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ASSOCIATION OF PHYSICAL ACTIVITY AND MATERNAL HISTORY WITH PREMENSTRUAL SYNDROME IN YOUNG WOMEN: A CROSS-SECTIONAL STUDY

Dr. Raji Nair V.*
Dr. Rajesh C. B.**

ABSTRACT

Objective: *The study aimed to examine the association of maternal history and physical activity with premenstrual syndrome (PMS) symptoms in young women.* **Methods:** *A cross-sectional study was conducted with 125 randomly selected women aged 20–30 years. Participants completed a PMS questionnaire that collected demographic information, maternal PMS history, and physical activity habits. Data were analyzed using descriptive statistics and chi-square (χ^2) tests in SPSS, with a significance level set at $\alpha = 0.05$.* **Results:** *The prevalence of PMS among participants was associated with maternal history of PMS, χ^2 (1, N = 125) = 7.45, p = .006. Additionally, exercise patterns were significantly associated with PMS symptoms, χ^2 = 9.33, p = .0095. Participants who exercised regularly reported fewer PMS symptoms compared to those with low levels of physical activity.* **Conclusion:** *Both maternal history and physical activity were significantly associated with PMS in young women. These findings suggest that genetic predisposition and lifestyle factors, particularly regular exercise, play an important role in the occurrence and management of PMS.*

Keywords: *premenstrual syndrome, maternal history, physical activity, young women, cross-sectional study*

Introduction

Menstrual disorders are commonly observed in young females. Among them common issues faced by young women are amenorrhea, dysmenorrhea and premenstrual syndrome (PMS). It is widespread among women of childbearing

* *Assistant Professor of Physical Education, Govt. Engineering College Palakkad, Kerala, Email: vrajinair@rediffmail.com*

** *Associate Professor in Physical Education, N.S.S College of Engineering, Palakkad, E mail: rajeshcbalakrishnan@gmail.com*

age and is marked by emotional, physical, physiological and behavioral symptoms that disrupt daily routine during the luteal phase and subside few days after menstruation begins.

The global prevalence of premenstrual syndrome varies, with studies indicating a range from 47.8% to 75% among menstruating women (Tawakoli MF et al 2025). Around 20% of these women experience severe symptoms which affect their daily activities, while the others face mild to moderate symptoms (Gudipally PR et al 2023). Recent studies in India report that 14.3%–74.4% of the general population experiences premenstrual syndrome. Severe symptoms can make it challenging for women to participate in daily activities.

Symptoms of PMS include physiological and behavioral problems like depression, social withdrawal confusion, emotional burst, irritability, anxiety, inability to concentrate, sleep disturbances, changes in appetite, as well as physical problems such as weight gain, breast tenderness, bloating, headaches, aches and swelling of limbs (Liguori F et al. 2023). These symptoms typically peak a week before menstruation and diminish with its onset. The pathophysiology of premenstrual syndrome is intricate and not fully known, but it is likely influenced by progesterone effect on neurotransmitters. Various factors may contribute to this, including genetics, impaired function of hypothalamic-pituitary-adrenal (HPA) axis, insulin resistance, variations in glucose metabolism, increased prolactin levels, psychological factors, and lifestyle changes such as stress, sleep, nutrition, exercise.

Management of premenstrual syndrome includes lifestyle modifications like physical activity, dietary modifications, stress management and medications. Many women opt for non-medical treatments to avoid the side effects of medications. Non-pharmacologic therapy was recommended by The American College of Obstetricians and Gynecologists (ACOG) as the treatment for PMS.

Regular physical activity and exercise is an alternate method to medication for managing premenstrual symptoms and is related with improved wellness during the premenstrual phase. These non-pharmacological treatments are adaptable and often cited as effective means of controlling premenstrual syndrome. Additional benefits of exercise include enhanced overall health, emotional balance, socialization, and reduction in psychophysiological symptoms, all of which help to alleviate the severity of symptoms.

Research studies indicates that daughters of women with PMS are at increased risk of experiencing similar symptoms, possibly due to shared genetic factors influencing hormonal sensitivity and neurotransmitter regulation. Investigating maternal history may help identify high-risk individuals and contribute to early preventive strategies. Several studies on premenstrual syndrome have been conducted in foreign countries. But very few studies are conducted in Indian women. Thus, this study main objective is to explore the association of physical activity and maternal history on Premenstrual syndrome among young women.

Methodology

This research study aimed to examine the association between premenstrual syndrome (PMS) and physical activity in young women. A total of 125 women, aged 20 to 30 years, were selected through random sampling for participation in the study. Participants were approached individually, informed about the purpose of the study, and assured of confidentiality. After obtaining consent, the modified PMS questionnaire was administered. Respondents completed the questionnaires in the presence of the researcher to prevent missing data and ensure clarity.

To assess PMS, the researcher used the Premenstrual Syndrome Questionnaire originally developed by Kelly Wallace, B.Sc., N.D. The questionnaire also included additional items related to demographic and personal information, as well as questions regarding exercise habits and maternal history of PMS. The information regarding the maternal history, exercise habits and frequency of the subjects was included in the questionnaire.

Statistical Analysis

Data were analyzed using descriptive and inferential statistics. Descriptive statistics, including frequencies and percentages, were used to summarize participants' demographic characteristics, maternal history of PMS, physical activity patterns, and prevalence of premenstrual syndrome (PMS). Associations between PMS, maternal history of PMS, and physical activity were examined using the chi-square test of independence. All statistical tests were conducted at a significance level of $\alpha = 0.05$, which was considered appropriate for this study. Statistical analyses were performed using SPSS 21.0 software

Result

Table 1

Association Between Maternal History of PMS and Presence of PMS

Among Participants (N = 125)

Maternal History of PMS	With PMS, n (%)	Without PMS, n (%)	Total (n)	% of Total
Yes	34 (82.9%)	7 (17.1%)	41	32.8%
No	49 (58.3%)	35 (41.7%)	84	67.2%
Total	83 (66.4%)	42 (33.6%)	125	100%

$\chi^2 = 7.45$, df = 1, p = 0.0064

Table 1 presents the descriptive statistics of PMS scores of the subjects and maternal history. Among 125 participants 66.4% (n=83) reported PMS and 33.6% (n=42) have no PMS symptoms. Among the participants (n=41) with maternal history of PMS, 34 (82.9%) participants has PMS symptoms, whereas 7 (17.1%) participants reported no PMS symptoms, In contrast, among those without a maternal history of PMS (n = 84), 58.3% (n = 49) experienced PMS and 41.7% (n = 35) did not have PMS symptoms. This result shows that Participants who reported a maternal history of PMS were more likely to experience PMS themselves (34 out of 41; 82.9%) compared with participants without such a history (49 out of 84; 58.3%).

A chi-square test of association was performed to determine whether a maternal history of PMS was related to the presence of PMS among participants. The analysis showed a significant association between maternal PMS history and the participants'

PMS scores, χ^2 (df=1, N = 125) = 7.45, p = 0.006 at 0.05 level of significance. Since the obtained 'p' value is less than 0.05, the null hypothesis was rejected and alternative hypothesis was accepted. Thus, it was concluded that there was significant association between maternal history of PMS with subjects PMS score.

This findings indicate that participants with a maternal history of PMS was significantly more likely to exhibit PMS symptoms compared to participants without such a history. This suggests a possible genetic pattern in the occurrence of PMS. The association between maternal history of PMS with subjects PMS is shown in Figure 1.

Figure 1

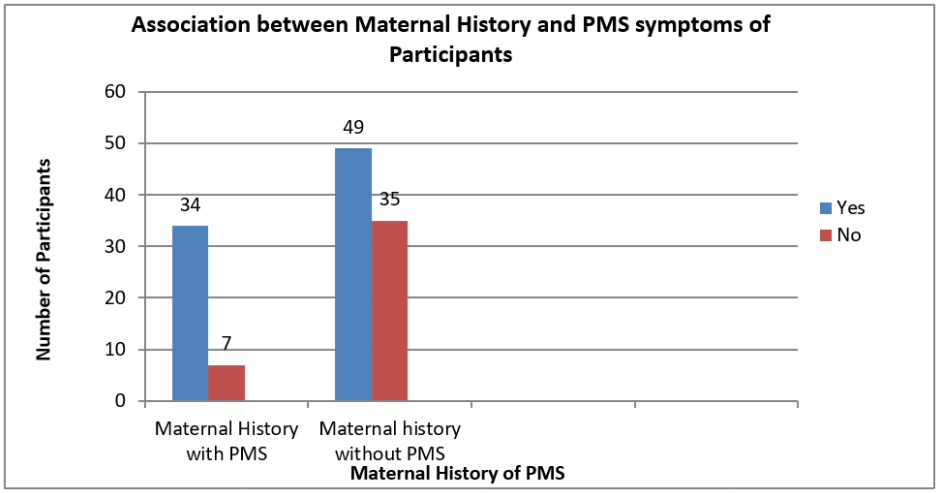


Table.2
Association Between Exercise Habits and PMS Scores of Participants

Regular Exercise Habits	Participants With PMS, n (%)	Participants Without P))MS, n (%)	Total (n)	% of Total
Often	13 (15.7%)	13 (31.0%)	26	20.8%
Sometimes	32 (38.6%)	21 (50.0%)	53	42.4%
Rarely	38 (45.8%)	8 (19.0%)	46	36.8%
Total	83 (100%)	42 (100%)	125	100%

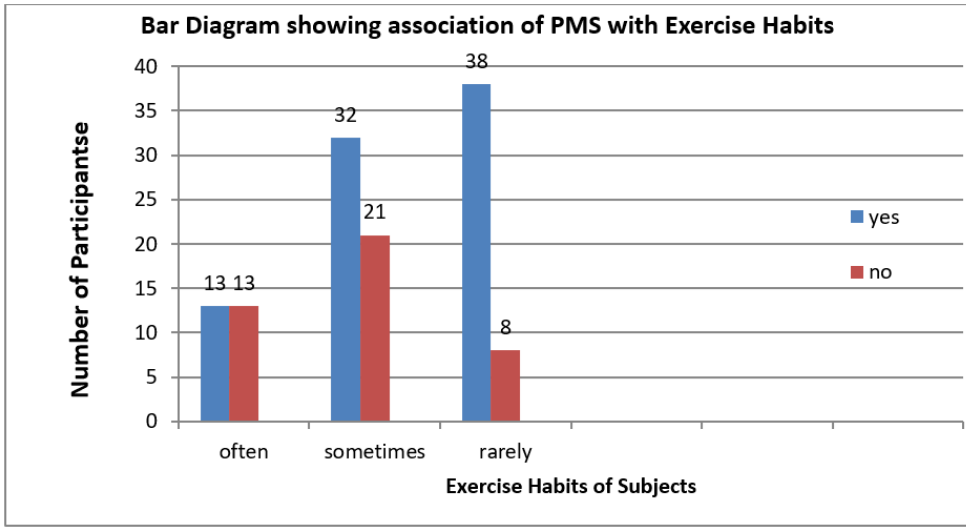
$\chi^2(2, N = 125) = 9.33, p = .0095$

Table.2 shows the association between PMS and exercise habits among the 125 participants. Overall, 66.4% (n = 83) of participants experienced PMS, while 33.6% (n = 42) reported no PMS symptoms. Regarding exercise frequency, 20.8% (n = 26) of participants reported exercising often, 42.4% (n = 53) exercised sometimes, and 36.8% (n = 46) exercised rarely. Among participants who experienced PMS,

38 (45.8%) reported exercising rarely, 32 (38.6%) exercised sometimes, and 13 (15.7%) exercised often. These results indicate that participants who engaged in regular exercise ("often") reported fewer PMS symptoms compared with those who exercised less frequently, suggesting that regular physical activity may be associated with reduced premenstrual symptoms.

A chi-square test of independence showed a statistically significant association between exercise pattern and PMS with $\chi^2 = 9.33$, $p = .0095$. Since the obtained 'p' (0.0095) value is less than 0.05 the null hypothesis was rejected and alternative hypothesis was accepted. This showed significant association between Exercise and PMS symptoms in young women

Figure 2



Discussion

The findings of the present study indicate a positive association between maternal history of premenstrual syndrome (PMS) and the occurrence of PMS among participants. Of the total sample, 32.8% reported a maternal history of PMS. Among these participants, 27.2% experienced PMS, whereas 5.6% did not report PMS symptoms. The proportion of PMS was higher among those with a maternal history compared to those without such history, suggesting a possible hereditary influence.

These findings are consistent with previous research. Wilson (1992) and Rasheed et al. (2003) reported similar associations between familial history and the prevalence of PMS. Furthermore, Halbreich (2003) suggested that genetic predisposition to specific premenstrual symptoms may be evident in mother–daughter and twin studies, supporting the hypothesis that hereditary factors contribute to PMS vulnerability. The observed association in the current study strengthens the evidence for a potential genetic or familial component in the development of PMS.

In addition to hereditary factors, the study revealed a significant association

between daily exercise habits and the occurrence of premenstrual symptoms. Among participants who experienced PMS, 45.8% reported exercising rarely, 38.6% exercised sometimes, and 15.7% exercised often. Notably, participants who reported exercising often experienced fewer PMS symptoms compared to those who exercised sometimes or rarely. This finding suggests that regular physical activity may be associated with a reduction in premenstrual symptoms.

The present results align with findings reported by Liguori et al. (2023), who emphasized that PMS management involves a multidimensional approach, including dietary modifications, regular exercise, stress management, cognitive-behavioral therapy, and pharmacological interventions. Regular physical activity may help regulate hormonal fluctuations, improve mood through endorphin release, and reduce stress, thereby alleviating PMS symptoms.

Overall, the findings of this study highlight the combined influence of hereditary and lifestyle factors in the occurrence of PMS among young women. Identifying modifiable risk factors such as physical inactivity, alongside non-modifiable factors like maternal history, may help in developing targeted preventive and management strategies.

Limitations and Recommendations

This study has several limitations. The cross-sectional design limits the ability to establish causal relationships between maternal history, physical activity, and premenstrual syndrome (PMS), as exposure and outcome were assessed at the same time. Second, data were self-reported, which may introduce recall bias or social desirability bias, particularly regarding maternal PMS history and exercise habits. Third, the study sample was limited to young women from a specific population, which restricts generalizability to other age groups or broader populations. Additionally, potential confounding factors such as dietary patterns, stress levels, body mass index, and socioeconomic status were not fully controlled.

Future research should use longitudinal or cohort designs to establish temporal and causal relationships between hereditary and lifestyle factors and PMS. Larger and more diverse samples would improve the generalizability of findings. Researchers are encouraged to incorporate objective measures of physical activity and clinical verification of PMS symptoms to reduce bias. From a practical perspective, health promotion programs focusing on regular exercise and awareness of familial risk factors may help prevent or alleviate PMS among young women. Further studies investigating the combined influence of lifestyle and genetic factors on PMS are warranted to inform effective interventions.

Conclusion

The findings of this study highlight important factors associated with the occurrence of premenstrual syndrome (PMS) among young women. A significant positive association was observed between maternal history and Physical activity on severity of Premenstrual syndrome symptoms. Overall, the study underscores the influence of both genetic predisposition and lifestyle factors on premenstrual symptoms. Encouraging regular physical activity and considering family history

may be beneficial in developing preventive strategies and management plans for PMS among young women. Participants who engaged regularly in physical activity experienced fewer PMS symptoms compared to those who exercised rarely or only sometimes.

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(Research Centre in Education)
Website: https://sites.google.com/view/educational-extracts
email: educationalextracts@gmail.com

MATHEMATICS ACHIEVEMENT: KEY FACTORS AND EFFECTIVE TEACHING STRATEGIES

Solly Susan Varghese* & Dr. Lavina Dominic**

Abstract

Mathematics achievement plays a crucial role in academia and opens many opportunities. It encompasses students' understanding of mathematical concepts, their ability to apply problem-solving skills, and their overall engagement with the subject. This article examines the multifaceted determinants of mathematics achievement, including socioeconomic status, instructional quality, technological integration, and student motivation. Research shows that disparities in achievement often stem from unequal access to resources, variations in teaching methods, and differences in learners' emotional and cognitive engagement. The review emphasises the importance of innovative approaches, including differentiated instruction, reflective learning, formative assessment practices, and the integration of ICT tools, in enhancing students' mathematical proficiency. Furthermore, empirical studies demonstrate that cooperative learning models and digital learning resources can significantly improve students' communication skills and conceptual understanding. The article concludes by emphasising the need for professional development for educators, equitable learning environments, and continued pedagogical innovation to support diverse learners. These insights suggest that a holistic, research-informed approach is essential for sustaining long-term improvements in mathematics education.

Key Words: *Mathematics Achievement, Academic Achievement, Student Performance*

Introduction

A strong foundation in mathematics empowers individuals to navigate an increasingly complex world and opens doors to various career opportunities. Mathematics achievement is one of the crucial aspects of education that influences students' success and societal progress. It encompasses a student's ability to

* *ICSSR Doctoral Fellow Scholar, St. Thomas College of Teacher Education, Pala*
** *Associate Professor, St. Thomas College of Teacher Education, Pala*

understand, apply, and create mathematical concepts and skills (Suparman et al., 2022). Mathematics develops critical and creative thinking and problem-solving skills, which are essential across various fields. Mathematics achievement is one of the critical components in educational success and future opportunities. It encompasses not only the understanding of mathematical concepts but also the ability to apply them in real-world situations. As students progress through their academic careers, proficiency in mathematics becomes increasingly vital; it is intricately linked to performance across disciplines, including science, technology, engineering, and even the humanities. Despite its significance, disparities in mathematics achievement persist among different demographic groups, with significant implications for educational equity. Addressing these disparities requires a multifaceted approach that considers factors such as socio-economic status, instructional methodologies, and the psychological aspects of learning. Thus, understanding the dynamics of mathematics achievement is essential for educators and policymakers alike, as it serves as both a benchmark for student performance and a predictor of broader societal outcomes. Additionally, improving mathematics achievement has become a central priority in education systems worldwide due to its strong connection to national progress, innovation, and long-term economic stability. Research consistently demonstrates that early skill development in mathematics strongly shapes students' academic futures, underscoring the importance of strengthening numeracy from the primary grades onward. Learners who build a firm understanding of mathematical ideas are better prepared to think critically, solve complex problems, and make informed choices in their daily lives. As the demand for STEM-related careers continues to grow, schools are under increased pressure to raise mathematics performance across all levels of education. Modern classrooms, therefore, require a deeper awareness of how technology, learner diversity, and motivational factors influence mathematical learning. The use of ICT tools has transformed mathematics instruction by offering interactive, customised, and adaptive learning opportunities for students. Despite these advances, teachers still face barriers, such as unequal access to resources, which often reflect broader socioeconomic differences. Emotional and psychological factors, such as students' confidence, anxiety, and attitudes toward mathematics, significantly affect their performance. For this reason, researchers recommend teaching approaches that address both cognitive development and emotional well-being. Ultimately, enhancing mathematics achievement is essential not only for educational progress but also for preparing future generations to succeed in an increasingly analytical and data-driven society.

