It is difficult to identify human experts who can shape and influence their experience and are willing to share their knowledge. There is no point in generating useful information

Knowledge management is about the management of an organization's rich intellectual assets

Knowledge management plays an important role in entrepreneurship in enhancing creativity, managing change and empowering employees (Nonaka & Takeuchi 1995). help develop knowledge assets to meet organizational goals". Knowledge management can also be defined as "capturing the collective expertise of an organization wherever it resides and distributing it where it contributes to the greatest return" (Hibbard, 1997).

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2. Knowledge management process

Knowledge management acts as an environment to achieve competitive advantage. All organizations require knowledge mobilization to advance and support their strategy and ensure knowledge mobilization is facilitated by knowledge management. The most important process in organizations today is knowledge management. Davenport and Prusak (2000) argue that the most challenging issues in the era of knowledge management are knowledge capacity building and culture change. Collecting and managing knowledge, as well as protecting acquired knowledge resources from exploitation, is the impetus for the knowledge management process. Liao and Wu (2010) pointed out the need to implement the knowledge management process in every organization, to help employees to manage and to help employees to manage.

Effective knowledge management requires a strategy that involves several new processes. Companies need to unlock the knowledge they have, understand how to leverage that knowledge to generate added value, and plan how it will turn into action.

1. Discovery

- Every organization has several sources of knowledge, from employees to data and records.
- In the discovery process, the organization must identify existing knowledge resources, paying particular attention to information that can easily be lost.

2. Collection

- Gather existing knowledge and data form the basis of future processes.
- The company should review the experience of existing employees, documentation, and external educational sources. After implementation, many organizations redefine internal processes to make institutional knowledge part of daily operations. This can be through a continuous employee feedback system or a deeper online process.

3. Evaluation

- The team can then determine how to share information to improve the company's operations and provide employees with the knowledge they need to improve their productivity.
- Facilitates this process by allowing leaders to manage, evaluate, segment, and maintain a comprehensive knowledge base.

4. Sharing.

- Once you have established complete and accurate knowledge about your company, you must plan how it will be shared.
- Although there are many examples of information sharing, one thing that should be universal is creating a cultural shift towards learning and development.

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5. Application

- This is the step where the organization gets the benefit of knowledge management. Finding and maintaining institutional knowledge is only the beginning.
- Staff utilizing newly acquired expertise in their tasks brings a range of benefits in productivity, accuracy, decision-making, and more innovative employees.

Conclusion

Knowledge management works best when the knowledge creator easily coaches them and implement it. The people who are implementing what is known, not those who understand information technology, Learning plays a role and knowledge gains importance giving a path for Knowledge workers that helps in uplifting the organization and achieving its goals.

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“Entrepreneurship with Special Reference to Women’s Of Chhattisgarh”

Dr. Kamaljeet Kaur, Mr. Suraj Singh²

¹Assistance professor Disha College, Raipur

²Assistant Professor AAFT University, Raipur

Abstract

Entrepreneurship is an activity which is dynamic in nature. Entrepreneurs are known to undertake risk and foresee market behavior along with a drive of strong motive to achieve a definite goal. Absence of driving force that is motive ceases the existence of an entrepreneur Feasibility of being an entrepreneur and comfort level in acquiring customers have significant relationship with desirability to be an entrepreneur among women in Chhattisgarh. These two factors positively affect the desirability. This means that the more the level of comfort in acquiring customers and the more the self-confidence, motivation and persistence that results in more feasibility the more the desirability to become an entrepreneur. Social stability has a positive significant relationship with desirability to become an entrepreneur. It was observed that the more the person was socially stable the more they were desirable to start new venture..

Introduction

Economic strengthening in terms of entrepreneurship refers to the process of increasing the employment opportunity in the nation and thereby increasing the income levels of individuals. Entrepreneurship is an activity which is dynamic in nature. An entrepreneur as discussed in section above should be highly motivated and should have mandatory characteristic of calculated risk-taking ability with a definitive foresight. However, the characteristics of an entrepreneur should not be limited to the above mentioned one. Entrepreneur should have high level of motivation towards achievement of a definitive goal. Goal hoping should be minimalistic and should be performed only after set goal has been achieved to a level of self-satisfaction. Persuasion towards accomplishment of goal is mandatory when one decides to become an entrepreneur .Person should have enthusiasm and endurance. Road to achievement of set goals are often long and the journey to is exhaustive. Person with low enthusiasm and enthusiasm might lose interest in achieving goals when encountering a long road and exhaustive journey. Commitment towards achievement of goal is mandatory for entrepreneur. A new business can only be successful if the person is committed towards the attainment of the goal.

Key words- Entrepreneur, Social, Planning and Development

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Objectives

1. To analyze present status of Indian women entrepreneurs.
2. To evaluate the factors responsible for encouraging women to become entrepreneurs
3. To study the impact of the government policies and programmers to encourage women entrepreneurs
4. To critically examine the challenges faced by women entrepreneurs.

