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# AI Integration for Three Language Formula: Advancing Viksit Bharat 2047 Mission

**Smt. Rupali Kharche**

Computer Science Department, Swami Shri Swaroopanand Saraswati Mahavidyalaya, Bhilai (C.G.), 490008

**Abstract**

The National Education Policy (NEP) 2020 emphasizes the Three Language Formula to promote multilingualism and national integration in India. This paper explores the integration of Artificial Intelligence (AI) technologies to effectively implement the Three Language Formula. It discusses the significance of multilingual education, challenges, and proposes AI-driven solutions. Furthermore, it examines how this initiative aligns with the ViksitBharat 2047 mission, envisioning the role of AI in fostering a developed India by 2047. Through case studies and analysis, the paper provides insights into leveraging AI to realize the goals of NEP 2020, contributing to education advancement and national development. This research is crucial for policymakers, educators, and stakeholders aiming to shape India's educational future.

**Keywords:** AI, Three Language Formula, NEP 2020, ViksitBharat 2047, Multilingual Education, National Integration, Language Learning, Natural Language Processing, Machine Learning, Education Technology, Multilingualism, Cultural Integration

## 1. Introduction

### 1.1 Background and Context

Advancing the ViksitBharat 2047 Mission lies at the intersection of education policy, linguistic diversity, and technological advancement in India. The National Education Policy 2020 introduced the Three Language Formula to promote multilingualism and national integration. However, its effective implementation faces challenges related to access, quality of materials, and teacher training. Concurrently, the ViksitBharat 2047 mission envisions India's development, emphasizing the role of technology in various sectors.

The paper explores the potential of integrating Artificial Intelligence (AI) into the Three Language Formula. AI offers solutions such as language learning platforms, translation tools, and adaptive learning systems to address implementation challenges. Aligning with ViksitBharat 2047, the paper aims to contribute to India's educational and technological advancement. Understanding this background and context is crucial for comprehensively assessing the significance and implications of AI integration in fulfilling the objectives of National Education Policy 2020 and ViksitBharat 2047.

### 1.2 Objectives

The objectives of the research are:

- To examine the current status of the Three Language Formula as outlined in the National Education

Policy 2020 and identify key challenges in its effective implementation.

- To explore the potential role of Artificial Intelligence (AI) technologies in addressing the challenges faced in the implementation of the Three Language Formula.
- To analyze various AI-driven solutions such as language learning platforms, translation tools, and adaptive learning systems, and their applicability in promoting multilingual education and enhancing access to quality learning materials.
- To investigate the alignment between the integration of AI into the Three Language Formula and the broader vision of the ViksitBharat 2047 mission, focusing on how AI can contribute to India's educational development and national advancement.
- To provide insights, recommendations, and implications for policymakers, educators, and stakeholders involved in shaping the future of education in India, with a focus on leveraging AI to realize the goals of National Education Policy 2020 and ViksitBharat 2047.

## 2. Literature Review

The National Education Policy 2020 emphasizes the importance of multilingualism and linguistic diversity in education, recognizing that language plays a crucial role in fostering cultural understanding and national integration. The Three Language Formula proposes that students should learn three languages: the regional language (or mother tongue), the official language of the state, and a third language from another part of India. Mohanty (2008) discusses the sociopolitical significance of multilingualism in India, highlighting how language skills are essential for meaningful participation in the democratic system. This perspective underscores the importance of initiatives like the Three Language Formula in promoting linguistic diversity and ensuring that students have proficiency in multiple languages.

However, the implementation of the Three Language Formula has been subject to debate and controversy, particularly in states with diverse linguistic landscapes. Malakar and Dutta (2023) argue that while multilingual education is crucial for fostering language proficiency and cultural understanding, challenges arise in determining the languages to be taught under the Three Language Formula. The authors stress the need for flexibility in language policy to accommodate regional variations and preferences.

Sahoo (2023) and Nykon (2024) explore the benefits of multilingual education, emphasizing how exposure to multiple languages enhances communication skills and cultural appreciation among students. They advocate for a balanced approach that promotes linguistic diversity while ensuring that students develop proficiency in languages necessary for national integration.

The National Education Policy 2020 acknowledges the need for flexibility in implementing the Three Language Formula, allowing states to determine the specific languages to be taught based on local context and preferences. Tiwari (2023) discusses the challenges and opportunities associated with this approach, highlighting the importance of consultation with stakeholders and community involvement in decision-making.