Definition and Importance of Mathematics Achievement

Mathematics achievement is fundamentally defined as the level of proficiency and understanding an individual attains in mathematical concepts, skills, and applications. This achievement encompasses a range of competencies, from basic arithmetic to advanced problem-solving and analytical reasoning. The importance of mathematics achievement extends beyond academic performance; it is a pivotal indicator of critical thinking

and cognitive ability, influencing future educational and career opportunities. According to research, a strong foundation in mathematics fosters strategic thinking and enhances one's ability to navigate complex problems, which is essential in various fields, including science, technology, engineering, and mathematics (STEM) disciplines. Furthermore, effective professional development in mathematics education can significantly improve instructional strategies, ensuring that educators are equipped to boost student achievement in this crucial area (Campbell et al., 2011). Emphasising mathematics achievement not only benefits individual learners but also contributes to a more mathematically literate society, essential for addressing global challenges (White et al., 2005).

Factors Influencing Mathematics Achievement

An array of factors significantly influences mathematics achievement, encompassing both individual characteristics and broader educational environments. Among these, student engagement stands out as a crucial determinant; research indicates that perceived control and task value enhance engagement, ultimately improving academic performance in mathematics (González et al.). This relationship is further mediated by levels of disaffection, which can impede students' learning if not appropriately addressed. Additionally, the role of technology in the classroom cannot be overlooked. The effective integration of technological tools, such as computers and graphical calculators, has been shown to impact curriculum effectiveness and students' mathematical attitudes, which, in turn, affect their achievement. Furthermore, educators' professional development in pedagogical approaches is essential, as their ability to utilise technology innovatively shapes students' experiences and outcomes in mathematics education. Therefore, a comprehensive understanding of these interconnected factors is crucial for improving students' mathematics achievement.

Role of Socio-Economic Status on Student Performance

Socio-Economic status (SES) plays a pivotal role in determining student performance, particularly in mathematics achievement. Research indicates that students from lower SES backgrounds often exhibit lower academic outcomes, primarily due to limited access to educational resources and support systems. For example, a study analysing Canadian public school students found that socioeconomic status was a statistically significant factor influencing math performance, alongside gender considerations (Appiagyei et al., 2019). Furthermore, the disparity in parental expectations and engagement, which often correlates with SES, further exacerbates performance gaps. In a separate investigation focused on Louisiana high school students, although agriscience education demonstrated a positive effect on academic achievement, the underlying influence of socioeconomic factors on student performance remained substantial, highlighting the need for targeted interventions (Theriot et al., 2007). Ultimately, addressing these socioeconomic barriers is crucial for enhancing mathematics achievement and ensuring equitable educational opportunities for all students.

Strategies to Enhance Mathematics Achievement

Effective strategies to enhance mathematics achievement encompass the integration of technology and formative assessment practices, which have been shown to produce significant benefits in educational settings. The incorporation of Information and Communication Technology (ICT) tools, such as interactive whiteboards and educational software, can boost student engagement and motivation, ultimately leading to improved mathematical understanding and performance (Agyeman et al., 2023). Additionally, the application of formative assessment strategies encourages the development of higher-order thinking skills among students, as evidenced by recent studies that have demonstrated marked improvements in students' abilities to tackle complex mathematical tasks in Botswana (Moyo et al., 2021). Furthermore, professional development for teachers is essential to successfully implement these strategies, fostering not only their confidence but also their effectiveness in teaching mathematics. Collectively, these strategies form a robust framework for enhancing mathematics achievement, addressing diverse learning needs, and fostering a deeper understanding of mathematical concepts.

Effective Teaching Methods and their Impact

The efficacy of teaching methods is paramount in enhancing students' mathematics achievement, particularly for those who struggle in this subject area. Research has shown that differentiated instruction (DI) can significantly enhance the performance of low-achieving students in mathematics; for instance, a study involving Nigerian primary students found that DI outperformed traditional teaching strategies ($F = 19.321$, $P < 0.05$) (NGOZI et al., 2021). This approach tailors educational experiences to meet the individual needs of learners, fostering better engagement and comprehension. Furthermore, the use of reflective learning strategies has been identified as a contemporary method that bolsters academic success, emphasising student-centred learning over instructor-led approaches. An experimental study in Baghdad demonstrated that students utilising reflective learning principles showed statistically significant improvements in their mathematics achievement, along with a stronger positive attitude towards e-learning compared to those taught through traditional methods (Ngozi et al., 2021). These findings underscore the pivotal role that innovative teaching methodologies play in enhancing student outcomes in mathematics.

Conclusion

In conclusion, enhancing mathematics achievement requires the integration of effective instructional models and resources that cater to diverse learning needs. Research demonstrates the effectiveness of cooperative learning strategies, such as the TGT model, which has been shown to improve student performance in mathematics, particularly when combined with techniques like talking chips (Mardiyana et al., 2014). Additionally, the development of digital resources, such as e-books and interactive e-learning platforms, has further contributed to increasing students' understanding and engagement in mathematical concepts (Supratman et al., 2011). The findings indicate a clear correlation between the types

of instructional methodologies employed and the degree of student success. It is essential for educators to adopt innovative and interactive teaching approaches that not only target mathematical skills but also foster communication abilities among students. By prioritising these strategies, educational institutions can significantly enhance overall mathematics achievement and better prepare students for future academic pursuits.

Future Implications for Mathematics Education

In summary, the key points in mathematics education highlight the intricate relationships among teaching methodologies, student engagement, and academic performance. Emphasising problem-solving approaches and collaborative learning environments fosters deeper comprehension and retention of mathematical concepts. Additionally, integrating technology into the curriculum has shown promise in enhancing student interest and making complex topics more accessible. Looking ahead, the implications for mathematics education suggest a need for continuous professional development for educators to implement innovative practices effectively. Furthermore, curriculum reforms that prioritise equity and inclusivity are essential to address the diverse needs of students, particularly those from underrepresented backgrounds. Ultimately, advancing mathematics achievement requires a multifaceted approach that combines pedagogical improvements with a steadfast commitment to fostering a positive and supportive learning environment for all students. This holistic perspective will pave the way for more significant advancements in mathematics education for future generations.

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FOLKLORE HERITAGE OF NORTH MALABAR: RITUAL TRADITIONS AND CULTURAL CONTINUITY

Indu P*

Abstract

The folklore traditions of North Malabar represent a living cultural heritage sustained through ritual practices, oral traditions, and community participation. This study examines Theyyam, Kalaripayattu, and Sacred groves as forms of informal and experiential learning through which knowledge, values, and social responsibilities are transmitted across generations. Based on a qualitative analysis of literature and cultural interpretation, the study shows that Theyyam functions as a space for ethical reflection and social meaning, Kalaripayattu as a system of disciplined and holistic learning, and Sacred groves as community-based environments that promote ecological awareness and sustainable practices.

Together, these traditions demonstrate how learning is embedded in everyday cultural life. The study highlights their relevance for contemporary education, particularly in supporting value-based learning, environmental responsibility, and culturally responsive pedagogy. It suggests that integrating such indigenous knowledge systems can contribute to more meaningful and context-sensitive educational practices.

Keywords: *North Malabar, folklore heritage, Theyyam, Kalaripayattu, Sacred groves, ritual traditions, cultural continuity, indigenous knowledge.*

Introduction

North Malabar, located along the northern coast of Kerala, is widely recognized for its rich and enduring cultural traditions. Unlike many regions where traditional practices have declined, this region continues to maintain a strong connection with its heritage through living rituals and community-based cultural expressions that remain part of everyday social and spiritual life (Hobsbawm & Ranger, 1983; Smith, 2006).

The districts of Kannur and Kasaragod form the cultural heartland of North Malabar, where folklore traditions are preserved through ritual performance, oral

* *Assistant Professor of Mathematics, Crescent B.Ed. College, Madayipara, Kannur*

storytelling, and hereditary knowledge systems (Kurup, 2000; Nambiar, 2015). Among these, Theyyam and Kalaripayattu stand out as distinctive cultural institutions that combine spiritual belief, artistic expression, and social organization. While Theyyam represents a ritual in which the performer embodies a divine or ancestral presence, Kalaripayattu functions as a disciplined system of physical and moral development (Freeman, 1999; Zarrilli, 1998).

Understanding the folklore of North Malabar therefore requires attention not only to its history but also to the values and relationships embedded within these practices. Despite their cultural importance, the educational significance of these traditions as systems of informal learning has received limited scholarly attention. This study therefore examines folklore traditions as meaningful pedagogical processes that transmit knowledge, values, and skills across generations and explores their relevance for teachers and curriculum designers (Dewey, 1938; Kolb, 1984; Vygotsky, 1978; Rogoff, 2003).

Literature Review

Educational research has increasingly acknowledged the importance of experiential learning and cultural context in the learning process. Kolb (1984) emphasised that knowledge is constructed through direct experience and reflective practice, forming the foundation of experiential learning theory widely applied in educational research (Kolb, 1984; Dewey, 1938). This perspective suggests that learning occurs through observation, participation, and experimentation rather than passive reception of information.

Similarly, Vygotsky's sociocultural theory highlights the role of social interaction and cultural tools in cognitive development, suggesting that learning occurs within socially mediated environments (Vygotsky, 1978; Rogoff, 2003). According to this theory, learning takes place within a social environment where individuals acquire knowledge through communication, imitation, and collaboration. Traditional apprenticeship systems, such as those found in folklore practices, reflect these principles by enabling learners to develop skills through guided participation.

Scholars in the field of ethno-pedagogy have further emphasised the educational significance of indigenous cultural practices, noting that cultural traditions function as systems of knowledge transmission and identity formation within communities (Battiste, 2013; Smith, 2012). Folklore traditions serve as repositories of community knowledge, moral values, and social norms that are transmitted across generations through storytelling, ritual performance, and collective participation. Studies on intangible cultural heritage have demonstrated that cultural practices contribute to identity formation, environmental awareness, and community cohesion.

Theoretical Framework

This study is guided by three major educational theories that provide a conceptual framework for analysing folklore traditions as learning systems.

Experiential Learning Theory proposes that learning occurs through active engagement in meaningful experiences. In folklore traditions, individuals acquire

knowledge by participating in rituals, observing skilled practitioners, and practising cultural activities.

Sociocultural Learning Theory emphasises the role of social interaction and cultural context in knowledge transmission. Community-based traditions such as Theyyam and Kalaripayattu demonstrate how learning occurs within shared cultural environments where experienced practitioners guide novices through structured stages of training.

Informal Learning Theory recognises that education takes place outside formal institutions through everyday experiences and social participation. Folklore traditions represent informal learning environments in which knowledge is transmitted through storytelling, ritual performance, and communal activities.

Methodology

The present study adopts a qualitative descriptive research design aimed at analysing folklore traditions as systems of informal education. The research is based on secondary data sources, including scholarly books, journal articles, and documented cultural practices related to Theyyam, Kalaripayattu, and sacred grove traditions in North Malabar.

The method of analysis involves interpretive and thematic examination of folklore practices to identify their educational functions and pedagogical significance. Particular attention was given to the ways in which knowledge, values, and skills are transmitted through participation in ritual and cultural activities.

Sacred Groves as Environmental Education

While sacred groves originate from spiritual belief systems, their continued relevance in contemporary society lies in their educational value. These spaces provide practical lessons in environmental conservation, biodiversity protection, and sustainable resource management, enabling younger generations to understand the importance of ecological balance in everyday life (Gadgil & Vartak, 1976; Malhotra et al., 2007).

In modern educational contexts, sacred groves can be interpreted as natural classrooms that support experiential learning and responsible interaction with nature. These protected forest areas are preserved through cultural beliefs and ritual practices that emphasise respect for biodiversity and ecological harmony (Bhagwat & Rutte, 2006).

From an educational perspective, sacred groves function as community-based centres of environmental learning where individuals acquire principles of conservation and responsible resource management (Tilbury, 1995; UNESCO, 2017). Traditional beliefs that divine forces inhabit these groves encourage protective behaviour, discouraging activities such as tree cutting or wildlife disturbance and thereby supporting the preservation of local ecosystems (Ormsby, 2011).

Sacred groves therefore represent early forms of ecological awareness rooted in cultural belief and community responsibility. They serve as repositories of indigenous ecological knowledge and demonstrate how folklore traditions promote sustainable

environmental practices long before the emergence of modern conservation science (Gadgil & Guha, 1992; Berkes, 2012; Smith, 2006).

In this sense, folklore in North Malabar extends beyond storytelling or ritual performance to encompass ecological awareness, social responsibility, and moral values, forming a holistic worldview in which culture, environment, and spirituality remain closely interconnected (Berkes, 2012; Tilbury, 1995).

Theyyam as the Core Expression of Folklore

Nature and Significance

Theyyam is widely regarded as the most powerful and meaningful expression of folklore in North Malabar, representing a unique fusion of ritual, art, and spirituality (Kurup, 2000; Nambiar, 2015). Rather than serving as entertainment, it functions as a sacred ceremony in which performers act as intermediaries between the human and divine worlds (Freeman, 1999).

Central to the tradition is the belief in divine embodiment, where the performer undergoes transformation through prayer, music, costume, and symbolic gestures, culminating in the temporary presence of the deity. Devotees approach the performer with reverence, seeking blessings, guidance, and solutions to personal concerns (Freeman, 1999; Bauman, 1984).

The settings of Theyyam performances—such as sacred groves, ancestral compounds, and temple courtyards—enhance the spiritual atmosphere and create a sense of sacred presence, where the boundaries between the physical and spiritual realms appear to merge (Bortolotto, 2011; UNESCO, 2003).

Historical and Cultural Roots

The origins of Theyyam can be traced to early Dravidian religious practices characterized by animistic beliefs and ancestor worship (Kurup, 2000; Hobsbawm & Ranger, 1983). Individuals who displayed courage or moral virtue were remembered as protective spirits, and rituals developed to honour their memory and secure community protection (Nambiar, 2015).

Over time, the tradition incorporated elements from major Hindu traditions such as Shaivism, Shaktism, and Vaishnavism, enriching its rituals with diverse mythological narratives and devotional practices. This integration reflects the adaptive nature of Theyyam, which preserved its indigenous character while evolving through cultural interaction (Smith, 2006; UNESCO, 2019). Its continued vitality demonstrates the resilience of folklore traditions across periods of social and cultural change (Bortolotto, 2011).

Ritual Structure and Performance

The performance of Theyyam follows a structured sequence of rituals beginning with purification ceremonies and the preparation of ritual materials (Kurup, 2000). A central element is the chanting of *Thottam Pattukal*, narrative songs that recount the origin stories of the deity. These songs invoke divine presence, preserve historical memory, and guide the performer into a trance-like state essential for ritual transformation (Bauman, 1984; Freeman, 1999).

The visual dimension of Theyyam is equally significant. Elaborate facial painting (*mukhathezhuthu*) uses symbolic colours and patterns representing the

identity and power of the deity (Nambiar, 2015). The ritual reaches its climax when the fully adorned performer appears before the community, believed to have assumed divine status, offering blessings, advice, and prophecy to devotees (Freeman, 1999).

Social and Cultural Functions

Beyond its religious role, Theyyam performs important social and cultural functions within North Malabar society. Ritual narratives preserve collective memory by recording historical events, moral values, and community traditions (Hobsbawm & Ranger, 1983; Smith, 2006).

Theyyam also serves as a platform for social reflection, addressing themes such as justice, equality, responsibility, and moral conduct. Through symbolic performance, it communicates ethical lessons and reinforces shared community values, functioning as both a cultural and moral institution (Kurup, 2000; Nambiar, 2015; Gopi, 2021; Jayaprakash & Senguttuvan, 2024).

A notable feature of the tradition is the temporary reversal of social hierarchy, where performers from marginalized communities are elevated to divine status and receive universal respect. This transformation symbolically suspends social divisions and strengthens social cohesion and cultural identity (Freeman, 1999; Rogoff, 2003; Ahammed, 2019).

Theyyam as Experiential and Value-Based Education

The Theyyam ritual represents a powerful form of experiential learning in which knowledge is acquired through observation, participation, and emotional engagement, reflecting key characteristics of informal learning environments (Freeman, 1999; Gopi, 2021; UNESCO, 2017). Through symbolic gestures, storytelling, and ritual practices, the performance communicates historical knowledge, ethical principles, and social values.

Kalaripayattu and the Folklore of Discipline

Origins, Philosophy, and Cultural Foundations

Kalaripayattu, the traditional martial art of Kerala, represents more than a system of combat; it is a holistic discipline that integrates physical training, mental strength, spiritual awareness, and healing knowledge into a unified way of life (Zarrilli, 1998; Alter, 2013). Deeply rooted in Kerala's cultural heritage, this martial tradition reflects centuries of accumulated wisdom and continues to remain relevant as a means of self-defence, personal development, and physical fitness (Menon, 2007).

Historically, Kalaripayattu has been viewed as a philosophy of life emphasizing character formation, discipline, and self-control, based on the belief that the human body can serve as a pathway to intellectual and spiritual growth (Green, 2011). Its survival and revival after periods of decline illustrate the resilience of traditional knowledge systems and their capacity to adapt to changing social conditions (Phillip, 2012).

The origins of Kalaripayattu are closely linked to mythology, history, and cultural memory. Traditional accounts attribute its introduction to Parasurama, who is believed to have established training centres to promote protection and social order (Kurup, 2000). Another revered figure, Sage Agastya, is associated with shaping the philosophical and spiritual foundations

of the discipline, particularly in southern styles (Zarrilli, 1998).

