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Establish a National Research Foundation (NRF) to foster a culture of Research and innovation and support interdisciplinary and collaborative Research a Indian Higher Education institutions

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Abstract:
The study encompasses a comprehensive analysis of the National Education Policy (NEP) 2020 of India and its implications for fostering a culture of research and innovation in Indian higher education institutions. The NEP 2020 aims to revolutionize the Indian education system by introducing several key initiatives, including the establishment of the National Research Foundation (NRF). The NRF is designed to fund competitive, peer-reviewed grant proposals across all disciplines, with a focus on societal impact and interdisciplinary research.

Key objectives of the NRF include enhancing the quality and relevance of research, facilitating research at academic institutions across the country, and ensuring that research findings are translated into actionable policies. The NRF also seeks to create a conducive environment for research through adequate funding, mentoring, and national-level coordination, as well as to establish strong linkages between research and policy-making.

Challenges such as lack of infrastructure, shortage of trained educators, and inadequate funding are addressed, along with strategies to overcome the digital divide that may limit the effectiveness of technology integration in education. The study also highlights the importance of balancing traditional academic disciplines with emerging areas of research and technology, ensuring equitable access to research opportunities for all regions and demographics, and aligning research outputs with national priorities and societal needs.

Articles and analyses from academic journals and policy think tanks have reviewed the NEP 2020, discussing its holistic approach, challenges in implementation, promotion of technology, implications for research and innovation, and its potential to contribute to India's growth as a knowledge-based economy.

Overall, the study provides an in-depth look at the NEP 2020's vision for transforming the education landscape in India, with a particular focus on enhancing research and innovation capabilities to meet the demands of the 21st century and to position India as a global leader in knowledge creation.

1. Introduction:

The National Education Policy (NEP) 2020 of India aims to revolutionize the country's education system. One of its key proposals is the establishment of a National Research Foundation (NRF) to promote a culture of

research and innovation, particularly in higher education institutions. Here's an overview of the introduction, objectives, challenges, benefits, and methods related to the NRF as per NEP-2020:

The NEP 2020 is a comprehensive framework designed to transform Indian education to meet the demands of the 21st century and to make India a knowledge-based society. It emphasizes a holistic and multidisciplinary approach to education (1).

Objectives of NRF:

- To foster a strong research culture and build research capacity across higher education.
- To promote interdisciplinary and collaborative research.
- To enhance the quality and relevance of research.
- To facilitate research at academic institutions across the country (4).

Challenges and Problems:

- Implementation challenges such as lack of infrastructure, shortage of trained educators, and inadequate funding.
- The digital divide may limit the effectiveness of technology integration in education.
- The policy calls for a significant shift towards vocational education, but there is a shortage of skilled trainers and resources (1) (2).
- Ensuring equitable access to research opportunities for all regions and demographics.
- Balancing traditional academic disciplines with emerging areas of research and technology.
- Aligning research outputs with national priorities and societal needs.

Benefits:

- Encourages innovation and research, contributing to India's growth as a knowledge-based economy.
- Supports interdisciplinary research, which can lead to breakthroughs and advancements in various fields.
- Enhances the quality of higher education by integrating research and education (3).
- The NRF will help in bridging the gap between industry and academia by promoting research that is relevant to industry needs.
- It will also provide opportunities for young researchers to engage in cutting-edge research, thereby nurturing a new generation of scholars.

Methods:

- Establishing the NRF to fund competitive, peer-reviewed grant proposals of all types and across all disciplines.
- Ensuring that the NRF will consider the societal impact of the proposed research as one of the criteria for funding (3).
- The NRF will work towards creating a conducive environment for research through adequate funding, mentoring, and national-level coordination.
- It will also aim to establish strong linkages between research and policy-making to ensure that research findings are translated into actionable policies.

Articles and analyses published in academic journals and policy think tanks that have reviewed the NEP 2020 and its implications for research and innovation in India.

The establishment of the NRF as per NEP 2020 is a significant step towards enhancing the research ecosystem in India. It aims to create a robust infrastructure for research and innovation, which is crucial for the country's development and global competitiveness. By addressing the challenges and leveraging the benefits, the NRF can transform India into a vibrant hub of research and innovation.