The document "Viksit Bharat @2047: Voice of Youth - A Collaborative Approach for a Developed Nation" (2023) outlines the key pillars and strategies of this agenda, highlighting the importance of collaborative efforts and youth engagement in achieving national development goals. This collaborative approach reflects a recognition of the diverse stakeholders involved in shaping India's future and emphasizes the need for inclusive decision-making processes.

## 3. The Three Language Formula in National Education Policy2020 and ViksitBharat2047 Mission

### 3.1 The Three Language Formula in National Education Policy2020

The Three Language Formula in the National Education Policy 2020 mandates learning regional languages, Hindi, and English. It aims to preserve India's linguistic diversity, promote national integration, and prepare students for a globalized world. Prioritizing proficiency in regional languages alongside Hindi and English ensures cultural preservation and equitable access to education. The Three Language Formula reflects National Education Policy 2020's emphasis on multilingualism as a cornerstone of holistic student development and national advancement.

### 3.2 Vision of ViksitBharat 2047

The ViksitBharat 2047 mission envisions India's comprehensive development by the year 2047, coinciding with the centenary of its independence. This vision encompasses holistic progress across various sectors, including education, economy, technology, healthcare, infrastructure, and governance, to transform India into a developed and prosperous nation.

### 3.3 Three language formula of National Education Policy2020 and ViksitBharat 2047 mission

The Three Language Formula of National Education Policy 2020 advocates for multilingualism and the preservation of India's linguistic diversity, which aligns with ViksitBharat 2047's vision of celebrating India's cultural heritage and promoting national integration. The Three Language Formula outlined in the National Education Policy supports this objective by promoting proficiency in regional languages, Hindi, and English.

### 3.4 Challenges in Implementation Three Language Formula In Indian Education System

Implementing Three Language Formula in India faces several challenges:

**Lack of Resources:** Many regions lack adequate resources such as textbooks, qualified teachers, and educational materials in regional languages. This hampers the effective implementation of multilingual education.

**Language Policy Conflicts:** India's diverse linguistic landscape often leads to conflicts over language policies. Balancing the promotion of regional languages with the necessity of teaching Hindi and English under the Three Language Formula can be contentious.

**Teacher Training:** Training teachers to effectively teach in multiple languages is a challenge. Many teachers may not be proficient in regional languages or lack pedagogical training for multilingual instruction.

**Standardization of Curricula:** Developing standardized curricula that cater to the linguistic diversity of India while meeting educational standards is challenging. It requires careful consideration of cultural contexts and linguistic nuances.

**Assessment and Evaluation:** Assessing students' proficiency in multiple languages can be complex. Standardized assessments may not accurately reflect students' language abilities, leading to discrepancies in evaluation.

**Socio-economic Factors:** Socio-economic factors, such as poverty and unequal access to education, disproportionately affect marginalized communities. Lack of resources and opportunities hinder their participation in multilingual education programs.

**Resistance to Change:** Resistance from stakeholders, including parents, communities, and policymakers, can impede the implementation of multilingual education. Perceptions of language

## 4. Role of AI in the Implementation of Three Language Formula in Education

### 4.1 AI technologies for the implementation of Three Language Formula

AI technologies offer significant potential for the implementation of the Three Language Formula (Three Language Formula) outlined in the National Education Policy (National Education Policy) 2020. Some AI applications for Three Language Formula implementation in education include:

1. **Personalized Learning Platforms:** AI-powered platforms can customize language learning experiences based on students' proficiency levels, learning styles, and preferences. These platforms offer adaptive exercises, interactive lessons, and tailored feedback to optimize language acquisition for each learner.
2. **Language Translation Tools:** AI-driven translation tools facilitate communication and comprehension by translating educational materials, instructions, and assessments between multiple languages in real time. This enables students to access content in their preferred language, promoting equitable learning opportunities.
3. **Speech Recognition and Pronunciation Feedback:** AI-enabled speech recognition technology can analyze students' pronunciation and provide real-time feedback to improve language speaking skills. This feature assists students in mastering the phonetics and accents of different languages.
4. **Natural Language Processing (NLP) for Content Generation:** NLP algorithms generate language learning content, including quizzes, exercises, and instructional materials, based on linguistic principles and educational objectives. These AI-generated resources cater to diverse learning needs and support Three Language Formula implementation.
5. **Language Proficiency Assessment:** AI-based assessment tools evaluate students' language proficiency across listening, speaking, reading, and writing skills. These assessments provide insights into students' strengths and areas for improvement, informing targeted interventions and personalized learning plans.
6. **Virtual Language Assistants:** AI-powered virtual assistants offer language tutoring, practice conversations, and language immersion experiences in a simulated environment. These assistants engage students in interactive dialogues and cultural contexts, enhancing language learning outcomes.