Historical evidence indicates that organized martial training developed during the Sangam period (approximately 600 BCE to 300 CE), when warriors were trained in both armed and unarmed combat (Nilakanta Sastri, 1955). Ancient texts such as the *Dhanur Veda* and the *Arthashastra* describe structured systems of warfare and physical training resembling the principles of Kalaripayattu (Kangle, 1965). Cultural practices such as ritual duels known as *Ankam* and warrior contests during the Mamankam festival further reflect a martial tradition that valued honour, discipline, and ethical conduct (Logan, 1887).

Another important cultural narrative links Kalaripayattu to Bodhidharma, a South Indian monk believed to have carried martial knowledge to China, influencing the development of Asian martial arts traditions such as Shaolin Kung Fu. Although this connection remains historically debated, it symbolizes the broader cultural influence and global imagination associated with Kerala's martial heritage (Green, 2011; Zarrilli, 1998; Shahar, 2008).

Kalaripayattu as a System of Holistic Education

Kalaripayattu training reflects a structured educational process based on discipline, gradual skill development, and close teacher–student interaction (Alter, 2013). Training begins with physical conditioning and progresses systematically to advanced techniques and healing practices, resembling modern competency-based learning models that emphasize continuous practice and mastery (Singh, 2015).

The relationship between the *Gurukkal* and the student represents a traditional mentorship system grounded in trust, respect, and moral responsibility (Nair, 2010). Students develop not only physical skills but also perseverance, patience, and emotional self-control. In this way, Kalaripayattu functions as an informal educational system that combines physical training, moral instruction, and cultural learning, demonstrating the value of experiential learning and character development in contemporary education.

The Kalari and the Role of the Gurukkal

The training space for Kalaripayattu, known as the *Kalari*, is regarded as a sacred learning environment rather than merely a physical practice ground. Traditionally constructed according to the principles of *Vastu Shastra*, the Kalari is designed to create a balanced atmosphere that supports both physical and spiritual development (Achuthan, 2014).

A key feature of the Kalari is the *Poothara*, a sacred platform symbolizing spiritual energy and cultural continuity. Daily rituals and prayers performed in this space reinforce the connection between martial training, ethical conduct, and spiritual awareness (Zarrilli, 1998). At the centre of this system stands the *Gurukkal*, who serves not only as a martial instructor but also as a mentor, healer, and cultural custodian responsible for transmitting knowledge across generations (Menon, 2007; Alter, 2013). An important aspect of this knowledge is *Marma Vidya*, the science of vital body points associated with healing and injury prevention (Sujatha, 2009).

Stages of Training, Skills, and Connection with Nature

Training in Kalaripayattu follows a structured progression designed to develop strength, flexibility, coordination, and discipline (Zarrilli, 1998). This systematic approach reflects the principle that mastery is achieved through continuous practice and gradual improvement (Lave & Wenger, 1991).

The learning process generally progresses through four major stages:

1. Meithari – Physical conditioning to improve flexibility, balance, and coordination.
2. Kolthari – Training with wooden weapons to develop timing and control.
3. Ankathari – Advanced instruction using metal weapons, emphasizing discipline and responsibility.
4. Verumkai – Bare-hand combat focusing on self-defence and body control.

Kalaripayattu also draws inspiration from nature, with practitioners imitating the movements of animals such as the lion, snake, elephant, tiger, and horse to enhance agility and strength (Green, 2011). This connection reflects an ancient understanding of harmony between human beings and the natural environment (Gupta, 2016).

Over time, Kalaripayattu developed into three major regional styles—*Vadakkan Kalari*, *Thekkan Kalari*, and *Madhya Kalari*—each shaped by local traditions while preserving the core philosophy of discipline and holistic training (Menon, 2007; Phillip, 2012).

Healing Traditions, Modern Revival, and Contemporary Relevance

Healing forms an essential component of the Kalaripayattu system. A specialized branch known as *Kalari Chikitsa* focuses on injury treatment, physical rehabilitation, and overall health maintenance through therapeutic massage, herbal medicine, and bone-setting techniques (Sujatha, 2009). The knowledge of *Marma* points plays a vital role in both treatment and injury prevention, reflecting the integration of martial training and healthcare practices (Alter, 2013).

Although Kalaripayattu declined during the colonial period due to restrictions on martial training, it has experienced significant revival since the twentieth century (Logan, 1887; Phillip, 2012). Today, the practice is widely recognized as a form of physical fitness, cultural identity, and self-defence (Green, 2011).

In contemporary society, Kalaripayattu has expanded into diverse fields, including fitness training, cultural performance, heritage tourism, and women's empowerment initiatives. These developments demonstrate its continued relevance as a dynamic cultural practice that adapts to modern needs while preserving traditional values (UNESCO, 2019).

Cultural Significance in Society and Performing Arts

Kalaripayattu has had a lasting influence on Kerala's cultural traditions and performing arts, shaping the discipline and expressive techniques found in classical and ritual forms such as Kathakali, Theyyam, and Thira (Kurup, 2000; Freeman, 1999). Its emphasis on posture, rhythm, balance, and coordination supports sustained and

meaningful performance, illustrating the close relationship between martial practice and artistic expression.

In addition, folk songs and ballads preserve stories of heroic warriors, reinforcing cultural values such as bravery, honour, and loyalty (Blackburn, 1988). Historically, training in Kalaripayattu was considered an important stage in personal development, fostering courage, discipline, and respect for authority (Menon, 2007).

Community, Caste, and Cultural Transmission

The preservation of folklore traditions in North Malabar depends largely on hereditary systems, where specific families and communities are responsible for sustaining ritual practices (Kurup, 2000; Freeman, 1999). Knowledge is transmitted through observation, participation, and oral guidance, reflecting indigenous learning systems rooted in lived experience and shared practice. This approach ensures continuity while allowing adaptation to changing social conditions (Hobsbawm & Ranger, 1983).

Ritual contexts can also challenge social hierarchies. In Theyyam performances, individuals from marginalized communities assume positions of spiritual authority, highlighting the dynamic relationship between tradition and social structure (Freeman, 1999; Nambiar, 2015; Ahammed, 2019).

Overall, these traditions demonstrate that education extends beyond formal institutions into community life, where rituals function as experiential learning environments that promote intellectual, physical, and moral development (Dewey, 1938; Gay, 2018; Kolb, 1984).

Folklore as Informal Education

Folklore traditions operate as effective systems of informal education, transmitting knowledge through participation and lived experience rather than formal instruction (Bruner, 1996). Through involvement in rituals and cultural practices, individuals develop artistic skills, ritual knowledge, and an understanding of symbolic meanings, alongside values such as respect, discipline, and social responsibility.

This integrated learning process nurtures both practical skills and ethical values across generations. It also strengthens cultural identity and fosters a sense of belonging, while encouraging collaboration and social interaction in community settings such as festivals and performances (Vygotsky, 1978; Rogoff, 2003; UNESCO, 2019).

Contemporary Relevance and Challenges

Despite rapid modernization, the folklore traditions of North Malabar remain vibrant due to their adaptability and cultural significance **(**Bauman, 1984; Gopi, 2021; Jayaprakash & Senguttuvan, 2024). However, several challenges threaten their sustainability. Increasing commercialization risks shifting focus from ritual meaning to entertainment, while the decline of traditional patronage systems reduces support for practitioners. Urbanization and migration further disrupt cultural continuity, and the gradual loss of traditional knowledge weakens intergenerational transmission.

These concerns highlight the need for systematic documentation and active community participation in preservation efforts (UNESCO, 2003; Smith, 2006).

Addressing these challenges requires coordinated initiatives involving educational institutions, cultural organizations, and local communities to safeguard and transmit this heritage to future generations (Bortolotto, 2011).

Conclusion

The present study demonstrates that the folklore traditions of North Malabar—particularly Theyyam, Kalaripayattu, and sacred grove practices—function as dynamic systems of cultural continuity, social organization, and informal education. Rather than merely ritual performances or cultural symbols, these traditions operate as living knowledge systems through which communities transmit values, skills, beliefs, and ecological wisdom across generations. They reflect a holistic worldview in which spirituality, social responsibility, physical discipline, and environmental stewardship are closely interconnected (Berkes, 2012; Kurup, 2000; UNESCO, 2019).

A key finding of the study is that folklore traditions provide meaningful models of experiential learning. Through observation, participation, imitation, and guided practice, individuals acquire knowledge in ways that align with contemporary theories of experiential and sociocultural learning (Dewey, 1938; Kolb, 1984; Vygotsky, 1978). Participation in Theyyam nurtures ethical awareness and social reflection; training in Kalaripayattu develops discipline and resilience; and the preservation of sacred groves promotes ecological responsibility. These examples illustrate how learning extends beyond formal classrooms into the lived cultural experiences of communities.

The study also highlights the social importance of folklore traditions in strengthening cultural identity and community cohesion. Ritual practices preserve collective memory and provide moral guidance, reinforcing values such as justice, respect, cooperation, and responsibility (Freeman, 1999; Nambiar, 2015). At the same time, traditions like Theyyam demonstrate the potential of ritual spaces to challenge social hierarchies and affirm the dignity of marginalized communities, thereby supporting social inclusion and cultural resilience (Hobsbawm & Ranger, 1983).

From an educational perspective, the findings emphasize the value of integrating indigenous cultural knowledge into contemporary teaching and teacher education programmes. Folklore traditions offer practical models of value-based learning, community engagement, and culturally responsive pedagogy (Gay, 2018; Bruner, 1996). Incorporating local cultural practices into learning experiences can strengthen students' sense of identity, respect for heritage, and environmental awareness.

In terms of policy implications, the study suggests that educational planners and cultural institutions should actively support the documentation, preservation, and educational use of folklore traditions. Integrating local cultural knowledge into school curricula, community-based programmes, and teacher training initiatives can contribute to sustainable cultural preservation while enhancing the relevance of education to local contexts (UNESCO, 2017). Collaboration among educational institutions, cultural practitioners, and local communities is essential to ensure the

continued vitality of traditional knowledge systems.

Finally, the study indicates directions for future research, including empirical investigations into the impact of folklore-based learning on student development, community participation, and environmental awareness. Comparative and interdisciplinary research may further deepen understanding of how indigenous traditions function as educational systems and contribute to sustainable development.

In conclusion, the folklore heritage of North Malabar remains a rich and enduring source of knowledge that continues to shape cultural identity, social relationships, and educational practices. Preserving and integrating these traditions within modern educational frameworks is not only an act of cultural conservation but also a pathway toward more meaningful, inclusive, and culturally grounded education for future generations.

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St. Thomas College of Teacher Education, Pala, Kerala, India
(Research Centre in Education)
Website: https://sites.google.com/view/educational-extracts
email: educationalextracts@gmail.com

ECOLOGICAL, CULTURAL AND HISTORICAL SIGNIFICANCE OF MADAYIPARA: A DESCRIPTIVE SURVEY OF STAKEHOLDER PERSPECTIVES IN KANNUR DISTRICT, KERALA

Lisha K.*

Abstract

This study tries to understand why Madayipara, a unique laterite hillock in Kannur district, matters so much, both for nature and for culture. Using a descriptive survey, the researcher collected responses from 110 people living in and around Madayipara. Information was gathered through a questionnaire (designed by the investigator), unstructured interviews, and informal talks with local stakeholders. The study highlights Madayipara's rich past, its deep connections to local traditions and cultural practices, and its value as a home to many plants and animals, including seasonal vegetation. It also looks at what this place means to local communities and how it adds to the region's identity and tourism. The results make it clear: we need to protect and preserve Madayipara responsibly, so that both its heritage and natural environment are not lost.

Keywords: *Madayipara, Biodiversity, Pooram, Madayi Kavu.*

Introduction

Madayipara, in Kannur district, is no ordinary laterite hillock. It is known for its natural beauty, its history, and its cultural importance. Its unique landscape, seasonal plants, and rich biodiversity make it an important natural habitat and also a place with strong social and historical value. Over time, Madayipara has shaped local traditions, cultural practices, and the daily lives of nearby communities, becoming a vital part of the region's heritage.

Need and Significance of the Study

Early studies, especially the faunal survey by Palot and Radhakrishnan in 2005, gave us basic information about animal life – birds, amphibians, reptiles, insects, and mammals – and also pointed

Assistant Professor of Mathematics, Crescent B.Ed. College, Madayipara

out how important the seasonal pools are for breeding and feeding. Later research started focusing more on plants. The book *A Hillock of Biodiversity* (2020) recorded over 665 angiosperm species and looked at vegetation patterns, soil conditions, and local climate. Supporting that, Pramod and Pradeep (2021) identified 636 flowering plant species, many of them found only here, and highlighted the role of special microhabitats and seasonal plants that survive in the tough laterite environment. Taxonomic studies, including the discovery of *Eriocaulon madayiparense* in 2012, further proved how unique the region is by identifying rare species that live nowhere else. Alongside biological studies, geological and geochemical research has shown that Madayipara was formed through intense lateritisation, with high iron content and long-term tropical weathering, and it also contains minerals like kaolin and lignite. Media reports and environmental studies (Sudhakaran, 2012; Byju, 2013) further indicate that human pressures have already weakened the ecosystem, making it more vulnerable to tourism. All this research clearly shows that Madayipara is biologically rich but fragile and that we urgently need proper conservation and sustainable management. The main purpose of this study is to understand the growing pressure on Madayipara's environment from human activities like uncontrolled tourism, land encroachment, and pollution – all of which are slowly harming the area.

Madayipara is a unique and fragile laterite ecosystem that hosts an amazing variety of plants and animals, many of which are found nowhere else. Its seasonal pools, grasslands, and rocky areas create habitats for life forms that cannot survive elsewhere, which really highlights the plateau's ecological importance. Studies show that protection for the area is still very limited. Human activities like laterite mining, land-use changes, urban growth, and unregulated tourism keep damaging its habitats and threatening its biodiversity. Even though researchers have long stressed the need for conservation and sustainable management, effective measures and strict protective policies have not yet been put in place. We need immediate action to safeguard Madayipara before its irreplaceable ecosystem suffers harm that cannot be reversed.

Today, growing environmental challenges, urban development, and changing social conditions make it necessary to understand and protect landscapes like this. Studying Madayipara's history, ecological value, and socio-cultural importance helps us ensure its proper conservation and sustainable use. Even though the area is significant in many ways, it has not received much academic attention, which is exactly why we need a detailed study of its different aspects.

Objectives of the Study

1. To understand how well people are aware of the ecological importance of Madayipara, including its rich biodiversity, seasonal plants, and unique laterite landscape.
2. To identify environmental threats and conservation issues affecting the ecosystem.

Procedure of the Study

The investigator conducted this study to understand the many-sided importance of Madayipara and to collect information from various stakeholders – people involved in preservation, conservation, social activities,

and residents of the area. A descriptive survey was done in two phases. For this, the investigator prepared a questionnaire and gave it to 125 people living in Madayipara; 110 questionnaires that were fully completed were used for analysis and interpretation. Purposive sampling technique, a type of non-probability sampling method, was used to include knowledgeable stakeholders. The study also used a mixed-method approach, combining quantitative data (questionnaire responses) and qualitative data (unstructured interviews and informal discussions). Unstructured interviews were held with various stakeholders to cross-check the data. To add to the observed information, the investigator also had an informal discussion with administrative staff of the Madayi Panchayat.

Analysis and Interpretation

The responses of stakeholders regarding the importance of Madayipara are presented in Table 1.

Table 1

Showing the Response of Stakeholders Regarding the Importance of Madayipara.

Sl. No.	Item	Responses			
		Yes		No	
		N	%	N	%
1	There have been noticeable changes over time in the festivals and celebrations in Madayipara.	75	68	35	32
2	There are unique traditional art forms, folk songs, or dances in this area.	86	78	24	22
3	Aware of local festival in this area.	100	91	10	9
4	Social and Cultural Organizations in Madayipara play an important role for the protection of this area.	88	80	22	20
5	Historical structures or relics exist in or around Madayipara and are being protected.	104	95	6	5
6	Aware of the diverse flora and fauna (biodiversity) of Madayipara.	55	50	55	50
7	The environment in this area is being adequately protected.	95	86	15	14
8	Excessive human intervention has caused harm in this area.	94	85	16	15
9	Tourism has led to noticeable consequences in this area.	90	82	20	18
10	There are panchayatlevel activities for the protection of Madayipara, and I participate in them.	53	48	57	52
11	Aware of unauthorized encroachment activities taking place in Madayipara.	72	65	38	35
12	Face difficulties with availability of electricity and water.	70	64	40	36
13	Sufficient roads and public transport facilities in this area.	72	65	38	35

Note. N = number of respondents (total N = 110); % = percentage of respondents.

Historical and Cultural Reminiscence

Madayipara was one of the administrative centers of the Kolathunadu royal dynasty. Historical records suggest that kings were crowned here. Madayi Fort and its watch towers still show the military and administrative importance of the region. Traces of visits by the Portuguese, the Dutch rulers, and Tipu Sultan can still be seen here. Jutha Kulam, an ancient reservoir on top of Madayipara, is considered evidence of a Jewish settlement. It is believed that an ancient Jewish trading community lived here and used this pond. The Madayipara region is a hub of many festivals and celebrations, and over time these cultural events have changed to fit modern times.

Important Temples, Churches and Kavu

The vast rocky plain of Madayipara, near Pazhayangadi town, becomes a festive spectacle during the Pooram days in the Malayalam month of Meenam. The nine-day Pooram festival at Madayi Kavu is the main festival of the Pazhayangadi region. The grand procession from Kodumkav on the northeastern slope of Madayipara – which starts from Thiruverkattu Mathilakam – is a magnificent sight. The Pooram procession begins from the Kavu at one end of Madayipara and goes to the fort at the other end. Ritual performances like Poorakkali happen every day during the festival. One common ritual practice is the ceremonial bath at Vadukunnu Lake of Vadukunnu Shiva Temple. Major rituals include Pooram, Kalasholsavam, Mari Theyyam, Puthari, and Nira. The Koothu and Koothambalam of Madayi Kavu are also famous. The Theyyampadi songs and Kalathil Arishattu performances tell the legend of the slaying of Darika.

