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Indian Knowledge Systems (IKS)

1. Research Abstract

1. Theme/Subject:	Indian Knowledge Systems (IKS)
2. Stage of Education:	Secondary Stage
3. Topic of Research:	A Study on Effect of Vedic Mathematics on Students' Performance in Government Schools of Haryana
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5. Name of the Institution where the Research was conducted	REAP Cell, SCERT Haryana
6. Category: (Research study/ Action research/ Other)	Research Report
7. Language of Research Report:	English
8. Year of Completion:	2022
9. Published/Unpublished:	Unpublished
10. Introduction:	<p>Many students fear Mathematics and tend to avoid it due to difficulties with long multiplication, division, and other calculations, often losing marks because of mistakes. To make learning math easier and more engaging, SCERT Haryana planned to introduce Vedic Mathematics in government schools from classes VI to X. In 2019, SCERT and BSEH decided to train selected teachers across the state in Vedic Mathematics, aiming to reduce students' fear of the subject and improve their understanding. The initiative involved training six teachers per block, equipping them with techniques to teach math more effectively. To evaluate the impact, a research study was conducted during 2021-22, comparing the academic performance of students in schools where teachers received Vedic Mathematics training with those where teachers did not. The primary goal was to determine whether the new teaching methods could enhance students' mathematical skills, boost their confidence, and reduce anxiety associated with math. This effort aimed to make mathematics more interesting and accessible, ultimately improving overall student performance and fostering a positive attitude towards the subject.</p>

11. Objectives:

The aim of the study was to know about the effect of teaching Vedic mathematics on students' performance in Mathematics subjects. The study had the following objectives-

- To compare the performance (in Math subject) of students taking classes in Vedic mathematics with the performance of students not taking such classes.
- To study the effect of teacher training in Vedic Mathematics on-
 - teaching of Mathematics subject
 - interest among students
 - number of students opting for Math subject in class XI
- To know about the problems faced by teachers in teaching Vedic Mathematics

12. Methodology:

An experimental research design was prepared to study the effect of teaching Vedic Mathematics on students' performance in Mathematics subjects in Government schools of Haryana. The treatment group included schools with at least one teacher trained in Vedic Mathematics and the control group included similar schools from the same blocks as that of the treatment group, without any trained teacher in Vedic mathematics. The study was conducted in 88 Senior Secondary schools from all the 22 districts of the state.

Sample Size- The sample included 44 schools with Math teachers (PGTs) trained in Vedic Mathematics and 44 schools with Math teachers (PGTs) not trained in Vedic Mathematics. The study was conducted in 44 blocks (2 per district) of the state. The students of Class IX and X taking 5 students per class were selected randomly leading to a sample of 880 students across the state.

Tool Development: The tools were developed during a Tool Development workshop held at SCERT and included Interview Schedule for School Head, Interview Schedule for Math Teachers (separately for both trained and untrained teachers in Vedic Mathematics) and Questionnaires for students. Two separate questionnaires were prepared for students. The first questionnaire was developed to know the perception of students about Vedic mathematics and their experience about using shortcut tricks in solving mathematical problems. A second questionnaire was prepared for students to assess their understanding about techniques of Vedic mathematics. The purpose of this questionnaire was to observe whether the students use the techniques of Vedic Mathematics for performing mathematical calculations or not.

Data Collection and Analysis: The data was collected from the sample schools with the help of 22 surveyors across the state including ARAs and DIET Lecturers. The surveyors were trained for collecting the information during the tool training programme. Both qualitative and quantitative data was collected from the stakeholders during Nov, 2021.

13. Findings:

The findings indicate that the application of Vedic techniques by students is similar across both groups, regardless of whether their teachers were trained in Vedic Mathematics by SCERT or BSEH. About 53% of students in schools with trained teachers are aware of shortcut methods for fast calculations, compared to 41% in schools without trained teachers, suggesting that teachers in both settings are using Vedic techniques. However, no student from either group was able to apply these techniques to all given problems. Importantly, there was no significant difference in the average scores of students from schools with trained teachers and those without, indicating that training alone may not directly influence academic performance. Teachers widely acknowledged that Vedic Mathematics helps address students' difficulties in understanding mathematical concepts, with 73% agreeing on its benefits. The primary challenge in implementing Vedic Mathematics in schools is its absence from the official curriculum, despite school heads recognizing its potential. They cited the lack of curriculum inclusion and clear guidelines as barriers to broader adoption and effective integration into regular teaching practices.