2. The role of industry in NRF:

The role of industry in the National Research Foundation (NRF) of India is pivotal. The NRF is designed to act as a bridge between academia and industry, fostering collaborations that are essential for driving research and development (R&D) in the country. Here are some key aspects of the industry's role in the NRF:

Collaboration: The NRF will forge collaborations among industry, academia, and government departments and research institutions (6) (8) (10). This will create a synergistic environment where academic research can align with industry needs, leading to practical applications of research findings.

Interface Mechanism: An interface mechanism will be established for the participation and contribution of industries and State governments in addition to the scientific and line ministries (8). This mechanism aims to streamline the process of industry involvement in research projects and ensure that the research is relevant to market demands.

Policy Framework: The NRF will focus on creating a policy framework and putting in place regulatory processes that can encourage collaboration and increased spending by the industry on R&D (6). This is crucial for ensuring that the private sector plays an active role in the research ecosystem.

Encouraging Private Sector Participation: The goal is to guarantee that scientific research is undertaken, funded fairly, and receives more support from the business sector (6). By involving the private sector, the NRF aims to diversify the sources of research funding and enhance the quality and scope of research in India.

Building Research Capacities: The NRF plans to build research capacities in universities by encouraging active researchers to take up NRF professorships, regardless of age, and collaborate with existing faculty (6). This initiative will help in nurturing a new generation of researchers who can contribute to industry-relevant projects.

Promoting Research Beyond Natural Sciences: The NRF will fund and promote research not only in natural sciences but also in humanities, social sciences, and art (7). This broader approach will help in developing a well-rounded research base that can cater to various aspects of societal development.

The industry's involvement in the NRF is essential for the translation of academic research into commercial products and services, which can boost economic growth and create job opportunities. The collaboration between industry and academia is expected to lead to the development of innovative solutions, new technologies, and indigenous industries that can reduce India's dependence on imports and contribute to sustainable economic development (9).

Current status of NRF implementation: The current status of the National Research Foundation (NRF) implementation in India is as follows:

Legislative Approval: The Ministry of Science and Technology, Government of India, has approved the introduction of the National Research Foundation (NRF) Bill, 2023, in Parliament (12). The bill aims to establish the NRF as an apex body to provide high-level strategic direction for scientific research in India.

Budget Allocation: In the budget for the financial year 2021-22, an outlay of INR 50,000 crores has been proposed for the NRF initiative over the next five years (11).

Operational Status: It is speculated that the NRF will be operational by the end of the year. It would subsume approved and ongoing projects of the Science and Engineering Research Board (SERB) and may be able to initiate new projects within this financial year (13).

Governance Structure: The Department of Science and Technology (DST) will be the administrative Department of the NRF, which will be governed by a Governing Board consisting of eminent researchers and professionals across disciplines. The Prime Minister will be the ex-officio President of the Board, and the Union Minister of Science & Technology & Union Minister of Education will be the ex-officio Vice-Presidents (12).

Research Integration: The NRF aims to involve colleges and universities in scientific research, as currently, less than 1% of the nearly 40,000 higher learning institutions in India are engaged in research (12).

Expansion of Research Areas: The NRF will fund and promote research not only in natural sciences but also in humanities, social sciences, and art. Establishing directorates for social sciences, Indian languages and knowledge systems, arts, and humanities is among the NRF's goals (12).

The NRF is being formulated to catalyze, facilitate, coordinate, seed, grow, and mentor research in institutions around the country. It seeks to address critical societal challenges, develop an enlightened knowledge society, and enhance India's position as a global leader in research and innovation (11). The implementation of the NRF is a major step towards achieving the objectives outlined in the National Education Policy 2020.

3. The NRF Bill - 2023 :

The National Research Foundation (NRF) Bill, 2023, is a legislative proposal that aims to establish the NRF as an apex body to provide high-level strategic direction for scientific research in India. Here are the key points of the NRF Bill, 2023:

Establishment of NRF: The bill seeks to establish the NRF to seed, grow, and promote Research and Development (R&D) and foster a culture of research and innovation throughout India's universities, colleges, research institutions, and R&D laboratories (14).
Strategic Direction: The NRF will provide strategic direction to scientific research in the country as per the recommendations of the National Education Policy (NEP), with an estimated cost of Rs. 50,000 crore over five years (2023-28) (14).
Governance: The Department of Science and Technology (DST) will be the administrative Department of the NRF. The NRF will be governed by a Governing Board consisting of eminent researchers and professionals across disciplines. The Prime Minister will be the ex-officio President of the Board, and the Union Minister of Science & Technology & Union Minister of Education will be the ex-officio Vice-Presidents (14).
Executive Council: The functioning of the NRF will be governed by an Executive Council chaired by the Principal Scientific Adviser to the Government of India (14).
Collaborations: The NRF will forge collaborations among industry, academia, and government departments and research institutions. It will also create an interface mechanism for the participation and contribution of industries and State governments in addition to the scientific and line ministries (14).
Policy Framework: The bill will focus on creating a policy framework and putting in place regulatory processes that can encourage collaboration and increased spending by the industry on R&D (14).
Repeal of SERB: The bill will repeal the Science and Engineering Research Board (SERB) established by an act of Parliament in 2008 and subsume it into the NRF, which has an expanded mandate and covers activities over and above the activities of SERB (14).

The NRF Bill, 2023, has been passed by the Indian Parliament and is considered a crucial step in strengthening the research ecosystem in the country. It is expected to have a long-term impact on research, innovation, and entrepreneurship in various fields, including natural sciences, engineering, environmental and earth sciences, health, agriculture, humanities, and social sciences (15). The bill also makes a separate allocation exclusively for State Universities and Institutions, promoting separate competition within the State Universities and Institutions (15).

4. Impact of NRF research funding for universities and colleges:

The National Research Foundation (NRF) is set to have a significant impact on research funding for universities and colleges in India. Here are some of the ways the NRF will influence research funding:

Increased Funding: The NRF will provide a substantial boost in funding for research with an outlay of INR 50,000 crores over the next five years (19). This increased investment is expected to revolutionize the research ecosystem in India.
Merit-Based Funding: The NRF will provide a reliable base of merit-based but equitable peer-reviewed research funding (18). This will help develop a culture of research in the country through suitable incentives.

Catalyzing Research: It will catalyze research at universities and colleges that have not been major players in research until now (19). The NRF will also help build the capacity to do research through an institutionalized mentoring mechanism, involving expert researchers from premier institutions of the country.
Broadening Research Scope: The NRF aims to fund and promote research not only in natural sciences but also in humanities, social sciences, and art, thereby broadening the scope of research areas that can receive funding (18).
Encouraging Private Sector Participation: The NRF's goal is to "seed, grow and promote" research across the country's institutions by strengthening ties between academia, industry, and the government. Some 70% of these funds are intended to come from investors in the private sector, and the remaining portion will be covered by the government (17).
Promoting Interdisciplinary Research: The NRF will support interdisciplinary and collaborative research, which can lead to breakthroughs and advancements in various fields (16).
Building Research Capacities: The NRF plans to build research capacities in universities by encouraging active researchers to take up NRF professorships, regardless of age, and collaborate with existing faculty (16).

The NRF is expected to create a robust infrastructure for research and innovation, which is crucial for the country's development and global competitiveness. By addressing the challenges and leveraging the benefits, the NRF can transform India into a vibrant hub of research and innovation.

5. Fostering strong research culture and build research capacity across higher education:
Fostering a strong research culture and building research capacity across higher education institutions involves a multifaceted approach. Here are some strategies to achieve this, along with sources for further reference:

Establishing Support Systems: Creating support systems within institutions can boost morale and enhance a positive research environment. This includes providing career counseling, coaching, and support services to reduce pressures and connect researchers to resources (22).
Promoting Collaboration: Encouraging collaboration among faculty members, between departments, and with external partners can lead to a more vibrant research culture. This includes interdisciplinary research and international collaborations (24).
Providing Training and Development: Offering training programs to develop research skills and competencies is crucial. This can include workshops, seminars, and mentorship programs for both staff and students (20).
Allocating Research Grants: Introducing research grants and promotions based on research output can incentivize faculty members to engage in research activities. Regular monitoring and rewarding of research contributions can also be motivating (24).
Creating Research Groups: Forming research groups within institutions can help in sharing knowledge, resources, and expertise, thereby enhancing the overall research output (23).
Developing a Research Agenda: Establishing a clear research agenda that aligns with national priorities and institutional goals can guide research efforts and ensure relevance (21).
Encouraging Publication and Dissemination: Supporting faculty members to publish their research findings in reputable journals and present at conferences can enhance the institution's research profile (23).
Investing in Infrastructure: Providing the necessary infrastructure, such as laboratories, libraries, and digital resources, is essential for conducting high-quality research (21).
Integrating Research into Curriculum: Embedding research components into the curriculum can help inculcate a research mindset among students from an early stage (21).
Fostering Industry Partnerships: Building partnerships with industry can provide practical insights and funding opportunities for research projects (22).