Structures and sites like Darikan Kotta, Murikkancheri Fort, Madayi Kalari, Hermann Gundert's bungalow, Madayi Mosque (one of the earliest mosques in India), Jutha Kulam, Palayam, and Sultan Thodu – along with Madayi Kavu – all reflect the historical background of Madayi. Important annual rituals include Vishu in Medam, Kalasham in Edavam, Prathishta in Mithunam, Thira and Mari Theyyam in Karkidakam, Chinga Puthari, Thiruvonam, Koothu in Kanni, Ettu Pattu and Kalathilari in Thulam, Muppathu Pattu and Kalathilari in Vrischikam, the Karthika festival, Pandalkal ritual in Dhanu, Sankramam in Makaram, Pathimoonu Pattu and Kalathilari, and Pooram in Meenam.

Relationships between Temples and Churches

Jewish settlement in the region is shown by Jutha Kulam; an ancient Jewish trading community lived here and used this pond. Madayi Mosque, near Pazhayangadi in Kannur district, is considered one of Kerala's oldest mosques. It is not only a spiritual center for the Muslim community but also a symbol of social unity where different religions live together peacefully. Most people (95%) are aware of the historical structures in the area – which shows a strong connection to local heritage.

Local Festival – Pooram

Madayipara Pooram is a major temple festival celebrated right here at Madayipara. The festival is linked to the ancient Madayikavu Temple, dedicated to Goddess Bhagavathy, who is worshiped as a powerful form of Devi (Kali). Celebrated every year in the Malayalam month of Meenam (March–April), the festival reflects the ritual richness and cultural diversity of

North Kerala. The Madayikavu Temple is believed to date back several centuries. Local traditions connect the region to early Brahmin settlements and ancient temple-centered cultural development. The Pooram festival grew out of the temple's annual ritual calendar, serving both religious and social functions in the community.

From a religious point of view, Madayipara Pooram is held to honor Goddess Bhagavathy and to seek her blessings for protection, prosperity, and good farming. The rituals include special poojas, offerings, ceremonial flag hoisting, and traditional rites performed by temple priests according to old customs. Devotees join in with deep faith, often keeping vows and making offerings as acts of devotion.

The survey shows a community that still holds on to its cultural and environmental roots, even as modern influences keep growing. Many people (68%) feel that festivals and celebrations have changed over time, but at the same time a larger number (78%) say traditional art forms are still alive. Most people (91%) are aware of the local festival in this area.

Biodiversity and Its Conservation

Madayipara is a rare laterite plateau in Kannur district and has been declared a biodiversity rich area. Rare grasses, medicinal plants, and seasonal flowers grow here. It is also a habitat for many butterflies, birds, and small creatures. During the monsoon and autumn, the whole plateau is covered with flowers of different colors. A waterfall once existed on the southwestern side of the plateau, but it disappeared after mechanized china clay mining started. Another waterfall flowing into Kakkithodu can be seen in the southern valley of Madayipara. Small streams flowing eastward can be seen around Madayi Fort, and Vadukunnu Lake never dries up – even in severe summer.

But we have to understand that effective conservation efforts are lacking here. Because of too much human interference, the area is becoming more and more polluted. Even though it is a well-known tourist spot, it sometimes becomes a place for anti-social activities. Illegal encroachments are also happening. When natural disasters like forest fires destroy this vast scenic area, there are no proper measures to stop them. Despite attracting a lot of curiosity from visitors, the region has poor public transport. And although the area once had plenty of water, human intervention has now led to water scarcity.

Awareness about biodiversity is split exactly 5050 – meaning not everyone knows about the region's natural richness. Ninetyone percent (91%) of respondents notice fewer people taking up traditional jobs, which shows changing lifestyles and priorities. On a positive note, 80% say that traditional farming practices including the use of local seeds and crops are still being followed.

Influence of Tourism in Madayipara

Madayipara is a unique laterite plateau loved for its natural beauty, seasonal blooms, grasslands, and cultural importance. Over the years, the growth of tourism has affected the region in both good and challenging ways.

Positive Impacts of Tourism

Growth of the Local Economy: The expansion of tourism has opened up jobs and income opportunities for local people.

Small shops, refreshment stalls, and local guiding services have come up, helping residents make a living.

Development of Infrastructure: More visitors have led to better roads, signboards, and basic public facilities. These improvements help both tourists and the local community.

Strengthening of Cultural Awareness: With more people coming, local traditions and celebrations including Pooram have gained wider recognition. Tourists learn about regional customs, temple rituals, and traditional art forms, which helps preserve cultural heritage.

Increased Environmental Conscious ness: The ecological importance of Madayipara has attracted researchers, students, and nature lovers. Their interest has spread awareness about biodiversity and highlighted the need to protect the plateau's unique ecosystem.

Negative Impacts of Tourism

When tourism is not properly managed, it can lead to littering, plastic waste, and destruction of delicate plants. The fragile laterite terrain is easily damaged by soil erosion and too much foot traffic. Large numbers of visitors may disturb migratory birds and seasonal vegetation, upsetting the natural ecological balance. Too much commercial activity can slowly reduce the spiritual and cultural significance of the area, especially during important festivals. According to the survey, 86% believe the environment is being protected, but many (85%) also admit that too much human activity is having negative effects, and 82% feel tourism is also creating some impact. Illegal land encroachments (65%) and difficulties with basic facilities like water, electricity, roads, and public transport show that development challenges still exist.

Role of Social and Cultural Organizations in Madayipara

In Madayipara, social and cultural organizations have a vital responsibility: they safeguard traditional art forms, temple rituals, and folk performances. During festival seasons, they run cultural programs and actively promote regional art forms like Theyyam. By organizing workshops, competitions, and stage shows, these organizations make sure that customs and traditions are passed on to the younger generation. Through such continuous efforts, they preserve and strengthen the region's cultural identity. They hold awareness programs, cleaning campaigns, and biodiversity documentation to protect the fragile ecosystem. Their efforts aim to prevent environmental damage and shield the region from pollution and overexploitation.

Youth clubs and residents' associations also play an important role in social progress. They organize sports competitions, career guidance sessions, educational seminars, and health awareness programs. Such initiatives help empower young people and encourage them to take part responsibly in community development. They also help protect the environment by organizing tree-planting drives, eco-awareness rallies, and volunteer services during tourist seasons. Many organizations in Madayipara are actively involved in charity and welfare work – blood donation drives, educational support, financial help for the poor, and disaster relief. These activities build social solidarity and a sense of shared responsibility among residents.

From the survey, it was found that 80% of people agree that social and cultural organizations in Madayipara play an important role in protecting the area.

Panchayat and Local Activities to Protect Madayipara

The Grama Panchayat plays a central role in conserving Madayipara by taking steps to prevent illegal mining, land encroachment, and environmentally harmful activities. Through regular monitoring and coordination with district authorities, it makes sure that ecological threats are controlled effectively. The Panchayat also regulates construction and development near the plateau by enforcing proper permission procedures and environmental guidelines. Before approving any project, environmental impacts are carefully considered.

In addition, the Panchayat promotes responsible and eco-friendly tourism. By putting up awareness signboards, restricting plastic use, and issuing visitor guidelines, it aims to reduce environmental damage caused by increasing tourist numbers. Furthermore, the Panchayat works with various government departments – forest, tourism, and environment – to strengthen biodiversity conservation and run protection programs.

Role of Local Community and Organizations

Local organizations, nature clubs, and residents' associations actively support conservation efforts through awareness campaigns. Public meetings, school programs, and educational events are organized to highlight the ecological importance of Madayipara. Community-led clean-up drives are held regularly, especially after festivals and peak tourist seasons, to remove waste and keep the plateau clean. Nature enthusiasts and environmental groups also help by documenting rare plants, migratory birds, and seasonal flora. Such documentation supports research, planning, and long-term conservation strategies.

Participation in conservation efforts seems relatively low, though only 48% are actively involved, which means more people could be encouraged to take part.

Educational Implications of the Study

1. The findings of this study point to including local environmental topics in classroom teaching. When students learn about the plants, animals, and natural features around them, learning becomes more meaningful and easier to relate to their everyday experiences.
2. It also shows the importance of heritage education. Cultural practices and festivals such as Madayipara Pooram can be used as learning resources in schools. This helps students understand their culture, respect traditions, and feel more connected to their community.
3. Another key point is the value of learning through experience. Activities like field visits, eco-club participation, and direct observation of nature allow students to learn by seeing and doing, which makes the learning experience more lasting and engaging.
4. The findings also highlight the need for environmental awareness programs. Since awareness about biodiversity is not very high, schools can play an important role in helping students understand the importance of conservation and responsible use of natural resources.

5. In addition, the study suggests that education becomes stronger when there is active involvement of the community. When schools, local bodies, and residents work together, students gain a better understanding of real-world issues and feel encouraged to take part in solving them.
6. The study also emphasizes the importance of value-based education. Teaching values such as caring for the environment, respecting culture, and living sustainably helps students grow into responsible individuals who contribute positively to society.

Suggestions

1. The Panchayat should take more initiative for the proper preservation of Madayipara. For this, a detailed action plan should be prepared in consultation with all the agencies involved.
2. A forum of various stakeholders should be organized to coordinate conservation and preservation activities.
3. The involvement and participation of political leaders, social organizations, clubs and libraries, ecologists, environmentalists, and local people should be ensured for regular monitoring of conservation, pollution prevention, and controlling excessive activities at Madayipara.
4. A separate office for Madayipara conservation should be set up under the supervision of Madayi Panchayat, and guide facilities should be provided for tourists and others who visit Madayipara for study or tourism.
5. A green wall using suitable plants should be built along the border regions without disturbing the present ecosystem to reduce heat during monsoon and prevent natural fires.
6. Miyawaki forests should be promoted in the nearby areas of Madayipara.
7. A cluster of educational institutions in the nearby area should be formed to coordinate activities at various levels.

Conclusion

Madayipara is deeply connected to history and culture. It has links to old trade routes, religious places, and traditional practices that have been followed for generations. But today, changes in lifestyle and rapid development are affecting these traditions. Studying them now is important so that they can be recorded and remembered in the future. There is a need to recognize the importance of protecting Madayipara and preserving its natural and cultural heritage. This study is useful because it helps people see the true value of Madayipara in a simple, clear way. It explains why the area matters for its plants, animals, and natural balance, which is necessary for proper protection. It also highlights the cultural and historical side of the region, including its traditions, rituals, and heritage. Writing about these helps keep them alive and meaningful for the next generation.

The study can also help local authorities and planners make better decisions. It gives ideas on how to develop the area without harming its natural and cultural value, especially when it comes to tourism. For local people, this study recognizes their role in protecting their surroundings. It encourages them to take part in conservation and to feel proud of their heritage. It also helps spread awareness among students, visitors, and researchers about why places like this need care and protection. In short,

this study shows how important it is to balance development and conservation so that Madayipara can continue to remain a special place for future generations.

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St. Thomas College of Teacher Education, Pala, Kerala, India
(Research Centre in Education)
Website: https://sites.google.com/view/educational-extracts
email: educationalextracts@gmail.com

DIMENSIONS OF MENTAL HEALTH OF STUDENTS

Josna K. John* & Dr. P.P. Shajimon**

Abstract

Mental Health is a fundamental aspect of students' holistic development and is closely interconnected with educational experiences, academic achievement, and overall personality formation. This paper presents a comprehensive analysis of the Mental Health of students by examining its meaning, importance, components, influencing factors, and strategies for promotion within educational settings. Mental Health is understood as a positive state of emotional, psychological, and social well-being that enables students to manage academic stress, maintain healthy relationships, make responsible decisions, and function productively. The paper elaborates on the multidimensional components of Mental Health, including emotional, psychological, social, behavioural, cognitive, moral, and resilience-related well-being, highlighting their collective role in effective learning and balanced development. It further analyses the major factors determining students' Mental Health, such as individual traits, family environment, school and academic pressures, peer relationships, socioeconomic conditions, cultural influences, and structural support systems. Special emphasis is given to the 5 C's framework of Mental Health—Connection, Coping, Competence, Confidence, and Character/Compassion—as a practical and holistic model for strengthening students' inner capacities and social support networks. In addition, the study outlines realistic and life-oriented suggestions for promoting Mental Health through healthy lifestyles, supportive relationships, co-curricular activities, guidance and counselling services, and positive, inclusive school environments. The paper concludes that education and Mental Health are mutually reinforcing and that integrating Mental Health promotion into the teaching–learning process is essential for nurturing academically competent, emotionally resilient, and socially responsible individuals.

Key words: *Mental Health, connection, coping, competence, confidence, character, compassion, students, well-being*

* *Guest Faculty, St. Thomas College of Teacher Education, Pala*
** *Associate Professor, St. Thomas College of Teacher Education, Pala*

Introduction

Mental Health of students refers to their emotional, psychological, and social well-being, which influences how they think, feel, behave, and cope with daily challenges (World Health Organisation, 2004). Good Mental Health enables students to manage academic stress, maintain positive relationships, make responsible decisions, and participate effectively in learning activities (Keyes, 2002). It supports concentration, motivation, self-confidence, resilience, and adaptability, all of which are essential for academic success and personal growth (Sharma & Rani, 2016). Mental Health is not merely the absence of mental illness but a positive state of well-being that allows students to realise their abilities and function productively in society (WHO, 2004).

Importance of Mental Health

Mental Health plays a crucial role in students' overall development and educational outcomes. Students with good Mental Health are better able to concentrate, manage pressure, engage actively in classroom activities, and achieve their academic goals (World Health Organisation, 2014). In contrast, poor Mental Health resulting from factors such as academic stress, family problems, social challenges, or lack of support can lead to anxiety, depression, low self-esteem, behavioural problems, absenteeism, and poor academic performance (Kessler et al., 2005). Emotional distress may impair memory, motivation, and decision-making, thereby affecting learning and social relationships (American Psychiatric Association, 2013). Therefore, promoting Mental Health is essential for ensuring students' holistic development, well-being, and long-term success (WHO, 2022).

Role of Education in Promoting Mental Health

Education plays a vital role in shaping students' Mental Health and overall personality development. Education is not limited to academic instruction; it also contributes to emotional, social, moral, and psychological growth (UNESCO, 2015). A supportive educational environment helps students develop self-confidence, critical thinking, problem-solving skills, coping strategies, and positive attitudes toward learning (OECD, 2017). Through meaningful interaction with teachers and peers, students learn emotional regulation, social skills, cooperation, and values that support healthy mental development (Bandura, 1997). Educational institutions have a responsibility to integrate Mental Health promotion into the teaching–learning process by creating safe and inclusive environments, providing guidance and counselling services, training teachers to identify early signs of Mental Health issues, and promoting life skills and emotional literacy (WHO, 2022). By linking education with Mental Health support, institutions can nurture well-rounded individuals who are academically competent, emotionally resilient, and socially responsible (UNESCO, 2021).

Objectives

1. To identify the components of Mental Health of Students
2. To analyse the factors that determine the Mental Health of Students
3. To understand the 5 C's framework of Mental Health of Students
4. To suggest ways to promote Mental Health of Students

Components of Mental Health of Students

The Mental Health of students is multidimensional and includes emotional, psychological, social, and behavioural components. Each component contributes to students' ability to learn effectively, cope with stress, build relationships, and develop as balanced individuals (World Health Organisation, 2004; Keyes, 2002). The important key components of Mental Health of Students are as follows:

1. Emotional Well-Being

Emotional well-being refers to a student's ability to understand, express, and regulate emotions in healthy ways. It involves managing feelings such as anxiety, anger, fear, and sadness while also experiencing positive emotions like happiness, hope, and satisfaction (WHO, 2004). Students with good emotional well-being can handle academic pressure, adapt to change, and recover from setbacks effectively (Gross, 2015) without becoming emotionally overwhelmed. Emotional balance supports self-control, motivation, and mental stability.

2. Psychological Well-Being

Psychological well-being focuses on inner functioning and personal growth. It includes positive self-esteem, self-acceptance, autonomy, resilience, purpose in life, and effective cognitive functioning (Ryff, 1989). Students with strong psychological well-being are confident in their abilities, think clearly, make sound decisions, and remain motivated even during difficulties. This component supports creativity, problem-solving skills, and long-term academic and personal success (Ryff & Singer, 2008).

3. Social Well-Being

Social well-being refers to the quality of students' relationships and their sense of belonging within family, school, and society. It includes effective communication, empathy, cooperation, and the ability to form and maintain healthy relationships with peers and teachers. Strong social well-being reduces loneliness and social anxiety, promotes emotional security, and acts as a protective factor against stress and Mental Health problems (Keyes, 1998).

4. Behavioural Well-Being

Behavioural well-being relates to students' ability to regulate their actions and respond appropriately to different situations. It includes self-discipline, responsibility, adaptability, and constructive coping behaviours. Students with positive behavioural well-being display healthy habits, avoid risky behaviours, and follow social and academic norms. This component supports classroom engagement, academic achievement, and positive peer interactions (American Psychological Association, 2020).

5. Cognitive Well-Being

Cognitive well-being involves attention, memory, concentration, reasoning, and problem-solving abilities. It enables students to process information effectively, learn new concepts, and apply knowledge meaningfully. Good cognitive functioning supports academic performance and reduces learning-related stress and frustration.

6. Moral and Value-Based Well-Being

Moral well-being includes values such as honesty, empathy, responsibility, and respect for self and others. It guides ethical decision-making and pro-social behaviour. Students with strong moral values experience greater inner harmony and social acceptance, which contribute to psychological stability and positive Mental Health.

7. Coping and Resilience

Coping and resilience refer to the ability to manage stress, overcome challenges, and adapt to change. Resilient students use healthy coping strategies such as problem-solving, seeking support, and emotional regulation. This component helps students recover from failure, maintain motivation, and sustain mental well-being in demanding academic and social environments (Masten, 2014).

The Mental Health of students is a holistic construct made up of emotional, psychological, social, behavioural, cognitive, moral, and resilience-related components. Balanced development of these components enables students to learn effectively, maintain well-being, and grow into confident, responsible, and emotionally healthy individuals. Educational institutions play a vital role in nurturing these components through supportive environments, guidance services, and inclusive teaching practices.