Challenges & Opportunities

In ancient times when orthodox society cultural was prevalent and was widely accepted as normal women were restricted to household activities only. Their duties were normally restricted to performing household activities that involved duties as homemaker and mother. Managing a household, at that time was also not easy. At that time too the households functioned as production and consumption units. The responsibility of bringing in raw material for preparation of consumable items were levied upon the male members of the household and female members were assigned the job of converting those raw materials into consumable items using methods and tools that can now be considered as rudimentary in nature.

With the advent of technology advancements were made in field of mechanization and fully automation of many processes of production. Out of these processes of production many were earlier limited to a man's job due to the amount of physical labour and strength required to perform the same. However, scientifically there exists no evidence that females are less in physical strength as compared to male counterparts, but the orthodox mentality of employers that equated physical strength to masculinity resulted in the same. The process of full mechanization and automation can be termed as another industrial revolution. This process benefited women who were willing to step out of the regular household course and undertake employment. This helped female members of an individual household to contribute in an effective way in earning money for the house. Participation of women in industrial sectors or taking up blue or white collared jobs meant that Indian economy was getting benefited. Women who were now coming out of their character of only a homemaker and mother were taking up the mantle of person who is contributing to the Indian economy in following form –

1. Getting employed in Unorganized sector such as food stalls, street vendors, daily wagers etc.
2. Getting employed in organized sector such as manufacturing industries, IT jobs, government employee etc.

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3. Entrepreneur education status relationship with the desirability to become an entrepreneur.

Sectors:-

1. Unorganized sector

- a. Unorganized sector is the sector in India that provides largest employment opportunity to Indians.
- b. Few Studies have indicated that unorganized sectors employ more women as compared to men in state of Chhattisgarh

2. Organized Sector

- a. Organized sector as per the size of the pie depicted in figure 3.1 is the second largest in India that is offering employment.
- b. Persons employed in organized sector can never be considered as an entrepreneur. To pick up the mantle of entrepreneur they must leave their traditional job first.

3. Entrepreneur

- a. Entrepreneurs can be the ones that could be classified as the people getting as well as offering opportunities to people in either unorganized or organized sector.
- b. To get officially recognized as an entrepreneur and to take advantage of government schemes and subsidies one must at some point of time migrate into an organized sector category.

In Chhattisgarh these products are Kosa Saris, Amari Juice, World renowned Bell-metal handicraft in which no two pieces are the same and State specific delicacies. These products are manufactured by women using local available material. Especially Kosa Saris that are made by rearing Silkworms.. In Villages of Chhattisgarh one can easily notice two or three groups of women taking up the mantle of entrepreneurship through formation of SHGs. Regional Manager of State Bank of India, Raipur answering to open ended questions stated that in Chhattisgarh the success of women entrepreneurship should be credited to the account of SHGs. SHGs are self-help groups that are formed by women with a common motive of raising their socio-economic standard and under this economic activity is must. The group as a whole or every member of the group should carry out some sort of economic activity. This is because SHGs work on microfinance. Small loan amounts are granted to individual or group with collective responsibility of the group. Chhattisgarhi Women when they form such groups lays down strict rule that repayment of loan is must. Failure to repay



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loans on time results in strict punishment which even includes public shaming. Members of these group is they carry out common economic activity then they either go for setting up of their own venture which includes manufacturing of sanitary pad, broom manufacturing centre or even taking up catering services. Women in Chhattisgarh have the potential to become successful entrepreneurs they only need support from family and solid schemes such as micro financing opportunities. In Chhattisgarh women occupy lowest strata of socio-economic pyramid. Years of negligence before creation of separate state, lack of education, child marriage and society prohibiting widow remarriage lead to their further exploitation. On top of it, Chhattisgarhi society is a male dominant one. Women earlier had to depend on male family members for daily supplies. This dependence of male family member imposed a restriction that women family members have very little access to finances and this in turn reduced their confidence. To start a new venture, it requires finances and due to strong dependency on male family member for finance women in Chhattisgarh were not able to start their own enterprise despite having innovative idea or potential to do so. It is with the advent of new government policy that encourage SHGs women started to vault the social barriers and start their own enterprise and become an entrepreneur. The state government in lines with the policies of central government brought numerous schemes that gave equal opportunities to female members of the society as that to male members.

Conclusion

Specific study of progress Entrepreneurs that were incubated through government start-up programs should be carried out to determine the efficacy of start-up incubator in Chhattisgarh. Specific study of rural entrepreneurs focusing on the micro-level management practices and multifunctional roles carried out by the entrepreneurs to manage their business. Specific study of start-up potential areas for women entrepreneurs should carried out to determine what potential areas exists in Chhattisgarh were women entrepreneurs can progress. Feasibility of being an entrepreneur and comfort level in acquiring customers have significant relationship with desirability to be an entrepreneur among women in Chhattisgarh. These two factors positively affect the desirability. This means that the more the level of comfort in acquiring customers and the more the self-confidence, motivation and persistence that results in more feasibility the more the desirability to become an entrepreneur. Social stability has a positive significant relationship with desirability to become an entrepreneur.

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