For more detailed strategies and insights into building a research culture and capacity in higher education, you can refer to the following sources:

- The Press Information Bureau's announcement on the National Education Policy 2020, which discusses the establishment of the National Research Foundation to foster research culture (21).
- The World Economic Forum's article on promoting better research culture, which provides practical ways to enhance research integrity and culture (22).
- An editorial on demystifying research culture in universities, which highlights incentives for creating a research culture (24).
- A report on building a culture of research, which examines successful practices for developing a research culture in higher education (25).

6. Challenges faced by Indian education system today:

The Indian education system faces several challenges that need to be addressed to improve the quality and accessibility of education. Some of the key challenges include:

Teacher-Student Ratio: There is a significant shortage of teachers in schools, with 11.16 lakh teaching positions vacant according to UNESCO's State of the Education report for India 2021 (27). This affects the quality of education and the attention each student receives.
Quality of Education: The curriculum often remains outdated and does not align with the current industrial requirements, leading to a gap between education and employability (27).
Infrastructure: Many schools, especially in rural areas, lack basic infrastructure facilities. With the focus on digital education, it is essential to provide necessary facilities across all schools (26).
Funding: There is a need for increased expenditure on education to develop the system further. More funds should be allotted for the development of education in India (26).
Access and Equity: Ensuring equitable access to education for all regions and demographics is a challenge. There is unequal access to education, particularly for marginalized communities (30).
Capacity Utilization: Encouraging schools to boost students' capacities to the maximum and not let their ideas go unheard is crucial. The world needs creative minds, and the education system should nurture this creativity (26).
Public-Private Partnerships (PPP): Well-designed PPPs can create models of innovation for the school system in India. However, establishing effective partnerships remains a challenge (26).
Accreditation and Branding: There is a need for quality standards in education. Accreditation helps in maintaining quality, but many institutions still lack proper accreditation (29).
Vocational Training and Practical Skills: There is a greater emphasis needed on vocational training and practical skills to prepare students for the job market (28).

7. Promote interdisciplinary and collaborative research:

Promoting interdisciplinary and collaborative research requires a strategic approach that encourages researchers from different disciplines to work together towards common goals. Here are some strategies to promote such research, along with sources for further reference:

Creating Conducive Organizational Settings: Universities can create an organizational setting that is conducive to collaboration by modifying policies to encourage interdisciplinary research and offering seed money for interdisciplinary projects (33).
Incentivizing Collaboration: Incentives can be provided to academics to collaborate with colleagues across research disciplines. This could include material incentives, such as grants and funding opportunities, as well as recognition and career advancement (31).
Establishing Common Ground: Effective interdisciplinary research collaboration requires collaborators to establish key components that inform and guide the collaborative work for addressing a shared mission. This includes finding common ground concerning a research area of interest and co-creating research aims and approaches through participatory processes (34).

Developing Shared Language: It's important for collaborators to develop a shared language to facilitate communication across disciplinary boundaries. This helps in understanding each other's perspectives and methodologies (34).

Formulating Effective Research Questions: A shift toward a better formulation of research questions is required, with a view toward generating more empirical data on practical strategies for connecting researchers and encouraging them to work together across disciplinary boundaries (35).

Fostering a Culture of Interdisciplinarity: University leaders can actively promote and encourage interdisciplinarity at research institutions around the world. This involves cultural change and aligning the perceptions of academics with those of university leaders (31).

For more detailed strategies and insights into promoting interdisciplinary and collaborative research, you can refer to the following sources:

- A journal article on incentivizing interdisciplinary research collaboration, which provides evidence from Australia and discusses the difference of opinion between academics and university leaders on how to incentivize collaboration (31).
- A systematic review on promoting interdisciplinary research collaboration, which highlights the need for a better formulation of research questions and generating empirical data on strategies for connecting researchers (32).
- An article discussing internally incentivized interdisciplinarity and common initiatives for promoting interdisciplinary collaborations at universities (33).
- A publication on promoting interdisciplinary research collaboration among mathematics educators, which emphasizes the need for an intentional work atmosphere and shared language (34).
- A systematic review on promoting interdisciplinary research collaboration, which calls for a shift toward generating more empirical data on practical strategies (35).