Table 1
Components of Mental Health of Students

Component	Core Focus	Key Features / Educational Significance
Emotional Well-Being	Regulation of emotions	Ability to understand, express, and control emotions such as anxiety, anger, and sadness; supports emotional balance, motivation, stress management, and mental stability.
Psychological Well-Being	Inner functioning and growth	Includes self-esteem, autonomy, resilience, purpose in life, and positive self-concept; promotes confidence, creativity, problem-solving, and long-term academic success.
Social Well-Being	Quality of relationships	Healthy relationships with peers, teachers, and family; fosters belongingness, empathy, cooperation, emotional security, and protection against loneliness and stress.
Behavioural Well-Being	Regulation of actions	Self-discipline, responsibility, adaptability, and healthy habits; supports classroom engagement, academic achievement, and positive social behaviour.
Cognitive Well-Being	Mental functioning	Attention, memory, concentration, reasoning, and problem-solving abilities; enables effective learning, academic performance, and reduced learning-related stress.

Moral & Value-Based Well-Being	Ethical development	Values such as honesty, empathy, respect, and responsibility; guides ethical decision-making, pro social behaviour, and psychological stability.
Coping & Resilience	Stress management and adaptation	Ability to handle stress, overcome challenges, and adapt to change using healthy coping strategies; supports persistence, motivation, and emotional recovery.

Note: Table 1 is prepared based on the theories and concepts of mental well-being proposed by World Health Organization, Carol Ryff (1989), Corey Keyes (1998), Daniel Goleman (1995), Albert Bandura (1977), Jean Piaget, and Lawrence Kohlberg (1981).

Factors that determine Mental Health of Students

The Mental Health of students is shaped by a complex interaction of personal, social, educational, and environmental factors. These factors can either support psychological well-being or increase vulnerability to stress and Mental Health problems (World Health Organisation, 2022; Keyes, 2002). Understanding them is essential for promoting healthy development and effective learning. Certain factors that influence Mental Health of students

1. Individual Factors

Individual factors include biological, psychological, and personal characteristics of the student. Genetic makeup may predispose some students to anxiety, depression, or other Mental Health conditions. Personality traits such as resilience, self-esteem, optimism, and emotional stability influence how students respond to academic pressure and life challenges. Coping skills, emotional regulation, and problem-solving abilities play a crucial role in managing stress. Physical health, nutrition, sleep patterns, and lifestyle habits such as exercise also significantly affect emotional and psychological well-being (WHO, 2004; Masten, 2014).

2. Family related Factors

Family environment has a strong impact on students' Mental Health. Supportive parenting, emotional warmth, effective communication, and stable family relationships promote a sense of security and confidence. In contrast, family conflict, parental stress, neglect, overprotection, unrealistic expectations, or economic hardship can increase anxiety and emotional distress. Parenting styles and family values influence students' self-concept, emotional regulation, and social behaviour, shaping their overall Mental Health.

3. School and Academic Factors

The school environment plays a critical role in students' mental well-being. Academic pressure, examination stress, heavy workload, and fear of failure can contribute to anxiety and burnout. Teacher attitudes, teaching methods, classroom climate, and peer relationships influence students' motivation and emotional security. Supportive teachers, inclusive practices, fair evaluation, and guidance services

promote confidence and engagement, while negative experiences such as bullying, discrimination, or academic neglect harm Mental Health.

4. Peer and Social Factors

Peer relationships are especially important during childhood and adolescence. Acceptance, friendship, and positive peer interaction enhance self-esteem and emotional stability. Conversely, peer rejection, bullying, social isolation, or negative peer pressure can lead to stress, low self-worth, and behavioural problems. Social media and digital exposure also affect students' Mental Health by influencing self-image, comparison, and emotional regulation, both positively and negatively (Twenge, 2017).

5. Socioeconomic Factors

Socioeconomic status significantly influences students' Mental Health. Poverty, financial insecurity, lack of educational resources, and limited access to healthcare increase stress and reduce coping capacity. Students from disadvantaged backgrounds may face additional challenges such as poor living conditions, food insecurity, and limited academic support, which can negatively affect emotional well-being and academic performance (Reiss, 2013).

6. Cultural and Community Factors

Cultural values, beliefs, and societal norms shape attitudes toward Mental Health, emotional expression, and help-seeking behaviour. Supportive communities promote belonging, safety, and social support, which protect Mental Health. In contrast, stigma, discrimination, gender bias, caste or ethnic marginalisation, and social inequality contribute to chronic stress and emotional distress. Community resources such as counselling centres, recreational facilities, and social support systems play a protective role.

7. Structural and Environmental Factors

Structural factors include access to quality education, healthcare, counselling services, and Mental Health support. Overcrowded classrooms, unsafe school environments, lack of trained professionals, and limited Mental Health services negatively impact students' well-being. Broader environmental factors such as exposure to violence, natural disasters, pandemics, and societal instability also affect students' psychological health (WHO, 2022).

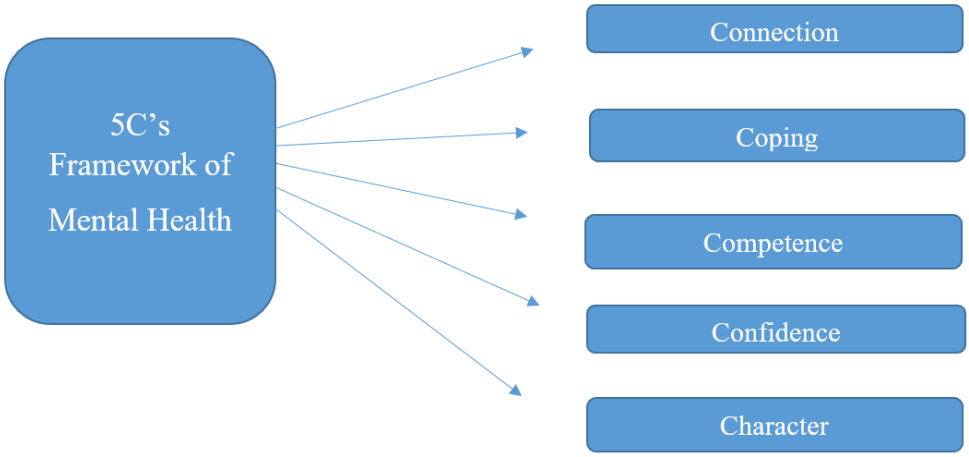
The Mental Health of students is influenced by multiple, interrelated factors operating at individual, family, school, social, and societal levels. Promoting positive Mental Health requires a holistic approach that addresses these factors through supportive families, inclusive educational practices, Mental Health awareness, and accessible support services. Such an approach ensures students' emotional well-being, academic success, and overall development.

The 5 C's Framework of Mental Health

The 5 C's framework of Mental Health offers a practical and holistic approach to understanding and promoting students' mental well-being. 5c's together form the foundation of mental and emotional health. By strengthening both personal capacities and social support systems, the 5 C's framework supports emotional stability, resilience, and positive adjustment in students.

Incorporating the principles of the 5 C's into daily life helps create an effective plan for stress management, enhances interpersonal relationships, and fosters personal growth. The framework highlights how balanced emotional regulation, supportive relationships, and positive self-attitudes contribute to academic success and overall personality development (Keyes, 2002; Masten, 20145). Each component plays a distinct yet interconnected role in helping students manage challenges, adapt to change, and maintain psychological well-being. The five components of the 5 C's framework are illustrated in the following figure:

Figure 1
Components of the 5 C's Framework



The details of each component is given below:

1. Connection

Connection refers to healthy and supportive relationships with peers, teachers, family members, and the school community. Strong connections create a sense of belonging, reduce feelings of loneliness and anxiety, and provide emotional support during academic and personal challenges. Positive relationships enhance communication skills and act as a protective factor against stress and behavioural problems (Bronfenbrenner, 1979; WHO, 2022).

2. Coping

Coping involves the ability of students to manage stress, academic pressure, and emotional difficulties in constructive ways. Effective coping strategies include problem-solving, relaxation techniques, mindfulness, time management, and seeking support when needed. Strong coping skills help students adapt to challenges, prevent negative behaviours, and maintain emotional balance (Lazarus & Folkman, 1984; Compas et al., 2017).

3. Competence

Competence refers to students' belief in their ability to perform tasks effectively and handle academic responsibilities. It develops through skill acquisition, successful learning experiences, and constructive feedback. A sense of competence enhances motivation, independence, problem-solving ability, and perseverance, while reducing fear of failure and helplessness (Bandura, 1997; Lerner et al., 2005).

4. Confidence

Confidence involves positive self-esteem and belief in one's abilities. Confident students are more willing to participate in learning activities, set goals, and face challenges without excessive fear or anxiety. Confidence promotes optimism, emotional stability, assertiveness, and healthy risk-taking, (Rosenberg, 1965; Keyes, 2002).all of which contribute to academic and personal success.

5. Character / Compassion

Character and compassion focus on moral values, empathy, responsibility, and respect for self and others. These qualities encourage ethical behaviour, emotional maturity, and positive social interactions. Compassion, including self-compassion, helps students handle mistakes with patience and understanding, reducing stress and promoting psychological well-being (Neff, 2011; WHO, 2004).

The 5 Cs framework supports the holistic Mental Health of students by addressing emotional, social, moral, and psychological dimensions. By nurturing these components within educational settings, schools and teachers can promote resilience, well-being, and positive adjustment, enabling students to thrive academically and personally.

Practical Implications

The practical implications are as follows:

a) Schools should promote positive teacher-student relationships, peer support groups, and parent-school collaboration. Activities like group discussions, mentoring systems, and classroom inclusion programs help students build trust and belonging. Strong connection reduces loneliness, anxiety, and school dropout risk.

b) Students should be taught stress management techniques such as mindfulness, time management, relaxation exercises, and problem-solving skills. Life skills education and counselling sessions help students respond positively to failures, exam pressure, and personal problems instead of developing anxiety or depression.

c) Schools should create opportunities for skill development through leadership tasks, classroom participation, project work, and extracurricular activities. When students feel capable of handling responsibilities, their mental well-being improves and they become more resilient in difficult situations.

d) Teachers should use positive reinforcement, appreciation, and constructive feedback to strengthen student self-esteem. Avoiding excessive criticism and encouraging small achievements help students develop self-confidence. Confident students show better classroom participation and lower emotional distress.

e) Value education, empathy-building activities, community service, and anti-bullying programs help students develop compassion and ethical behaviour. Students with strong character and empathy usually show healthier social relationships and fewer behavioural problems, contributing to better Mental Health.

Mental Health Policies and Institutional Framework

The important Mental Health policies and Institutional frameworks are as follows:

1. School Mental Health Policies

School Mental Health policies are structured guidelines designed to promote psychological well-being and early identification of Mental Health issues among students. According to the World Health Organisation (WHO, 2021), schools play a critical role in delivering preventive Mental Health services because children spend a large portion of their developmental years in educational settings. These policies typically include Mental Health education, counselling services, teacher training, and referral systems for specialised care. They also aim to create a supportive school environment that reduces stigma and encourages help-seeking behaviour.

2. Anti-Bullying Policies

Anti-bullying policies are institutional frameworks developed to prevent, identify, and respond to bullying behaviours in schools. UNESCO (2019) emphasises that bullying significantly affects students' Mental Health, leading to anxiety, depression, and poor academic performance. Effective anti-bullying policies include clear definitions of bullying, reporting mechanisms, disciplinary actions, and awareness programs. In India, CBSE guidelines (2015) mandate the formation of anti-bullying committees in schools and encourage peer awareness programs to ensure a safe and inclusive learning environment.

3. Child Protection Guidelines

Child protection guidelines are designed to safeguard children from abuse, neglect, exploitation, and violence within educational institutions. The UN Convention on the Rights of the Child (UNCRC, 1989) emphasises the right of every child to protection and psychological well-being. In India, the Juvenile Justice (Care and Protection of Children) Act, 2015 and school safety guidelines ensure mandatory reporting of abuse and establishment of child protection committees. These frameworks help create a safe environment that supports both physical and Mental Health of students.

4. National Mental Health Programs in Education

National Mental Health programs aim to integrate mental health services into public systems, including education. In India, the National Mental Health Programme (NMHP, 1982) focuses on community-based Mental Health care and accessibility. The District Mental Health Programme (DMHP) extends services to schools through awareness, counselling, and early intervention. Additionally, initiatives like Rashtriya Kishor Swasthya Karyakram (RKSK, 2014) address adolescent Mental Health by providing school-based counselling, life skills education, and peer education programs.

Suggestions for Promoting Mental Health of Students

The following are certain suggestions for promoting the Mental Health of Students:

- Maintain a healthy daily routine by following regular sleep–wake cycles, eating balanced meals, and engaging in physical activity such as walking, yoga, or sports to reduce stress and improve emotional balance.
- Practice simple stress-relief techniques like deep breathing, mindfulness, or short meditation sessions, especially before examinations or during periods of academic pressure.
- Encourage open communication by talking regularly with parents, teachers, friends, or mentors about academic stress, emotional concerns, or personal difficulties instead of suppressing feelings.
- Build supportive peer relationships through group study, teamwork, and participation in class or hostel activities to reduce loneliness and develop a sense of belonging.
- Engage in hobbies and interests such as music, art, reading, gardening, or creative writing to relax the mind and enhance self-expression beyond academics (Sharma & Rani, 2016)
- Develop time-management skills by preparing realistic study schedules, setting achievable goals, and avoiding last-minute pressure, especially during examinations.
- Participate actively in co-curricular activities like debates, discussions, seminars, and workshops that promote self-confidence, communication skills, and emotional expression.
- Attend Mental Health awareness programs and seminars to understand stress, anxiety, and coping strategies, and to reduce stigma related to seeking psychological help.
- Take part in skill-based workshops on emotional regulation, problem-solving, conflict resolution, and life skills to strengthen resilience and self-control.
- Spend time in outdoor activities and nature through sports, yoga, trekking, or simple walks in open spaces to improve mood, physical fitness, and mental relaxation.
- Use digital media responsibly by limiting excessive screen time and social media use, and by avoiding unhealthy comparison that affects self-esteem and emotional well-being.
- Seek professional help when needed by approaching school counsellors, psychologists, or Mental Health professionals if stress, anxiety, or emotional problems persist.
- Practice self-compassion and positive self-talk by accepting mistakes as part of learning and avoiding harsh self-criticism during academic or personal failures (Neff, 2011)
- Engage in helping activities and volunteering to develop empathy, social responsibility, and a sense of purpose, which positively influence mental well-being.
- Create a supportive school environment where teachers encourage students, recognise effort, address bullying, and promote emotional safety in classrooms.

Conclusion

The Mental Health of students is a fundamental component of their academic success, emotional stability, and overall personality development. Education plays a crucial role not only in imparting knowledge and skills but also in nurturing emotional regulation, social competence, moral values, and resilience. Students with good Mental Health are better able to concentrate, manage academic stress, participate actively in learning, and achieve their educational goals, whereas poor Mental Health can lead to anxiety, depression, behavioural problems, and academic underachievement. The multidimensional nature of Mental Health—encompassing emotional, psychological, social, behavioural, cognitive, moral, and coping-related components—highlights the need for a holistic approach to student development within educational settings.

Mental Health is shaped by the interaction of individual, family, school, social, and environmental factors, making it essential for educational institutions to create supportive and inclusive learning environments. Frameworks such as the 5 C's of Mental Health (Connection, Coping, Competence, Confidence, and Character/ Compassion) provide practical guidance for strengthening students' inner capacities and social support systems. By integrating Mental Health promotion through curriculum, teacher practices, guidance and counselling services, healthy lifestyles, and co-curricular activities, education can foster emotionally resilient, socially responsible, and confident learners who are well prepared to meet academic demands and life challenges.

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St. Thomas College of Teacher Education, Pala, Kerala, India
(Research Centre in Education)
Website: https://sites.google.com/view/educational-extracts
email: educationalextracts@gmail.com

A FRAMEWORK FOR INTEGRATING ARTIFICIAL INTELLIGENCE TOOLS IN CHEMISTRY EDUCATION FOR INCLUSIVE SECONDARY CLASSROOMS

Helan Raj* & Bindu T.V.**

Abstract

The integration of Artificial Intelligence in education has opened new trends and opportunities in transforming the conventional teacher-centred classrooms to inclusive, personalised learning environments, where learning needs of each student is considered and no one is left behind. This paper explores the application of Artificial Intelligence tools in the development of lesson plans in Chemistry to accommodate the diverse learners. The concept taken for the development of the lesson plan is Electrochemistry. The purpose of the study is to examine how AI tools can support diverse learners and enhance conceptual understanding in Chemistry. The researcher used a design-based research approach to develop and validate the lesson plan that integrates Artificial Intelligence tools in Chemistry in an inclusive pedagogical framework. Findings suggest that AI tools, when systematically integrated, can improve engagement, support differentiated instruction, and enhance accessibility for students with diverse learning needs. However, issues such as digital divide and teacher preparedness remain significant challenges. The study contributes a practical yet theoretically grounded framework for AI integration in chemistry education and highlights directions for future research and implementation.

Introduction

Artificial Intelligence is the simulation of human intelligence, enabling machines to think and act like humans. The challenges and disparities which are keeping the current education system away from the effective implementation of teaching, learning and evaluation process can be minimised by the integration of

* *Research Scholar, Department of Education, University of Kerala*
** *Professor & Head, Department of Education, University of Kerala*

AI technologies that holds promise for creating adaptive and personalised learning environments, fostering accessibility, and addressing individual learning styles. The integration of AI technologies in education offers a path to bridge the gaps by providing personalised learning solutions that address individual differences and promoting an inclusive environment that values diversity. It is crucial to understand the wider context of inclusive education and the significant impact that AI can bring in transforming educational practices. Recent studies show an increase in research focused on the effects of AI on personalised learning experiences (Smith et al., 2020) the creation of assistive technologies (Rehman et al., 2024), and the deployment of intelligent tutoring systems. These innovations have the potential to change the landscape of education, making it more inclusive, accessible, and effective for learners with varying needs. The new education policy aims to promote knowledge production for the better prosperity of humanity.

Teachers are now trained to offer dynamic learning experiences that cater to individual student needs by incorporating AI-driven simulations, adaptive assessments, and intelligent tutoring systems. AI can also support students with disabilities by providing text-to-speech, language translation, and real-time feedback. This approach enhances engagement, promotes deeper understanding, and fosters scientific curiosity among students.