By leveraging AI technologies in education, schools, and educational institutions can effectively implement the Three Language Formula of National Education Policy 2020, promoting multilingualism, cultural understanding, and linguistic proficiency among students.

### 4.2 AI-powered Language Learning tools for Three Language Formula implementation

1. **Duolingo:** Duolingo is a popular AI-powered language learning platform that offers courses in various languages, including regional Indian languages, Hindi, and English. It uses gamification elements, personalized learning paths, and adaptive feedback to engage learners and facilitate language acquisition.
2. **Rosetta Stone:** Rosetta Stone provides AI-driven language learning software that supports multiple languages, including Indian regional languages, Hindi, and English. It offers immersive learning experiences through interactive lessons, speech recognition technology, and personalized feedback.

3. **Babbel:** Babbel offers language learning courses in Indian regional languages, Hindi, and English, with a focus on practical conversation skills. Its AI-driven platform utilizes personalized learning paths, interactive exercises, and real-life scenarios to help learners develop language proficiency.
4. **Busuu:** Busuu is an AI-powered language learning app that offers courses in Hindi, English, and other languages. It provides personalized study plans, interactive lessons, and social features that allow learners to practice language skills with native speakers and receive feedback.
5. **Memrise:** Memrise uses AI algorithms to personalize language learning experiences and optimize memory retention. It offers courses in Hindi, English, and other languages, with interactive lessons, mnemonic techniques, and spaced repetition to enhance learning effectiveness.

These AI-powered language learning tools align with the Three Language Formula by offering courses in regional Indian languages, Hindi, and English, thereby supporting multilingual education as advocated in the National Education Policy 2020.

## 5. AI Solutions for Challenges in the Implementation of Three Language Formula

### 5.1 Access and Infrastructure

To address challenges related to access and infrastructure in implementing the Three Language Formula (Three Language Formula) outlined in the National Education Policy 2020, AI solutions can play a crucial role. Here are some examples:

1. **Online Learning Platforms:** Develop AI-powered online learning platforms accessible via smartphones, tablets, or computers. These platforms should provide interactive language learning materials in regional languages, Hindi, and English, overcoming geographical barriers and facilitating access to quality education.
2. **Mobile Applications:** Create mobile applications equipped with AI-driven features for language learning. These apps should offer offline access to learning materials, adaptive learning paths, and personalized feedback, catering to learners with limited internet connectivity or access to traditional educational resources.
3. **AI-enabled Content Delivery:** Utilize AI to optimize content delivery based on learners' internet bandwidth and device capabilities. Implement adaptive streaming technologies that adjust video quality and loading times, ensuring smooth access to educational videos and interactive content even in low-bandwidth environments.
4. **Tele-Education Solutions:** Implement AI-powered tele-education solutions that enable real-time interaction between teachers and students across different locations. These solutions should support video conferencing, screen sharing, and collaborative whiteboarding features, facilitating remote language instruction and support.
5. **AI-driven Infrastructure Planning:** Employ AI algorithms to analyze data on population demographics, internet connectivity, and educational infrastructure to identify areas with limited access to language learning resources. Use this information to prioritize infrastructure development and resource allocation for effective implementation of the Three Language Formula.
6. **Offline Learning Resources:** Develop AI-enabled offline learning resources, such as interactive textbooks or educational games, that can be distributed in areas with limited internet connectivity or unreliable infrastructure. These resources should leverage AI for personalized learning experiences and adaptive feedback without requiring constant online access.

7. **Community Learning Centers:** Establish AI-supported community learning centers equipped with digital learning resources and internet connectivity. These centers can serve as hubs for language learning activities, providing access to AI-powered educational tools and facilitating collaborative learning among students.

### 5.2 Quality and Learning Material

To address challenges related to the quality and availability of learning materials in implementing the Three Language Formula (Three Language Formula) outlined in the National Education Policy (National Education Policy) 2020, AI solutions can offer innovative approaches. Here's how AI can help:

1. **Content Curation and Customization:** AI-powered platforms can curate and customize learning materials to ensure relevance and quality. Natural Language Processing (NLP) algorithms can analyze vast amounts of content to identify high-quality resources in regional languages, Hindi, and English, tailored to the curriculum requirements.
2. **Content Generation:** AI can generate language learning materials, including interactive exercises, quizzes, and multimedia content, based on educational standards and learner preferences. Generative models like GPT-3 can create language-rich content, ensuring a diverse and engaging learning experience.
3. **Adaptive Learning Paths:** AI algorithms can design adaptive learning paths that cater to individual learning styles, abilities, and progress. By continuously analyzing learner data, AI platforms can recommend appropriate learning materials, adjust difficulty levels, and provide targeted support to optimize learning outcomes.
4. **Quality Assessment:** AI-driven assessment tools can evaluate the quality of learning materials based on educational standards, linguistic accuracy, and pedagogical effectiveness. These tools can also assess learners' comprehension and mastery of language concepts, providing feedback for improvement.
5. **Crowdsourced Content Creation:** AI platforms can facilitate crowdsourced content creation, enabling educators, experts, and learners to contribute and evaluate learning materials collaboratively. AI algorithms can curate and moderate user-generated content to ensure accuracy and relevance.
6. **Content Translation and Localization:** AI-powered translation tools can translate learning materials between languages, ensuring accessibility for learners with diverse linguistic backgrounds. These tools use NLP and machine learning to produce accurate translations while preserving cultural nuances and context.
7. **Continuous Improvement:** AI analytics can track learner engagement, performance, and feedback to iteratively improve learning materials. By analyzing user interactions and outcomes, AI platforms can identify areas for enhancement and update content accordingly, ensuring ongoing quality and relevance.

### 5.3 Teacher training and support

To address challenges in teacher training and support for implementing the Three Language Formula (Three Language Formula) outlined in the National Education Policy (National Education Policy) 2020, AI solutions can offer innovative approaches:

1. **AI-Powered Professional Development:** Develop AI-powered platforms for teacher training, offering modules on language pedagogy, cultural sensitivity, and multilingual education. These

platforms can use adaptive learning algorithms to personalize training paths based on teachers' needs and prior knowledge.

2. **Virtual Training Assistants:** Create AI-driven virtual training assistants that support teachers in lesson planning, instructional design, and classroom management. These assistants can provide real-time feedback, suggest teaching strategies, and offer resources tailored to specific language learning objectives.
3. **Language Proficiency Assessment:** Utilize AI-based assessment tools to evaluate teachers' language proficiency levels and identify areas for improvement. These tools can offer personalized language learning plans and resources to help teachers enhance their linguistic skills.
4. **Interactive Learning Modules:** Develop interactive learning modules powered by AI that simulate real classroom scenarios and provide opportunities for teachers to practice language teaching techniques. These modules can include virtual classrooms, role-playing exercises, and case studies for immersive learning experiences.
5. **AI-Powered Mentorship Programs:** Implement AI-driven mentorship programs that pair experienced language educators with novice teachers for guidance and support. AI algorithms can facilitate communication, track progress, and offer personalized recommendations for professional growth.
6. **Feedback and Reflection Tools:** Create AI-enabled tools for collecting feedback from students and peers on teaching practices. These tools can analyze feedback data to provide actionable insights and suggestions for improvement, fostering continuous professional development.
7. **Multilingual Resource Libraries:** Establish AI-curated libraries of multilingual teaching resources, including lesson plans, worksheets, and multimedia materials. These libraries can use machine learning algorithms to recommend relevant resources based on teachers' instructional needs and language preferences.
8. **Language Translation Support:** Provide AI-powered language translation support for teachers who instruct in languages other than their native tongue. AI translation tools can assist in translating instructional materials, communication with students and parents, and professional development resources.

## 6. Conclusion

the integration of Artificial Intelligence (AI) in implementing the Three Language Formula (Three Language Formula) outlined in the National Education Policy (National Education Policy) 2020 offers a promising pathway towards realizing the objectives of the ViksitBharat 2047 Mission. AI-powered language learning platforms have demonstrated their efficacy in addressing challenges related to access, quality, and teacher training in multilingual education. By offering personalized learning experiences, adaptive feedback, and access to diverse learning materials, AI contributes to fostering linguistic diversity, cultural understanding, and national integration as envisioned by the National Education Policy 2020 and ViksitBharat 2047.

The implications for policy and practice emphasize the importance of prioritizing investments in technology infrastructure, teacher professional development, and community partnerships to leverage the potential of AI in multilingual education. Furthermore, future research should continue to explore the long-term impact, equity considerations, ethical implications, and emerging technologies in AI-driven multilingual education.

In essence, the integration of AI in implementing the Three Language Formula aligns with the broader vision of ViksitBharat 2047 by advancing inclusive, equitable, and innovative multilingual education. By harnessing the transformative potential of AI, India can pave the way towards holistic development, prosperity, and global competitiveness by 2047 and beyond.

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