8. Enhance the quality and relevance of research:

Enhancing the quality and relevance of research is crucial for the advancement of knowledge and the development of society. Here are some strategies to achieve this, along with sources for further reference:

Raising Pertinent Questions: High-quality research covers all aspects of the study by raising pertinent questions and arriving at reliable answers that significantly enhance the existing knowledge base (36).

Appropriate Methodology: Using appropriate methodology to address the research problem is essential. This includes proper conceptualization of the research problem and reliable measurement of variables (36).

Engagement with Intellectual Networks: Engaging with internal and international intellectual networks and learned societies can improve the quality of research (36).

Promoting Research and Innovation: Developing strategies and taking necessary measures to enhance research and promote research quality at higher education institutions is vital. A goal-oriented and focused blueprint needs to be developed to achieve the highest possible standards in research (37).

Improving Practical Relevance: Scholars can enhance research relevance by engaging practitioners in on-campus encounters, conducting site visits and practitioner interviews, working as a practitioner, and developing a practitioner advisory team (38).

Conveying Findings to Managerial Audiences: It is important to convey research findings to managerial audiences, as there is no automatic mechanism that conveys research findings to managers or policymakers (39).

For more detailed strategies and insights into enhancing the quality and relevance of research, you can refer to the following sources:

- A report by the University Grants Commission (UGC) on improving the quality of research by faculty and creation of new knowledge (36).

- An essay from the book "Reimagining Indian Universities" on measures to promote research and innovation in Indian universities (37).
- A Harvard Business School working paper on enhancing the practical relevance of research (38).
- A Harvard Business School publication on enhancing the relevance of research (39).

9. Facilitate research at academic institutions across the country:

Facilitating research at academic institutions across the country involves a comprehensive approach that includes policy initiatives, funding mechanisms, and collaborative efforts. Here are some strategies to facilitate research, along with sources for further reference:

National Research Foundation (NRF): The NRF is being formulated to catalyze, facilitate, coordinate, seed, grow, and mentor research in institutions around the country. It aims to fund competitive peer-reviewed grant proposals, facilitate research at academic institutions, and act as a liaison among researchers (40).

Promotion of Academic and Research Collaboration (SPARC): The SPARC initiative aims at improving the research ecosystem of India's Higher Educational Institutions by facilitating academic and research collaborations between Indian Institutions and the best institutions in the world (42) (43) (44).

Research Infrastructure: Funding of research infrastructure is crucial to facilitate research. This includes providing state-of-the-art laboratories, equipment, and digital resources (40).

Increasing Participation: The NRF also aims to increase the participation of women and other underrepresented groups in research, creating a more inclusive research environment (40).

Central Clearinghouse: Creating a central clearinghouse for the analysis of information and data can help in recognizing outstanding research and progress, and serve as a high-level think tank for the coordination and planning of research in the country (40).

Policy Measures: Developing strategies and taking necessary measures to enhance research and promote research quality at higher education institutions is vital. A goal-oriented and focused blueprint needs to be developed to achieve the highest possible standards in research (41).

For more detailed strategies and insights into facilitating research at academic institutions, you can refer to the following sources:

- The ISTI Portal's article on the National Research Foundation – in pursuit of science (40).
- Gets its wings, which discusses the NRF's role in facilitating research across disciplines (40).
- An essay from the book "Reimagining Indian Universities" on measures to promote research and innovation in Indian universities, which provides a detailed discussion on enhancing research quality and promoting innovation (41).
- The official SPARC document, which outlines the scheme's objectives and methods for promoting academic and research collaboration (42).

10. Implement challenges such as lack of infrastructure, shortage of trained educators, and inadequate funding:

Addressing the challenges of lack of infrastructure, shortage of trained educators, and inadequate funding in the education sector requires a multi-pronged approach. Here are some strategies to implement solutions for these challenges, along with sources for further reference:

Lack of Infrastructure:

Government Initiatives: The government can launch initiatives to improve school infrastructure, especially in rural and remote areas, focusing on providing adequate classrooms, libraries, laboratories, and sanitation facilities (45).

Sustainable Infrastructure: Schools can adopt sustainable infrastructure solutions that are cost-effective and environmentally friendly, ensuring that the infrastructure is well-planned, spacious, and equipped with necessary amenities (46).

Shortage of Trained Educators:
Incentives for Teachers: States and districts can provide targeted incentives to retain teachers and bring new teachers into the profession, focusing on schools with longstanding resource inequities (48).
Professional Development: Improving professional development opportunities and fostering learning communities can attract and retain teachers. This includes increasing teacher pay and lowering barriers that make it harder for teachers to do their jobs (46).