The effectiveness of lesson transactions and achievement of learning outcomes in an inclusive classroom is quite arduous, as learners in an inclusive classroom possess diverse learning needs. Tan et al. (2025) studied the application of Artificial Intelligence in the field of education and recognised AI as a key driver of educational innovation. Baker et al (2019) highlighted the extensive use of Al tools in education, with regard to learners, teachers, and educational administrators. Century AI is a teaching and learning platform that uses AI technology to provide personalised learning and help to create constantly adapting pathways for students and powerful assessment data for teachers. Classcharts is an intelligent instructional management software provides deeper insights into student performance and fostering innovative classroom practices. Diffit is an AI tool that helps teachers create differentiated learning materials tailored to various proficiency levels. Eduaide is a multipurpose AI assistant helps to perform multiple tasks simultaneously to save time and improve the learning experiences. It provides actionable and timely feedback and automate administration task. Magic School AI is a tool for teachers that helps in generating lesson plans and assessments. Fireflies.ai helps to analyse, summarise, and transcribe recorded conversations automatically to concise glimpse of lectures. Curipod is an AI-powered platform designed to help educators create interactive lesson activities and presentations. AI-driven tutoring platforms like Carnegie Learning offer tailored feedback and assistance, adjusting to unique learning preferences and requirements to help students in grasping intricate concepts and enhancing their academic achievements. AI applications such as Duolingo employ adaptive algorithms to tailor language learning experiences. The AI modifies the difficulty of tasks according to the user's advancement, thereby guaranteeing an optimal learning trajectory and improving language acquisition.

Literature Review

Kanvaria and Ritika (2024) explored the integration of Artificial Intelligence in lesson planning for pre-service teachers, as the adaptability of lesson plans based on individual student needs resulted in increased engagement and improved comprehension across diverse learning. The application of AI tools in science learning enables the students to learn both how well the AI works in their particular learning activity. The fourth-grade students learning plant classification through inquiry project method using Google's Teachable Machine, an AI integrated program, learnt both how the Teachable Machine works with the input data of plant classification activity. The students learnt about the AI tool in the context of science education. The study recommends that the science curricula should be integrated with AI, as it would be helpful for the educators to teach basic ideas on how AI works and this may involve cutting edge scientific methods in a huge amount of data (Shin & Shin, 2021).

Various studies highlight the benefits of integration of AI in teaching and learning processes, as AI integration contributes to adaptive and interactive learning experiences for all kinds of learners, and the overall effectiveness of teaching practices (Smith et al., 2020; Johnson & Wang, 2021). Artificial Intelligence can be utilised to develop adaptive and personalised learning pathways for students with different abilities and learning styles. By examining individual learning patterns and preferences, AI algorithms can customise educational content and interventions to address the specific needs of each learner. This method can promote a more inclusive educational environment by catering to diverse learning profiles (Anderson et al.,2014). Zhang and Zang (2024) indicated that artificial intelligence can have a beneficial impact on inclusive education by aiding in classroom management, which improves inclusive learning settings and enhances digital competencies through the customisation of teaching methods, while also fostering social connections between educators and students. Advancements in research and practice are crucial for enhancing the comprehension and application of AI in the field of education. Recognising optimal practices is necessary to promote global inclusivity and to successfully incorporate AI into various educational frameworks. Particular emphasis should be placed on exploring how AI can improve accessibility and uphold universal design principles to meet the requirements of a diverse range of learners (Pagliara et al., 2024).

By reviewing the recent literature, the investigator could find that the incorporation of artificial intelligence in inclusive education presents significant opportunities to establish a more accessible, personalised, and equitable learning environment. By ensuring responsible implementation and fostering continuous collaboration, we can leverage the capabilities of AI to dismantle obstacles and enable learners of all abilities to flourish within an inclusive educational framework.

Research Objectives

- To develop a framework for integrating AI tools in secondary-level chemistry education
- To analyse the role of AI in supporting inclusive classrooms using UDL principles
- To design and validate an AI-integrated lesson plan in chemistry

Theoretical Framework

This study is grounded in the Universal Design for Learning (UDL) framework and inclusive pedagogy.

AI integration is conceptualised as a means to:

- Provide multiple representations (visual simulations, audio support)
- Enhance engagement (gamification, adaptive learning)
- Enable diverse expression (interactive tasks, AI-assisted responses)

Methodology

A design-based research (DBR) approach was adopted. In the development process, recent literatures on AI in education and inclusive pedagogy were reviewed. AI tools supporting inclusiveness were identified and categorised according to learning style. In the designing of lesson plan, the concept of Electrochemistry was chosen and it was developed as per the UDL principles by integrating AI tools at each curricular objective. The lesson plan was reviewed and validated by expert teachers.

Sample Lesson Plan: Introduction to Electrochemistry with AI Integration

Grade Level : Secondary School
Class : IX
Unit : Electrochemistry
Date and Time :
Topic : Fundamentals of electrochemistry

Curricular Objective: To make the students understand the concept of electrochemistry through experimentation, observation, tabulation and analysis using AI tools and apply the concept of electrochemistry in daily life.

Curricular Objective analysis:

A. Content analysis

i. The sub-concepts associated with the concept of electrochemistry include the interconversion of electrical and chemical energy

ii. Concept of electrolytic cell

iii. Concept of galvanic cell

B. Process analysis

i. Experiments using AI tools

ii. Observation using AI tools

iii. Tabulation of Data observed using AI tools

C. Objective analysis

i. To attain the ability to do experiments using virtual labs

ii. To develop the ability to use different AI tools for effective learning in chemistry

1. Warm-Up Activity (5-10 mins)

- AI-powered quiz (like Kahoot or Quizizz) to assess prior knowledge
- AI-generated fun facts related to electrochemistry to spark curiosity

2. Concept Explanation (20-30 mins)

- **AI-assisted smart board presentations** with real-time animations
- Virtual lab simulations where students can explore atoms, molecules, and reactions **visually**
- **AI-driven personalised learning tools** that adjust difficulty based on student responses

3. Hands-On Experiment (20-30 mins)

- Augmented Reality (AR) apps that allow students to virtually mix chemicals
- AI-guided accessibility features (text-to-speech for visually impaired students)

4. Assessment & Feedback (15-20 mins)

- AI-based adaptive assessments that modify questions based on student understanding
- AI-generated feedback and suggestions for improvement

5. Wrap-Up & Discussion (10 mins)

- AI chatbot-assisted Q&A session for clearing doubts
- Reflect on the real-world applications of AI in chemistry

An explanation of how AI can be integrated is given below:

AI tools for Teaching Concepts of Introduction to Electrochemistry, Electrolytic cells, Galvanic cells in an Inclusive Classroom

Classroom lectures can be animated at the real time through voice recognition – VEED.io (UDL practice) https://www.veed.io/tools/ai-video/animate-from-audio

Classroom notes can take and record using Atlas.ai. https://www.atlas.org/core/50a6649d-d8b4-4abc-b4ef-ccf241316d27/space

Experimentation of Electrolytic cells

1. Dr Palermo's Flipped Chemistry classroom – Though the tool is used for flipped classroom, the experimentation process can be used for simulation in the classroom teaching learning process for better concept clarity. Demonstration can run before going for virtual experiment. The goal of the experiment is to make understand that electrolytic cells are electrochemical devices that convert electrical energy to chemical energy.

To start an experiment, first select a positive terminal metal (anode) from the menu listed. Then select a negative terminal metal (cathode) and a solution from the menu. Record the initial mass for each metal electrode. Go to the ammeter to adjust settings for the current and the timer. Turn the ammeter on to run the experiment. Click on rerun for adjusting ammeter without changing electrodes and click on reset for conducting a new experiment.

The AI-integrated tool makes a sequence of analysing phenomena, articulating the patterns applied to the phenomena, and developing models that assist in elucidating the phenomena. The "activity-before-concept" is rooted in the 5E instructional model of learning. Students commence with an exploration or investigation that builds on their prior knowledge and subsequently construct models to clarify phenomena. Students will apply their comprehension to real-world challenges. Frequent low-stakes quizzes and mastery quizzes serve as formative assessment tools to evaluate understanding and also act as learning aids for students.

https://media.pearsoncmg.com/bc/bc_0media_chem/chem_sim/html5/Electro/Electro.php

UDL & Differentiation

Visual learners: Palermo's videos, AI-generated diagrams

Auditory learners: Class discussion, voice modulations and peer explanation

Kinesthetics learners: Selection of apparatus on virtual interface, hands-on experiments and group activities

CwSN: Videos with captions, AI-generated simplified texts, AI generated animations etc.

Experimentation of Galvanic cells

Labster is an innovative AI–powered virtual lab software that provides an immersive learning experience when performing virtual experiments safely and allows users to explore scientific concepts without the need for physical resources or laboratory apparatus. These simulations can be tailored to different learning styles and preferences, offering a personalised and engaging environment.

https://www.labster.com/simulations/electrolysis

Students can log into Labster and complete the Electrochemical Cells Simulation with a focus on to Zn-Cu galvanic cell & electrolysis of NaCl solution. Students can observe voltmeter readings, electron flow, electrode reactions then record observations and outcomes in worksheet.

UDL & Differentiation

Labster incorporates the principles of Universal Design for Learning (UDL) into its virtual lab simulations to improve accessibility and inclusivity for every learner. The UDL framework in Labster seeks to offer multiple means of representation, multiple means of engagement, multiple means of action & expression, for students to interact with the material, demonstrate understanding, and articulate learning, thereby catering to a range of learning preferences and learning needs.

Multiple Means of Representation: Labster provides a range of options for students to access information. This encompasses visual aids such as 3D models and animations, auditory features including voiceovers and sound effects, as well as written descriptions tailored to different learning preferences.

Multiple Means of Engagement: Labster's interactive simulations offer captivating, hands-on experiences, enabling students to investigate concepts at their own pace. The platform additionally presents various levels of support and scaffolding to accommodate differing levels of prior knowledge and learning preferences.

Multiple Means of Action and Expression: Students can showcase their comprehension through multiple approaches, including responding to questions, completing assignments, and interpreting data. Labster also supports keyboard navigation and is compatible with screen readers, ensuring accessibility for students with disabilities. There are other virtual labs for conducting science experiments, including interactive simulations, animations, and videos that allow students to explore scientific concepts and practice experiments in a safe digital environment. Some AI tools are LabXchange, NOVA Labs, ChemCollective virtual labs, OLabs, PraxiLabs, VRLab Academy, Gizmos, JavaLab, GoLabz etc.

Discussion & Results

The present study aimed to develop a framework for integrating Artificial Intelligence (AI) tools in secondary-level chemistry education within an inclusive pedagogical context. The findings indicate that AI integration, when guided by Universal Design for Learning (UDL) principles, can significantly enhance student engagement, conceptual understanding, and accessibility. One of the key contributions of this study lies in demonstrating how AI tools can operationalise UDL principles in chemistry classrooms. The integration of virtual laboratories, adaptive assessment platforms, and AI-assisted feedback mechanisms provides multiple means of representation, engagement, and expression. For instance, the use of simulation-based tools in electrochemistry enables visualisation of abstract concepts such as electron flow and redox reactions, which are traditionally difficult for learners to grasp. This aligns with existing research that emphasises the importance of visual and interactive representations in science learning. However, while the study highlights the pedagogical advantages of AI tools, it also shows that their effectiveness depends heavily on the manner of integration. AI tools do not inherently improve learning outcomes; rather, their impact is mediated by instructional design and teacher facilitation. In this study, the design-based approach ensured alignment between learning objectives, AI tools, and inclusive strategies. Yet, in real classroom contexts, such alignment may not always be achieved due to constraints such as time, teacher expertise, and institutional support.

The findings of the study suggest that AI tools can assist learners with diverse needs by providing adaptive content, real-time feedback, and accessibility features such as text-to-speech and visual scaffolding. This supports the argument that AI has the potential to reduce learning barriers and promote equitable participation. The analysis of AI tools within this study also highlights a shift from descriptive usage to evaluative selection. By applying criteria such as pedagogical alignment, accessibility, cost, and data privacy, the study contributes a more structured approach to tool selection. This is particularly important in the current educational landscape, where teachers are often overwhelmed by the availability of numerous AI tools without clear guidance on their effectiveness. However, it must be acknowledged that the evaluation of tools in this study is largely theoretical and based on available features rather than empirical classroom performance data.

The study underscores the evolving role of teachers in AI-integrated classrooms. Teachers are no longer mere transmitters of knowledge but facilitators, designers, and evaluators of AI-supported learning experiences. This shift necessitates professional development and digital competence among educators. Without adequate training, the integration of AI tools may remain superficial or even counterproductive. Effective integration of AI in Chemistry education requires pedagogical alignment, teacher preparedness, and systemic support.

Limitations of the study

The study adopts a design-based research approach without empirical classroom implementation. Although the lesson plan was validated by experts, it

was not tested in real classroom settings. Therefore, the findings regarding student engagement, learning outcomes, and inclusivity are largely theoretical and require further empirical verification. The scope of the study is limited to a single lesson plan on electrochemistry at the secondary school level. While this provides a focused illustration of AI integration, it restricts the generalizability of the proposed framework across different chemistry topics, grade levels, and educational contexts.

Conclusion

AI tools can significantly enhance student engagement by making learning more interactive, personalised, and accessible. AI impacts engagement in education through personalised learning because AI adapts lessons to individual learning styles and speeds, ensuring students stay engaged. AI-powered platforms and Interactive Study Tools encourage deeper learning by prompting students with follow-up questions that enhance critical thinking. AI-driven Gamification & Adaptive Assessments like quizzes and challenges keep students motivated while adjusting difficulty based on their progress. AI provides instant Real-Time feedback, helping students correct mistakes and improve understanding. AI supports students with disabilities through text-to-speech, speech-to-text, and adaptive learning environments, which ensure accessibility and Inclusivity. Studies show that AI-powered learning tools increase student participation and motivation, fostering a more engaging and intellectually stimulating educational experience. “Handling with care” needs to be in the mind of the real teacher when trying to integrate AI in lesson plans.

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St. Thomas College of Teacher Education, Pala, Kerala, India
(Research Centre in Education)
Website: https://sites.google.com/view/educational-extracts
email: educationalextracts@gmail.com

EDUCATIONAL PHILOSOPHY AND PEDAGOGY IN THE MANUSMṚTI

Dr Suma Parappattoli*

Abstract

Education occupied a central place in the cultural and spiritual life of ancient India, where it was conceived not merely as intellectual training but as a holistic process of character formation, discipline, and moral refinement. This study examines the educational philosophy and practices reflected in the Manusmṛti, one of the earliest and most authoritative Smṛti texts. Using a textual and analytical methodology, the article interprets relevant passages concerning the aims of education, the Upanayana rite, the duration of studentship, curriculum, teacher–student relationships, and pedagogical ethics. The analysis highlights Manu's emphasis on self-discipline, moral conduct, ritual training, and intellectual cultivation, alongside the gurukula system as the institutional framework of learning. Particular attention is given to Manu's views on educational accessibility, the social role of the teacher, and non-punitive modes of instruction.

The article contributes to the study of ancient Indian educational thought by clarifying the pedagogical ideals embedded in Dharmaśāstra literature and situating Manu's educational model within broader discussions of holistic education, ethical learning, and cultural transmission. It demonstrates that education in Manu's framework functioned as both a socializing and liberative force aimed at the all-round development of the individual.

Keywords: *Manusmṛti, Ancient Indian Education, Gurukula System,Teacher–Student Relationship, Brahmacarya (Studentship)*

Introduction

The vast literature, in the form of smrtis, occupies a prominent place in Classical literature. The Smrtis are the compendia systematically epitomising the material contained in the Grhya and Dharma-sutras. The Manusmrti stands at the top of the smrti literature, unrivalled and unsurpassed by any sister work. It received a reverence

Associate Professor, Dept. of Sanskrit, Chembai Memorial Govt Music College Palakkad.
Email: parappattolisuma@gmail.com

which was second only to that which was accorded to the Vedas. It has always been a work of universal authority. The oldest and most well known of the smrtis is that of Manu, also called Manava- samhita or Manava-Dharmasastra. It has served as a veritable store house of information for the social, cultural, political , religious and educational life of the people.

Historical Context

The importance of Education in the cultural equipment of a person was well recognized by ancient educationists. Bhartrhari describes this factor as the one which differentiates between man and animal.(Bhartrhari, Nitisataka, 16) According to Mahabharata, no other sight can equal the sight which one gains in the form of education.(Mahabharata, 12, 339, 6)The Rgveda says the superiority of one over the other can also be determined on the basis of education.(Rgveda,10,717) A modern educationist says, "the primary function of education is to transmit knowledge of the forms and skills, society regards It is indispensable for its survival and improvement The system regularizes knowledge, transmitting activity; inculcates the folkways and mores; trains the young to fit into the existing cultural scheme, aims to aid the individual in the development of personality and aptitude; and sets forth broad lines which the society believes must be followed in order to survive and improve". Education provides a means for the intellectual development of the individual as such. The value of education lies in the ability to direct the capacities and powers of the individual towards the proper functioning and stability of the social groups to which he belongs. True education helps the cultivation of not only character, habit and discipline of mind but also the intellect, reason and critical and discriminating faculty. Above all this education helps in the attainment of salvation. Manu has recognized the importance of education in the life of an individual.

Educational philosophy in Manusmṛti

Commencement of Education: Upanayana

The Upanayana (investiture ceremony) rite marked the beginning of the child's education. It was virtually regarded as the second birth of the young boy. The child was taken to the teacher by his parents. He was accepted as a pupil after due rites performed by the teacher. For a Brahmin child the ceremony took place in the eighth year of his birth. For a Ksatriya in the eleventh year after conception and in the twelfth year for a Vaisya. A Brahmin could perform the same at the age of five if he desired proficiency in the Vedas. A Kshatriya wishing to be powerful could have it at the age of six. In order to gain success in his business, A Vaisya could perform it in the eighth year after conception. The different ages for the Upanayana had something to do with the difference in intelligent quotation of these Varnas due to various factors: hereditary, environmental etc.. The last limit for the performance of the Upanayana for a Brahmin boy was sixteen, for the Ksatriya twenty two and for the Vaisya twentyfour.

Duration of Studentship (Brahmacharya)

Manu clearly states that the term of studentship extends up to thirty-six years or half that time or a quarter or until the student has perfectly learnt the three Vedas. Having learnt in due order the three Vedas or even one only without breaking the rules

of studentship, A student should enter the order of house holders. The first quarter of the twice born's life should be spent at the house of the teacher. The student could even spend his whole life at the house of his teacher. Such students were known as Naistika Brahmacarins. Pupils' attitude to learn one or more Veda, went a long way in determining the period of study.