14. Recommendations/ Implications:

To ensure effective implementation of Vedic Mathematics, clear guidelines should be provided to schools. Comprehensive training must be offered to all teachers to equip them with the necessary skills and knowledge. Additionally, regular monitoring and evaluation should be conducted to assess the progress and address any challenges faced during integration. These steps will facilitate consistent application of Vedic Mathematics in classrooms, enhance students' understanding of mathematical concepts, and maximize the benefits of the initiative across schools. Proper guidance, training, and oversight are essential to embed Vedic techniques effectively into the regular curriculum and teaching practices.

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16. Keywords: Learning Outcome, Vedic Mathematics, teacher training, students' understanding, teaching practices, teacher training

2. Research Abstract

1.	Theme/Subject:	Indian Knowledge Systems (IKS)
2.	Stage of Education:	Middle and Secondary Stages
3.	Topic of Research:	A study of Indigenous knowledge, vocational skills, and practices related to dyeing, and environmental conservation in Rajasthan State
4.	Name and Address of the Investigators(s) with email:	Dr. Om Prakash Meena, Associate Professor in Chemistry, DESM, RIE, Ajmer Email: opmeenancert@gmail.com
5.	Name of the Institution where the Research was conducted	Regional Institute of Education, Ajmer
6.	Category: (Research study/ Action research/Other)	Research Study
7.	Language of Research Report:	English
8.	Year of Completion:	2025
9.	Published/Unpublished:	Unpublished
10.	Introduction:	<p>This study was conducted in light of the National Education Policy 2020, which strongly emphasized for inclusion of indigenous knowledge in school curriculum. This knowledge gives a comprehensive picture of Indian aspirations for the future in terms of health, education, environment, etc. The policy recommends that school curriculum should incorporate Indian contribution to knowledge and the contexts in which it is discovered. In the light of the policy, this research study is conducted for Rajasthan state related to vocational skills and practices of dyeing and environmental conservation.</p> <p>Several kingdoms of Rajasthan such as Mewar, Marwar, Shekhawati, and Amber, were known for their bravery, chivalry, and architectural achievements. Rajasthan state was selected for the study because Rajasthan has a rich culture, heritage, and indigenous knowledge & practices in the field of dyeing and environmental conservation. Rajasthan state has one of the most diverse geographical conditions, ranging from desert to plains and mountains. Because of these adverse conditions, the people of Rajasthan state have adopted various environmental conservation practices.</p>

11. Objectives:

1. To identify the local Indigenous knowledge, vocational skills, and practices related to dyeing, and environmental conservation.
2. To map the identified indigenous knowledge and environmental conservation practices with existing science contents of middle and secondary level NCERT textbooks.
3. To map identified vocational skills required for dyeing and environmental conservation in existing school curriculum.

12. Methodology:

The tools and sites for data collection for this study in Rajasthan were finalized in a workshop mode under the guidance of some external resource persons associated with archeology and museum department, experts in natural dyeing, experts in miniature art in Rajasthan state, and experts of environmental science. Keeping in view the objective of the study, the following tools were finalized for data collection in the state:

- IKST-1: Interviews with Vocational experts/professionals on dyeing practices.
- IKST-2: Observation of traditional dyeing practices in Rajasthan.
- IKST-3: Observation of practices on environmental conservation in Rajasthan.
- IKST-4: Interviews/focus group discussion with community members on environmental conservation.

During the study, our team visited different sites of Rajasthan for the collection of data related to the indigenous knowledge, vocational skills, practices related to dyeing and environment conservation.

13. Findings:

We found large data on traditional knowledge, practices, and vocational skills on the dyeing and environment conservation, especially on Bagru print, Sanganeri print, Ajrakh print, Shekhawati Havelis, Water Conservation, forest protection (like: Nadi, Tanka, Johad, Pond), **Orans** (Pabu ji Maharaj, Jeen Mata, Deshnok, Harshnath), and wildlife conservation in Sariska, National Park Ranthambhore, Kevla Deo, Taal Chhappar, National Desert Park, etc.