Inadequate Funding:
Increased Investment: There is a need for increased investment in education, which directly targets teacher pay and working conditions. This can include raising teacher salaries and providing additional support for students and educators (50).
Funding Reforms: Funding reforms have the power to shift the status quo. Some states and local districts have revised their funding systems and made significant strides in student achievement as a result (45) (47).

For more detailed strategies and insights into addressing these challenges, you can refer to the following sources:

- An article on school education in India that discusses challenges, solutions, and government initiatives, including the New Education Policy (NEP) 2020 and infrastructure development (45).
- A report on sustainable school infrastructure that outlines challenges and solutions for creating a sustainable school culture (46).
- A resource on addressing teacher shortages in the short and long term, which provides recommendations for state and district leaders (48).
- An analysis of educational inequality in India that discusses how to end disparity in education, including addressing the lack of infrastructure and inadequate funding (51).

11. Digital divide may limit the effectiveness of technology integration in education:
The digital divide, which refers to the disparities in access to and use of technology, can significantly limit the effectiveness of technology integration in education. Here are some ways in which the digital divide impacts education, along with sources for further reference:

Access to Technology: Students from low-income households or rural areas often have limited access to the internet and personal devices, which hinders their ability to participate in digital learning (52).
Quality of Connectivity: Even when students have access to devices, the quality of internet connectivity can be a barrier. Slow or unreliable internet can disrupt online learning and access to educational resources (53).
Digital Literacy: There is a gap in digital literacy skills among students and educators, which affects the ability to effectively use technology for learning. Teachers also need ongoing training and support to integrate technology into their teaching practices (52).
Educational Outcomes: The digital divide can lead to unequal educational outcomes, as students without adequate access to technology may fall behind their peers in terms of academic achievement (53).
Policy and Infrastructure: Addressing the digital divide requires policy interventions and infrastructure development to ensure equitable access to technology and high-speed internet for all students (54).
Public-Private Partnerships: Establishing technology resource centers in schools and fostering public-private partnerships can help bridge the technology gap in education (52).

For more detailed insights into the digital divide's impact on education and strategies to address it, you can refer to the following sources:

- A study on addressing the digital divide in education, which investigates the impact of the digital divide on students' access to technology and its influence on their educational outcomes (52).

- An article from Forbes discussing the digital divide in education and how it affects students in underserved communities, highlighting the disparities in access to technology and the internet (53).
- A report on how the digital divide in education affects children, emphasizing the need for governments to become powerful instruments in bridging the digital divide by ensuring affordable, easy-to-use technologies (55).

12. Balancing traditional academic disciplines with emerging areas of research and technology:

Balancing traditional academic disciplines with emerging areas of research and technology is essential for fostering innovation and addressing complex global challenges. Here are some strategies to achieve this balance, along with sources for further reference:

Interdisciplinary Programs: Developing interdisciplinary programs that combine traditional disciplines with emerging fields can encourage students and researchers to explore new areas while maintaining a strong foundation in their primary field of study (56).

Collaborative Research: Encouraging collaborative research projects that involve experts from traditional and emerging fields can lead to innovative solutions that benefit from a diverse range of perspectives (58).

Curriculum Integration: Integrating emerging technologies and research areas into the curriculum of traditional disciplines can help students stay current with advancements and understand their applications within their field (56).

Faculty Development: Providing professional development opportunities for faculty to learn about emerging research areas and technologies can help them incorporate these topics into their teaching and research (59).

Research Funding: Allocating research funding to projects that bridge traditional and emerging areas can incentivize researchers to pursue interdisciplinary work (59).

Institutional Support: Ensuring that university management values and resources centers and institutes that carry out interdisciplinary research is crucial for the success of such initiatives (59).

For more detailed strategies and insights into balancing traditional academic disciplines with emerging research areas, you can refer to the following sources:

- A chapter from "Discipline-Based Education Research: Understanding and Improving Learning in Undergraduate Science and Engineering" that discusses emerging areas of discipline-based education research and the importance of interdisciplinary approaches (56).
- An article on the conceptualization of research areas and their operationalization in bibliometric research, which highlights the need for clarity when defining disciplines and research areas (57).
- A study on cross-disciplinary collaboration and scholarly independence, which explores the interaction between members from varying disciplines in academia (58).
- An article from The Conversation on how to value research that crosses more than one discipline, discussing the need for institutional support and adequate resources for interdisciplinary research (59).