The child received his first lesson in informal education from his parents. But his formal education started with the Upanayana ceremony which was performed at the house of the preceptor. These houses served as the centres of learning. They were called Gurukulas. These centres were managed by the preceptor and his wife. A student who lived with his preceptor in a Gurukula was called an Antevasin.

Pedagogical practices

Centres of Learning: The Gurukula

Education was primarily imparted in the Gurukula system, where students resided with the teacher (Ācārya). This residential model fostered immersive learning, moral discipline, and close teacher–student interaction.

Curriculum

The teacher at first instructed the pupil in the rules of personal purification, of conduct of fire-worship of prayers and meditation having sipped water in accordance with the injunctions of the Sastras, he put on a clean dress, controlled his sense organs and made the Brahmanjali. A student received instruction in all Vedas. He learned from his preceptor the Vedas and other sacred texts.

Manu gives a vast syllabus of various subjects. The syllabus comprised the four Vedas, Caranas together with the Brahmanas, Atharvaveda, Aranyakas, Upaniasads, Vedangas, Dharma-sutras, Puranas, Vrata, Anviksaki and Dandaniti. Besides these subjects the prince took instructions in the principles of trade, agriculture, cattle breeding and the science of wealth. Manus syllabus of commercial geography arithmetic and some languages as well as the practical details of trade, viz. the knowledge of defects or excellences of articles, the good or evil traits of countries, profits and losses in the manufactured articles, wages of artisans and work men, etc.

Student duties

Daily students should tend the sacred fire of the teacher by feeding it with fuels. He should perform morning and evening prayers. He should beg food for the inmates of the hermitage. Before going for begging he should take his staff, worship the sun and go round the fire as per rules. He should not collect food more than his needs or he will incur a guilt of theft. Whatever he obtained he should present it to his teacher. He should receive a part of it given by the teacher and eat it facing the eastern direction to acquire longevity. Begging was prescribed to create a spirit of humility in the mind of the student. Only two meals per day for a Brahmacarin. He should avoid over eating which causes ill health. He should be a strict vegetarian.

Discipline and conduct

Manusmrti gives some rules of conduct and discipline for a student. A student should get up before and go to bed after the preceptor. He should lie on the bare ground and should not sleep during the day. He should utter Gayatri and fast for a whole day if he sleeps during the day time.

If a student sleeps after sunrise and before sunset, He would attain great sin. He should acquire self control. He should always strive to promote the preceptor's interest by acts of body, mind and speech. Character building proceeded side by side with the development of intellect. Manu said that he should strive to re-strain his organs which run wild after sensual objects like a charioteer and his horses. One who controls his sense organs is better than one who is well versed in Vedas. Meat, honey, wine, sweets, perfumes, ornaments etc: inflame passions the student is advised by Manu to retrain from these things. He should give up anger, greed, dancing, singing, gambling falsehood etc: for the sake of learning. Through these disciplines a student can be achieved by simple living and high thinking.

Educational Accessibility and the Principle of Free Education

According to Manu, education was free. The teachers admitted the poor and rich boys without any consideration of monetary gains. Most teachers took no fee from their pupils. Upadhyayas accepted a fee from their students and those who were not able to pay it served the teacher in the day time while they were taught at night. But Manu sees no harm in giving a gift to a teacher, according to one's own means, after the completion of study.

Role of the Teacher

According to Manu a high position was accorded to a teacher who, being a spiritual father of a student , deserved more respect than his father. He prescribes many rules of behavior for a student in the presence of the teacher; they all indicate the respect received by the teacher from his pupil. In his presence the student occupied a lower seat. He stood up at the sight of the teacher. He neither uttered his name even in his absence, nor imitated his speech and manner. Disrespect shown to him led the student to many troubles in future births. Acarya was never worried about instructing his pupil. The teacher instructed the student about his activities which tended to his welfare without causing him pain. While instructing him he used sweet and gentle words.

Manu differentiates between Acarya, Upadhyaya, Guru and Rtvik. Acharya was one who, having initiated the pupil, taught him the Veda, Kalpa, Rahasyas. Upadhyaya was one who taught a portion of the Veda and Angas. He was chosen to perform Agnyadheya, Pakayajnas, Agnistoma etc: for another was called Rtvij. Thus it was quite clear that Acarya and Upadhyaya were directed with teachings. As Acarya taught his pupil without any return so he was considered more respectable than the Upadhyaya who took some fee for teaching. A teacher should teach only worthy students.

Teacher Student relationship

Manu envisages cordial relations between the teacher and the student. The Acarya is higher than the father who only causes birth. The student lived with Acharya as a member of his family. The Acarya treated him like his own son. He taught him devotedly. Acarya taught him whatever was pleasant and beneficial, with sweet and gentle words. The student gave him full respect and obeyed his instructions without questioning them. By serving his Acarya with devotion he could even attain salvation. Though the pupil will be grievously offended by the teacher he should not treat him with disrespect. For him the

teacher was the incarnation of Brahman. He should do what was agreeable to his teacher. By doing so the pupil obtained the rewards of austerities. He informed his preceptor about everything that he performed in thoughts, words or deeds for attaining to the next world. Summing up the intimate relationship between the teacher and student, Patanjali declares that the student should be covered like an umbrella by the teacher and the student should look after him like an umbrella.

Corrective discipline

Manu does not favour punishment for a student. According to him the teacher must use sweet and gentle words while instructing the student in a pleasant manner. But with a view to correct or improve the students, he may beat his pupils, on the back whenever they commit fault, with a rope or a split bamboo sparing the tender parts of the body, otherwise he incurred the same guilt as a thief. The best way to counter the habit of the student to commit faults was to awaken in him a feeling of love for the right and hatred for the wrong through sympathetic appeal to his heart.

Completion: Samāvartana

The Samāvartana ceremony signaled the completion of educating the student. The ceremony consisted of taking a final bath with the permission of the teacher. The permission was considered essential, for it certified that the Snataka was a fit person in learning, habits and character for married life. Before journeying back home the student was expected to give some gift to the teacher as a token of respect according to his means.

Manu speaks of three types of Snatakas, viz., Vidya Snataka, Vrata Snataka, Vidya Vrata Snataka. The Vidya Snataka was one who had completed studies but not the full term of Brahmacarya. The Vrata Snataka was one who had observed the Vratas but had not finished the full course of studies. The vidya Vrata Snataka was one who finished his student career after completing a full course of studies and observed Vratas. The Snataka was accorded great honour in society. He was respected by the king and given food in times of distress. On the road, the Snataka and the king were treated alike.

Critical Analysis

From a modern perspective, the Manusmṛti's educational model invites nuanced evaluation.

Strengths

The educational model in the Manusmṛti emphasizes holistic development by integrating intellectual learning with ethical and moral discipline. It promotes self-regulation, character formation, and sense-control as central educational goals. The curriculum demonstrates considerable breadth, combining sacred and practical knowledge. Additionally, the teacher–student relationship is portrayed as a deeply transformative and value-centered engagement.

Limitations

From a modern standpoint, the system exhibits certain limitations, particularly its social exclusivity. Access to education was largely varna-based, and gender restrictions are implicitly present. The hierarchical structure further reflects rigid social stratification, which limits inclusivity and equality.

Contemporary Relevance

Despite its historical constraints, the educational vision of the Manusmṛti retains enduring relevance. Its emphasis on character formation, ethical integration, self-discipline, experiential learning, and the teacher's role as a mentor aligns closely with key principles of modern educational philosophy. These continuities highlight the lasting significance of its holistic educational ideals.

Conclusion

Manu has recognized the importance of the education in life of an individual. Thus in the educational system simple and disciplined life was most essential, for maintaining the higher standard of education. It aimed at the allround development of personality and intellect. For fuller and purposeful development a student received instructions regarding the care of health, bodily grace manners, morals and religion along with lessons in arts, science and literature. During this period the teacher was his guide as well as friend. His life served as a model for the student. Both the teacher and the student coordinated in maintaining a proper and congenial atmosphere for imparting and receiving knowledge.

The Manusmṛti articulates a comprehensive educational vision rooted in moral discipline, intellectual cultivation, and spiritual refinement. Education is conceived as transformative rather than merely informative. While historically situated within a stratified society, its pedagogical insights particularly regarding character, discipline, and teacher student dynamics continue to offer valuable reflections for contemporary educational discourse.

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St. Thomas College of Teacher Education, Pala, Kerala, India
(Research Centre in Education)
Website: https://sites.google.com/view/educational-extracts
email: educationalextracts@gmail.com

BRIDGING THEORY AND PRACTICE: AN ANALYSIS OF INTERNSHIP EXPERIENCES IN B.ED. PROGRAMME

Archana K.*, Annu Dominic** & Dr. Sunu Austin***

Abstract

Teachers mould the future minds of the country, and thus their training phase is of ample importance. This study investigates the overall effectiveness of the B.Ed. Internship Programme. curriculum. It examines various challenges faced by teacher trainees during the internship phase and how support mechanisms help them. A total of 30 teacher trainees who had completed their internships served as the sample. The study employs descriptive and quantitative methods, primarily utilising a survey to collect data. The findings of the study may help in reviewing the structure of the internship programme in the B.Ed. curriculum to make it more effective.

Keywords: *B.Ed. curriculum, Internship, Teacher Trainees*

Introduction

Teachers play a vital role in shaping society by nurturing the intellectual, emotional, and social growth of young learners. The quality of a nation's education system directly reflects the competence and dedication of its teachers. Recognising this, the Education Commission (1964–1966) and the National Policy on Education (1986) emphasised that a society's progress depends on the quality and status of its educators. Therefore, teacher education must continually evolve to prepare teachers for modern classrooms.

India offers various teacher education programs, and the National Council for Teacher Education (NCTE) developed the National Curriculum Framework for Teacher Education (NCFTE) in 2009 to guide them, drawing upon national policies and constitutional values. In 2015, the NCTE introduced a revised two-year B.Ed. program that integrates theory, practical training, and internships to strengthen professional competence.

The NCTE identifies field engagement as a vital component of every teacher education programme. This involves

* & ** *B.Ed. Students, St. Thomas College of Teacher Education, Pala*
*** *Assistant Professor, St. Thomas College of Teacher Education, Pala*

sustained interaction with students and teachers in real school environments, commonly referred to as the school internship. This internship aims to help future teachers develop a strong foundation of professional knowledge, skills, competencies and a positive outlook toward schooling and teaching. This practical component of the curriculum enables studentteachers to move beyond theoretical learning and transform into wellprepared educators capable of handling the real responsibilities of teaching in actual school settings.

The school internship component of teacher education in India is undergoing a shift from the earlier model of practice teaching, which focused mainly on delivering a fixed number of lessons in the chosen subjects in traditional methods. With the NCTE Regulations of 2009, the scope of practice teaching was expanded to ensure that studentteachers gain exposure to the full range of school activities and programmes. This change aims to provide a more holistic and realistic understanding of school functioning.

Need and Significance

The two-year B.Ed. programme includes theory, practicum, and internship. Sessional work and the internship are crucial because they prepare future teachers professionally and give them practical exposure to real school functioning. As per NCTE 2014 guidelines, the internship involves activities such as teaching macro lessons, participating in morning assembly, preparing timetables, organising school activities, checking students' work, maintaining records, attending staff meetings, and preparing notices, exam papers, and certificates. These tasks are completed during actual school-based teaching practice (NCTE, 2015).

The internship in teacher education is essential for preparing prospective teachers by providing them with real classroom experience. However, trainees often encounter challenges that reveal the gap between theoretical knowledge and practical teaching, making it important to understand and address these issues. Key difficulties include managing classroom dynamics, meeting diverse student needs, and balancing multiple responsibilities such as lesson planning, assessment, and interactions with mentors. These pressures can reduce trainees' confidence, highlighting the need for stronger support systems, structured mentorship, hands-on training, and reflective practice within teacher education program.

Teacher education plays a crucial role in shaping future educators, yet it often remains overlooked despite various government initiatives. According to Kumar (2016), teacher education aims to professionally prepare teachers for roles in teaching, organizing, managing, and leading. The National Education Policy (2009) also calls for major reforms in pre-service training, qualifications, remuneration, career growth, and governance to strengthen the teaching workforce and improve the overall education system

A key component of this program is the third-semester internship, which serves as a bridge between academic learning and real classroom practice. During the internship, trainees apply pedagogical theories, develop classroom management skills, practice lesson planning, engage students effectively, and strengthen their assessment abilities. This hands-on experience enhances their

confidence and better prepares them for real teaching responsibilities.

However, interns face several challenges. Many struggle with managing diverse classrooms, preparing detailed lesson plans, and adapting teaching methods to varied learning needs. Administrative duties such as record-keeping and assessments can also be overwhelming. Research supports these issues: studies by Kumar and Gupta (2018), Sharma (2020), and Singh and Verma (2021) highlight difficulties in applying theory to practice, handling student behaviour, addressing diverse learning styles, and coping with insufficient mentorship and feedback

The study seeks to examine these challenges and emphasise the need for a more robust internship framework. Offering comprehensive guidance, timely feedback, and opportunities for reflective practice can greatly enhance the competence and confidence of trainee teachers. Strengthening the internship phase is essential not only for developing effective educators but also for improving the overall education system and contributing to broader societal progress.

Objectives of the Study

- To study the effectiveness and usefulness of internship programme
- To identify the common difficulties faced by the teacher trainees during the internship programme
- To know about the support mechanism that could aid in overcoming the challenges during the internship.

Methodology

The present study adopts a descriptive research design, employing the survey method as the primary approach. This design was considered appropriate since the central objective of the investigation is to examine the nature, effectiveness, and limitations of the internship program offered to student teachers. Data were collected and analysed using percentage analysis, which enabled the identification of trends and patterns within the responses. To enhance clarity and accessibility, the findings were further presented through tables. For data collection, a structured research instrument was developed in the form of a three-point Likert scale, comprising the response categories *Agree*, *Disagree*, and *Undecided*. The tool was systematically organised into three sections, encompassing a total of 14 items. Each section was designed to address a distinct dimension of the internship program.

The final-year B.Ed. Students of St. Thomas College of Teacher Education in Pala served as the sample for this study. A total of 30 B.Ed. Students participated in the research, which employed a survey method to gather data. The data collection involved administering a structured questionnaire to the respondents, allowing for a comprehensive analysis of their experiences and perspectives regarding the B.Ed. program.

Analysis and Interpretation

The present study's analysis is based on the data collected from the B.Ed. students in the Kottayam district. The total sample selected for data collection was 30, and they were the students of the final year B.Ed. programme of St. Thomas College of Teacher Education, Pala. All tables presented are based on this primary data.

Table 1
Showing the views about the 'Effectiveness and Usefulness of Internship Program

Sl. No.	Effectiveness of Internship Program	Agree	%	Disagree	%	Undecided	%
1	The internship program helped clarify the role and responsibility of a teacher.	30	100	0	0	0	0
2	The internship program encouraged critical reflection on teaching methodology and techniques.	29	97	0	0	1	3
3	Effectively integrated theory with practice	22	73	1	3	7	24
4	It provides opportunities to plan and deliver lessons in various disciplines.	22	73	2	7	6	20

As indicated in Table 1, that 100% participants agreed that the internship program helped to clarify the role and responsibility of a teacher, 97% teacher-trainees agreed that the internship program encouraged critical reflection on teaching methodology and technique. 73% opined that this program integrated theory with practice. 73% participants agreed that an internship provides an opportunity to plan and deliver lessons in various disciplines.

Table 2
Views about 'Common difficulties faced by the teacher trainees during the internship program'

Sl. No.	Common difficulties faced by teacher trainees	Agree	%	Disagree	%	Undecided	%
1	Teaching in front of the class caused nervousness or anxiety	8	27	13	43	9	30
2	Lesson planning was more time-consuming than expected	20	67	6	20	4	13
3	Integrating technology into lesson as challenging	6	20	15	50	9	30
4	Handing unexpected questions from students was difficult	5	17	11	36	14	47
5	Classroom management problem	20	67	3	10	7	23

6	Theoretical knowledge was sufficient for practical application	12	40	10	33	8	27
7	Balancing internship duties and academic responsibilities were a struggle	19	64	4	13	7	23

As indicated in Table 2, 27% of participants felt nervous while teaching, while 67% found lesson planning more time-consuming than expected. Integrating technology posed a challenge for 20%, and 17% struggled with unexpected student questions, highlighting the need for better adaptability. Classroom management was difficult for 67%, emphasising the importance of strong disciplinary strategies. While 40% felt their theoretical knowledge was sufficient, 33% disagreed, indicating a gap between theory and practice. Additionally, 64% found it challenging to balance internship duties with academic responsibilities, underscoring the need for better time management and institutional support.

Table 3
Views about 'Support mechanisms for internship Challenges'

Sl. No.	Support mechanisms for internship challenges	Agree	%	Disagree	%	Undecided	%
1	A mentor was available to assist when needed	27	90	1	3	2	7
2	Adequate training was provided to understand role and responsibilities	26	90	1	3	2	7
3	The level of practical exposure provided during the internship was satisfactory	24	80	2	7	4	13

As indicated in Table 3, 90% participants agreed that a mentor was available to assist when needed, and 90% opined that adequate training was provided to understand the role and responsibilities. Moreover, 80% stated that the level of practical exposure provided during the internship was satisfactory.

Major Findings of the Study

- Most of the participants agreed that the internship program helped them develop a true understanding of the complex nature of the teaching process.
- Most participants (97%) believed that the program successfully integrated theory with practice.
- A majority (73%) found the program effective and useful as it provided opportunities to plan and deliver lessons in various disciplines and critically analyse different teaching styles.
- Majority of student-teachers (73%) agreed that their teaching styles, methodologies, and techniques improved through the programme, although 14% disagreed.

- Most of the participants (100%) acknowledged that the internship program gave them a clear understanding of the roles and responsibilities of a teacher.
- Many participants stated that the internship experience helped them bridge the gap between theoretical learning and practical classroom application.
- A significant number of participants reported increased confidence in lesson planning, classroom management, and student engagement.
- Most participants felt that the internship facilitated peer learning, collaboration, and constructive feedback, contributing to their professional growth.