Data concerned with **Dyeing and Miniature art practices** were collected from Pushkar, Sanganer, Bagru, Bhilwara, Barmer, Balotara, Khandela, Jaipur,

Nathdwara, Kishangarh, Bhilwara, and Shekhawati Havellies-Jhunjhunu, Mandawa, Nawalgarh, Baggad etc.

Data concerned with environmental conservation practices were collected from **Orans**-Pabu Ji Maharaj; Bikaner: Jorbeer Conservation Reserve, Deshnok; Sikar: Jeen Mata and Harshnath, **National Parks and Reserves**-Sawai Madhopur : Ranthambhore; Alwar : Sariska; Bharatpur : Keoladeo Park; Jaisalmer : National Desert Park; Churu : Taalchappar, **Lakes**:-Sambhar, Barmer, Udaipur, Anasagar & varunsagar lake. **Focus group discussions** were held at Jaipur, Kishangarh, Pushkar, Sambhar, Bagru, Sanganer, Bhilwara, Jodhpur, Barmer, Sikar, Khandela, Bikaner, Deshnok, Karauli, Churu, Hanumangarh, Dungarpur, Kota, Tonk, Bundi, Pali, Alwar etc.

Rajasthan State's traditional Practices for Conserving the Environment:

Traditional Water Harvesting, Agroforestry, Crop Rotation, Organic Farming, Traditional and sustainable agricultural practices, Traditional Architecture for Sustainability, **Water conservation techniques** such as Johads, Stepwells, Tanka and Khadin etc., Protection of **Forests**- Oran Culture, Community based Practices: Saka (Sacrificing Life), Kesar Chhanta, Pavitra Kunjs (Sacred Groves), **Honoring of the Trees**: Ashoka (Budha, Indra), Vat (Kuber, Brahma), Peepal (Patradeva, Vishnu, Laxmi) etc., Respecting Animals as vehicles of God and Goddesses such as mushak (Ganesh), ulloo (Laxmi), mayur (kartikya), sher (maa durga) etc., **State Animals and state bird**: Chinkara, Camel, Godawan, **Traditional water conservation Practices**: Tanka Construction, Khadin Construction, Water Collection on Roofs etc., **Eco-Friendly Rituals and Fairs**: Gangaur, Akha Teej, Shitalastami, Kalpavriksha Fair, Shami (Khejadi) Poojan etc.

14. Implications:

- Traditional dyeing practices such as Bagru print, Sanganeri print, Ajrakh print etc. need to be preserved and promoted. This would not only be a source of employment but also useful for sustainable environment.
- Shekhawati Havelis are a testament to the rich cultural heritage of Rajasthan. The Havelies are renowned for their frescoes style, internal carvings, and ornate architecture, which reflect the region's unique blend of Rajput and Mughal influences. The walls of these Havelies are adorned with vibrant paintings depicting mythological scenes concerned Ramayana and the Mahabharat, historical events, and everyday life, showcasing the artistic prowess of the region's craftsmen. The Shekhawati Havelis have been recognized as a unique cultural phenomenon and have been designated as a UNESCO World

Heritage Site, acknowledging their importance as a testament to India's rich cultural diversity. Their preservation is important for the cultural heritage.

- Sustainable solution for modern challenges like water scarcity, climate change, conservation of biodiversity by adopting traditional water conservation practices like taanka, khadin, bawdi, and community-based Practices such as Oran Culture, Saka (Sacrificing Life), Kesar Chhanta, Pavitra Kunjs (Sacred Groves).
- Reviving these traditional practices, we can ensure ecological balance, water security, and sustainable development by promoting **Eco-Friendly Rituals and Fairs** such as Gangaur, Akha Teej, Shitalastami, Kalpavriksha Fair, Shami (Khejadi) Poojan etc.
- Some of these practices may be included in the school curriculum such as dyeing practices (Bagru and Sanganeri print), water conservation techniques (Taanka, Khadin, Bawdi), and conservation of architectural heritage (Shekhawati havelis).

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16. Keywords: Bagru print, Sanganeri print, Ajrakh print, Shekhawati Havelis, Oran, Akha Teej

3. Research Abstract

1. Theme/Subject:	Indian Knowledge Systems (IKS)
2. Stage of Education:	All Stages
3. Topic of Research:	Education for Sustainable Development: Study and Documentation of Indigenous Knowledge and Innovative Practices on Conservation of Natural Resource from Tribal Pockets of Odisha.
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5. Name of the Institution where the Research was conducted	Regional Institute of Education, Bhubaneswar
6. Category: (Research study/ Action research/Other)	Research Study
7. Language of Research Report:	English
8. Year of Completion:	2019
9. Published/Unpublished:	Unpublished
10. Introduction:	
<p>The concept of sustainable development became well known through the famous Brundtland report entitled “Our Common Future” published in 1987 (WCED, 1987). It defined Sustainable Development as the development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs. This reflects that the present resource base is the base for the survival of the future generation too. So nature has entrusted us with a hard task of preserving the environment while exploiting and passing it to the next generation as we borrowed it from our ancestors.</p> <p>To make education effective and relevant, knowledge and skill from the outside world need to be linked with classroom experiences (NCF, 2005). One of the important dimensions of environmental sustainability is the conservation of natural resources that support the life system. Many indigenous knowledge and innovative practices on conservation of natural resources (soil, water, plant etc.) are associated with tribal life and culture, left unnoticed, demanding their study, documentation and infusion into curriculum/text book in order to promote responsible citizenship. Under this background the present study has been conceptualized.</p>	

11. Objectives:

- To Study the Indigenous Knowledge and Innovative Practices on Conservation of Natural Resources from Tribal Packets.
- To document the collected information for future use.

12. Methodology:

The study aims to document the indigenous knowledge and practices of tribal communities associated with the conservation of natural resources in the state of Odisha. Due to limitations of time and human resource, the present study has been confined to Koraput, a tribal dominated district in the state of Orissa. Of the 63 tribal communities inhabiting the state, a maximum of 26 tribal groups along with some primitive tribes like Paraja, Bhumia, Gadaba etc. are seen in Koraput district. The tribal community includes Kondh, Paraja, Gadaba, Bhumia, Bhatra, Saura, Kandha, Dombo, Durua, Adivasi, Mali, Paika, Gouda etc. and other tribal groups of the Koraput region, still to a great extent, retain their traditional life style.

The survey method was followed in the present study.

- Field observation, structured interviews, and prepared questionnaire, were used for collection of information from elderly people, community leaders, teachers etc. (sample size-200) from Tribal pockets of Koraput, Mayurbhanj and Bolangir
- Documentation of the collected information with photographs/pictures/examples
- Textbook analysis (Science, Social Studies, Environmental Studies) were made and suggestions to incorporate the documented information at appropriate place(s) (Subject, Unit, Topic Chapter etc.) and stage with activities, photographs examples etc. were also made.

13. Findings:

A total of 66 plant species distributed in 63 genera belonging to 42 different families has been recorded in which Anacardiaceae, Asteraceae and Myrtaceae were the important families. The ethno-medicinal plant species include 22 trees, 6 shrubs, 26 herbs and 2 climbers/creepers. Various plant parts such as seed, fruit, root, tuber, leaf etc. have been used in the treatment of various diseases and infections. Many plant species used as a source of medicines are being scientifically studied to find out their active principles and mode of action. These plants need conservation as over exploitation is leading to their extinction. Sustainable use is the possible solution. Many of these plants need to be published and possibly put in school text books to make children/the general public aware of their use and conservation. Plant species numbering 54 have been recorded as food resources by tribal people of the area studied. From this total number of trees,

there are 25 herbs, 20 shrubs, 3 climbers/creepers, Leaf, Fruit, tuber and shoots are commonly used as sources of food. Mode of consumption by different tribes has also been listed in the table. Some of these food materials are consumed regularly whereas others such as bamboo seeds during emergency situations/different periods such as famine.

14. Implications:

The documented information not only adds to the spectrum of existing knowledge but also in terms of activities, practices, examples etc. will help text book writers to infuse the concepts in text books of Science, Social Science and Environmental Studies to promote Environmental Sustainability and responsible citizenship. The information shall be useful to organise training programmes on Sustainable Development with emphasis on local contexts.

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16. Keywords: Sustainable Development, Indigenous Knowledge, Innovative Practices, Conservation of Natural Resource, Tribal Pockets