Conclusion

In conclusion, the study identifies several key difficulties faced by teacher trainees during their internship program. These challenges include the transition from theoretical knowledge to practical classroom application, which often leaves trainees feeling unprepared for real-world teaching dynamics. Classroom management emerges as a significant concern, with trainees struggling to maintain authority and engage students effectively, especially in diverse and dynamic learning environments. Time management also proves to be a major hurdle, as trainees must balance lesson planning, teaching, grading, and administrative duties while managing personal academic commitments.

A lack of support and mentorship from supervising teachers or institutions can further exacerbate these difficulties, leaving trainees without adequate guidance to improve their skills. Limited practical experience, resource shortages in schools, and challenges in addressing the cultural and linguistic diversity of students add to the overall complexity of the internship. Despite these difficulties, the internship remains a crucial phase in the development of future educators. With proper institutional support, mentorship, and access to resources, trainees can overcome these challenges, enhance their teaching abilities, and ultimately transition into competent and confident educators. Addressing these difficulties is essential for improving the quality of teacher training and ensuring the success of the internship program.

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St. Thomas College of Teacher Education, Pala, Kerala, India
(Research Centre in Education)
Website: https://sites.google.com/view/educational-extracts
email: educationalextracts@gmail.com

ROOTED IN THE REAL: OUTDOOR EDUCATION AS HUMANISING PEDAGOGY IN THE AGE OF AI

Dr. Bindu David * & Dr. Dan George**

Abstract

The adoption of Artificial Intelligence in secondary education has significantly transformed adolescent learning. An imperative yet unprecedented change, this calls into question what is preserved and what is quietly lost when pedagogy becomes algorithmically mediated. While AI-driven tools are efficient in personalisation, feedback, and assessment, they tend to privilege measurable outcomes over affective depth, and the kind of relational encounter that characterises genuine learning. This narrative review examines thirty peer-reviewed studies published between 1970 and 2024, sourced from Scopus, ERIC, Web of Science, and Google Scholar, to theorise outdoor education as a humanising pedagogical counterpart to AI-integrated secondary schooling. The review is organised thematically across four domains: AI's pedagogical reach and limitations, outdoor education's documented impact on adolescent development, the specific deficits that outdoor learning addresses in algorithmically driven classrooms, and the curricular implications of integration. Findings suggest that outdoor education offers what algorithmic pedagogy structurally cannot provide, which include sensory engagement, emergent meaning-making, and affective experiences. Grounded in posthumanist educational theory, the review proposes a conceptual framework and calls for outdoor education to be reconceived as a structural necessity within secondary curricula in the age of AI.

Keywords: *Outdoor education, artificial intelligence in education, humanising pedagogy, place-based learning, posthumanist pedagogy.*

Introduction

The school a child enters today is never the same school their parents left behind. With every new age, the classroom also transitions. The technological inventions, the cultural transitions of the time, and the political upheavals in the nation significantly affect the classroom atmosphere. The advent of Artificial Intelligence in the classroom was an entirely new transformation. It is, as Selwyn (2019) argues, a reordering of

* *Assistant Professor, St. Thomas College of Teacher Education, Pala*
** *B.Ed. Student, St. Thomas College of Teacher Education, Pala*

the very conditions under which teaching and learning are imagined, organised, and evaluated. It is notable that with the coming of Artificial Intelligence in the classrooms, significant positive impacts have occurred. The curriculum has been personalised, feedback can be given immediately, and the learners at risk of falling behind can be identified considerably early. These are benefits of AI-driven instruction. Tangible gains can be perceived in student engagement and academic performance in contexts where these tools have been thoughtfully integrated (Zawacki-Richter et al., 2019). The concern this review raises, however, is not with the use of AI but with what is quietly displaced when algorithmic mediation becomes the dominant register of secondary education.

When it comes to adolescent education, it is to be remembered that it is not just a time of learning, but a comprehensive period of all round development of the individual. It is the time when they construct their sense of identity, belonging, and understand what the world outside the school might demand from them (Dahl et al., 2018). The paradox is that artificial intelligence, though capable in assistance with learning, is not entirely efficient to help the students meet these needs. If learning is only focused on quantifiable outcomes, then learners may not understand the intricacies of human relationships or be able to make informed decisions. Outdoor education bridges this gap. Outdoor education is the learning that takes place in natural or semi-natural environments. It has substantive place in educational practice (Priest, 1986; Rickinson et al., 2004). The advocates of outdoor education have argued that learning from, about, and with the natural world is helpful in developing skills like ecological literacy and collaborative resilience in students that indoor, screen-based education struggles to inculcate. In a world, where ecological crisis, and the psychological weight of digital life loom, these are important competencies. They may well be among the most important things a secondary school can offer.

Outdoor education, read against the grain of algorithmic pedagogy, emerges not as a nostalgic retreat from modernity but as a principled, theoretically grounded response to some of modernity's most concerning educational dilemmas. It offers, in short, what AI cannot, namely the irreducibly real, the sensory, the unscripted, and the human aspects of life. This narrative review draws on thirty peer-reviewed studies published between 1970 and 2024 to develop this argument. It is organised across four thematic sections, moving from an analysis of AI's pedagogical reach and limitations, through a review of outdoor education research, to an examination of how outdoor learning addresses the specific deficits, and finally to a proposed conceptual framework for integrating outdoor education into post-AI secondary curricula. The review does not position outdoor education as a replacement for AI-driven pedagogy. Rather, it argues for a more expansive understanding of what secondary education is for, one in which the living world beyond the classroom walls is recognised as an indispensable site of humanising learning.

The true aim of education is a question that weighs heavily on educational thought today. In many secondary schools around the world, uncertainty about how to educate students in relation to emerging technologies looms large. On the one hand, teachers must contend with the allure of new technology. On the other, they may feel concerned about losing something irretrievable in their pursuit of technological innovation. There exists the risk of a reductionist understanding of education in an artificial intelligence enabled learning. It gives precedence to quantified outcomes and optimised performance. The ecological dimensions of learning are often overlooked. When this is the case, adolescents feel anxious and disconnected from the natural world. Digitally mediated classrooms alone cannot adequately address the requirements of adolescent development. Outdoor education is one of the few pedagogical forms where affective and ecological formation can flourish. The benefits of outdoor education and the growing influence of artificial intelligence in secondary schooling have yet to be fully examined, and this review seeks to address that gap through a contribution that is theoretical, developmental, and policy-oriented.

Objectives

The present review is guided by the following objectives:

- To examine how AI integration is reshaping pedagogical practices in secondary classrooms and identify its key limitations.
- To review the existing literature on outdoor education and its documented impact on adolescent learning, well-being, and development.
- To analyse how outdoor education addresses the specific deficits created by algorithmic pedagogy in secondary schooling.
- To propose a conceptual framework that integrates outdoor education into post-AI secondary curriculum design.

Methodology

This review adopts a narrative review methodology to examine the relationship between outdoor education and AI-driven pedagogy in secondary schooling. Thirty peer-reviewed studies published between 1970 and 2024 were drawn from Scopus, ERIC, and Web of Science, with Google Scholar consulted supplementarily to capture grey literature and practitioner scholarship not consistently indexed in these databases. Search terms included outdoor education, artificial intelligence in education, algorithmic pedagogy, place-based learning, embodied cognition, posthumanist pedagogy, secondary education, and adolescent development, used independently and in combination. The analysis is thematic. It is acknowledged that the outdoor education research base is susceptible to publication bias towards positive outcomes, and findings should be interpreted with this limitation in mind.

Artificial Intelligence in Secondary Education: Affordances, Limitations, and Unintended Consequences

Artificial intelligence has entered the centre of educational life. The secondary classroom is undergoing a notable transformation. Educators now use advanced learning platforms and intelligent tutoring programmes as part of their regular practice (Holmes et al., 2019). Teachers and policymakers are still trying to make sense of a transformation (Selwyn, 2019). The classrooms are crowded and the promise of technology that can personalise learning without creating more work for an already burdened teacher is very compelling.

Artificial intelligence improves learning (Zawacki-Richter et al., 2019). Luckin et al. (2016) acknowledge that artificial intelligence reduces assessment anxiety among learners as they calibrate pace and feedback to the progress of individuals. Popenici and Kerr (2017) state that when AI functions as a scaffold rather than a replacement for human interaction, it can develop positive engagement between students and their learning environment. They move students along structured pathways and reward measurable outcomes. But when education starts to function like a pipeline, these moments get lost. Biesta (2013) calls this the reduction of education to a transactional logic. When learning is measured by scores alone, students begin to understand knowledge in those same narrow terms (Selwyn, 2019). This quietly teaches students that learning is about output, not growth. They get better at performing, but they do not necessarily get better at feeling.

What the Outdoors Teaches: A Review of Outdoor Education Research in Adolescent Contexts

There is this burgeoning social recognition that knowledge is created and perceived not just behind the desks, but also out there in the wilderness. It is in recent years that researchers have looked deep into this. Studies are conducted on how outdoor learning helps young people, including how it affects them, and what it builds in them (Rickinson et al., 2004). The findings show that outdoor education expedites adolescent well-being. Adolescents who spend time learning in natural environments have less stress and anxiety (Barton & Pretty, 2010). Since adolescence is a stressful time for many young people because of psychological pressure, the outdoors offers space to breathe. Outdoor education boosts adolescent self-confidence, resilience, and collaboration with others (Hattie et al., 1997). These skills are not efficiently created in a conventional classroom, and are nearly impossible to generate in an algorithmically managed one.

Outdoor learning assists in academic engagement as well. When students spend time outdoors and learn through natural experiences, they seem to be highly motivated and very curious (Dillon et al., 2006). This same feeling that one finds physically in nature is hardly acquired through a screen or a textbook. Ecological literacy is another benefit of outdoor education. This is not something that can be taught effectively through diagrams and documentaries alone. It requires direct encounter with nature (Sobel, 2008).

Secondary schools that confine learning to digital environments produce graduates who do not feel connected to nature. Outdoor education will teach students to stay calm and adapt (Priest, 1986). It is also, notably, something that no AI system can replicate. The outdoors is, by its very nature, unscripted.

It is also worth recognising that the benefits of outdoor education are not experienced uniformly across all adolescent groups. Gender plays an important role in outdoor experience in ways the literature has only partially addressed. Research suggests that girls and young women often navigate outdoor environments with a different set of social expectations and embodied self-perceptions than their male peers. Programme design that fails to account for this risks replicating rather than challenging existing inequities. Cultural background also mediates how adolescents relate to natural environments. For many young people from non-Western traditions, the relationship with the natural world is not one of encounter or discovery but of inherited belonging, shaped by communal land practices, and intergenerational ecological knowledge that mainstream outdoor education frameworks have not always recognised. A developmentally serious engagement with outdoor pedagogy must therefore attend not only to what the outdoors offers adolescents in general, but to how different young people, differently located by gender, culture, and social experience, are positioned within that encounter.

None of this is to suggest that outdoor education is without challenges. Access is unequal. Urban schools, under-resourced institutions, and schools in densely populated areas face real barriers to regular outdoor learning. Curriculum pressure leaves little room for experiences that do not map directly onto examination objectives. And teacher confidence in outdoor pedagogy varies considerably. These are genuine constraints, and the literature acknowledges them (Rickinson et al., 2004).

What AI Cannot Simulate: Outdoor Education as Response to Algorithmic Deficits

Artificial intelligence systems, though they seem highly sophisticated, are built on definite logical strains. They are designed to process data and generate responses in a particular format. But the natural world is highly unpredictable. When students are outdoors, they are in a scene which is not optimised for their learning. Paradoxically, this makes outdoor education educationally powerful. The first deficit that outdoor education addresses is the absence of unpredictability in AI-mediated classrooms. Algorithmic pedagogy is built to minimise surprise. AI guides learners towards predetermined outcomes, but it cannot provide the surprise element one finds in nature. Dewey (1938) argued that true learning begins in disruption, in the moment when experience does not conform to expectation and the learner is forced to reconsider, and reconstruct their beliefs. The outdoors generates these moments constantly and without contrivance.

The second deficit is the absence of embodied experience. The body is

not peripheral to learning; it is central to it (Varela et al., 1991). But the body is largely irrelevant in AI-assisted classroom education. Outdoor education demands physical engagement. It makes students climb, carry, and balance, to feel the ground beneath their feet. Learning happens through these physical experiences. The third deficit is relational. AI systems may be able to simulate relationships, but they do not have the capacity to understand the emotional state and needs of the learner. Outdoor education helps to form human relationships. Shared experiences form stronger bonds (Hattie et al., 1997). The fourth deficit is ecological. AI-driven education takes place within a human-constructed and human-centred world. Screens, keyboards, algorithms, data: all of it is made by humans, for humans, about humans. Outdoor education breaks this enclosure. It places students in direct contact with a world that was not made for them and does not revolve around them. This encounter with the posthuman world is, as Barad (2007) and Braidotti (2013) argue, enriching and epistemologically significant.

Towards a Conceptual Framework: Integrating Outdoor Education into Post AI Secondary Curriculum

When outdoor education is implemented in secondary curricula, the development of the body of adolescents, along with the mind, is to be considered, since knowledge is not only produced in the mind, but is produced through the body's active participation in its environment (Varela et al., 1991). Learning experiences are to be included that require students to use their bodies as primary tools of inquiry. Field-based science, environmental mapping, outdoor art, and physical navigation are some pedagogical activities that can be added to curricula. True learning, as Dewey (1938) argued, occurs when experience confounds expectation and compels the learner to reconstruct their perceptions. Gruenewald (2003) extends this insight by arguing that place-based education opens learners to forms of knowledge that cannot be anticipated in advance.

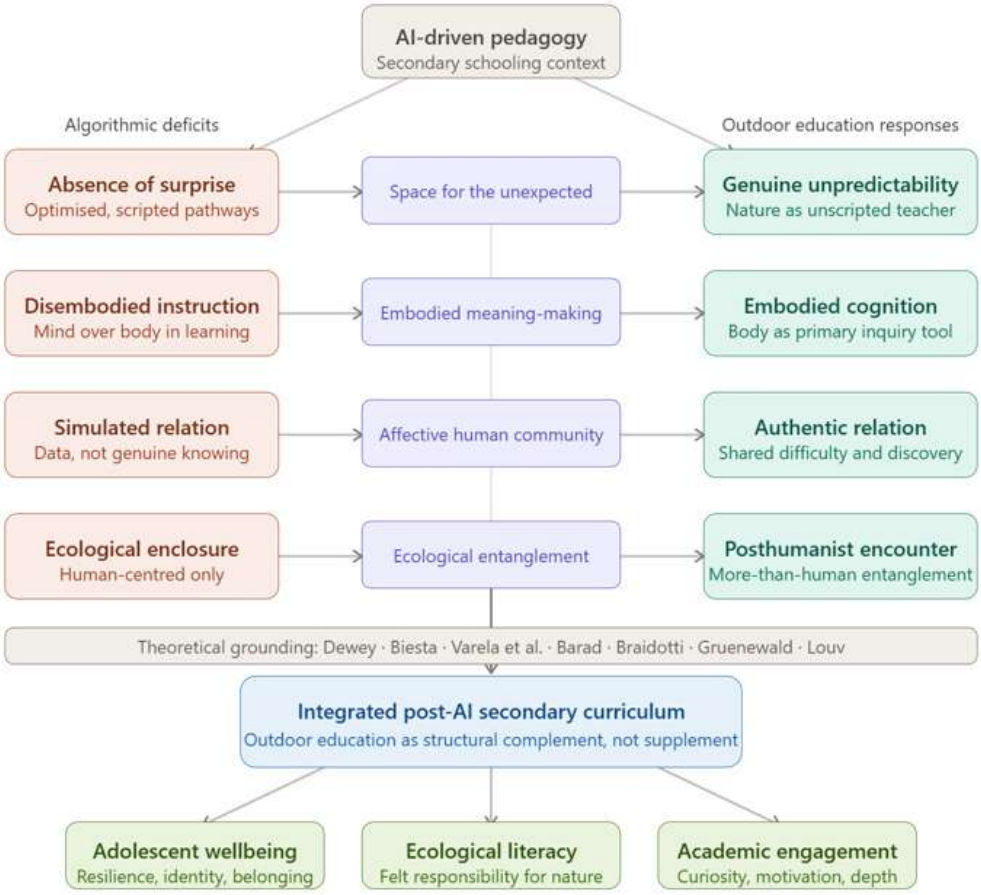
Barad (2007) and Braidotti (2013) state that the learner is not an individual isolated from nature. The curriculum should help learners become part of nature. Adolescents today are growing up in digitally saturated environments. Louv (2008) calls this nature-deficit disorder. Learners experience an intense estrangement from the living world. Outdoor education can provide affective experiences. Biesta (2013) states that the unscripted moments which outdoor education provides constitute the most educationally significant experiences a young person can have.

To implement outdoor education, resource-constrained secondary schools can begin with what is immediately available. They can work on schoolyard ecology projects, where students are required to document and monitor the biodiversity of their immediate institutional environment. This requires no specialist equipment and aligns readily with science and environmental studies curricula. Urban schools without access to green spaces can engage with nearby parks and community

gardens as sites of place-based inquiry. Structured reflection walks, where students move through their local neighbourhood with directed observational prompts, cultivate exactly the kind of attentive, embodied engagement that characterises genuine perceptual learning. Timetabling need not be sacrificed either. Even a fortnightly outdoor session of forty-five minutes, integrated into existing subjects, can begin to shift the affective register of learning in ways the research consistently documents. A curriculum that treats outdoor encounter as structurally necessary, however modest its initial form, is already a fundamentally different curriculum from one that does not.

Figure 1

Outdoor Education as Humanising Complement to AI-Driven Pedagogy in Secondary Schooling: A Conceptual Framework



Note. Theoretical grounding draws on Dewey (1938), Biesta (2013), Varela et al. (1991), Barad (2007), Braidotti (2013), Gruenewald (2003), and Louv (2008).

Conclusion

This review has addressed the objectives in sequence. The role of artificial intelligence in secondary schooling is evaluated, and outdoor education is found to be a necessity. Artificial intelligence in education has benefits, but it cannot replace the experiences a learner derives from being in the natural world. While digital tools can efficiently optimise curriculum delivery, they cannot replicate the emotional intelligence and sensory awareness gained outside the classroom. A balanced approach which blends technological advancement with experiential learning is essential for holistic development.

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