13. Ensuring equitable access to research opportunities for all regions and demographics:

Ensuring equitable access to research opportunities for all regions and demographics involves creating an inclusive environment where every individual has the opportunity to participate in and contribute to research. Here are some strategies to achieve this goal, along with sources for further reference:

Equity-Focused Framework: Utilize an equity- and antiracism-focused framework to inform research, becoming familiar with issues related to the colonization of research and the impact of implicit bias when conducting research (60).

Community Engagement: Engage underrepresented research populations at each step of the research process, which can serve as a starting point for building long-term partnerships with communities underrepresented in research (60).

Inclusive Policies: Review and evaluate the level of equity and inclusion in existing policies, decide the actions needed to improve policies and their implementation, and monitor progress as actions are taken (61).

Capacity Building: Develop capacity-building programs that target researchers from underrepresented regions and demographics, providing them with the skills and resources needed to conduct high-quality research (62).
Funding Equity: Ensure that funding opportunities are distributed equitably, with special consideration for researchers from regions and demographics that have historically been underfunded (63).
Access to Resources: Provide additional resources or support to those facing barriers so they can access opportunities as easily as those who do not face barriers (63).

For more detailed strategies and insights into ensuring equitable access to research opportunities, you can refer to the following sources:

- The Institute of Translational Health Sciences' document on equitable research best practices, which provides strategies for integrating the value of equity into the research process (60).
- UNESCO's guide for ensuring inclusion and equity in education, which highlights the vital role of inclusive and equitable education in transforming education systems worldwide (61).
- An article on equity and inclusivity in research, which discusses the importance of community-engaged research and participatory research being inclusive (62).

14. Aligning research outputs with national priorities and societal needs:
Aligning research outputs with national priorities and societal needs involves a strategic approach that ensures research efforts contribute to the broader goals of society and address pressing challenges. Here are some strategies to achieve this alignment, along with sources for further reference:

Engagement with Stakeholders: Engage with a wide range of stakeholders, including policymakers, industry leaders, non-governmental organizations (NGOs), and civil society to identify pressing societal needs and align research accordingly (64).
Interdisciplinary Teams: Form interdisciplinary research teams that can address complex societal problems from multiple perspectives, combining expertise from various fields (64).
Focus on Impact: Shift the focus of research from purely academic pursuits to projects with potential for real-world impact, addressing issues such as sustainability, health, and economic development (64).
Policy-Driven Research: Conduct policy-driven research that is directly informed by national priorities, such as those outlined in government plans and development agendas (65).
Priority Setting: Implement priority-setting processes that align research funding with national evidence needs and identify research questions necessary to fill knowledge gaps (66).
Organizational Prioritization: Adapt organizational priorities within research funding agencies to steer research, development, and innovation (RDI) toward specific goals of social and economic relevance (67).
National Research Agendas: Develop national research agendas that are aligned with health priorities, based on gap analysis to the Sustainable Development Goals (SDGs), with equity and access at their core (68).

For more detailed strategies and insights into aligning research outputs with national priorities and societal needs, you can refer to the following sources:

- An article from Issues in Science and Technology on aligning research with societal needs, which provides a case study of how academic scientists can help produce real-world solutions (64).
- A report from ICRISAT on achieving greater impact by aligning with national priorities, which discusses the framework for identifying gaps and opportunities that align the work of research centers with national priorities (65).
- A briefing note from the Alliance for Health Policy and Systems Research on priority setting for health policy and systems research, which emphasizes the importance of aligning research funding with national evidence needs (66).
- An article from Science and Public Policy on the challenges of implementing priorities for RDI in government agencies, which discusses the policy processes that steer RDI toward goals of social and economic relevance (67).

- Recommendations from WHO on elevating national research for health priorities, which highlight the need for research to be aligned to national health priorities with equity and access at its core (68).

15. Encourage innovation and research, contributing to India's growth as a knowledge-based economy:
Encouraging innovation and research is essential for India's growth as a knowledge-based economy. Here are some strategies to foster this environment, along with sources for further reference:

Investing in Human Capital: Developing a skilled workforce through quality education and training programs is crucial. This includes focusing on STEM (Science, Technology, Engineering, and Mathematics) education and lifelong learning opportunities (72).
Promoting Entrepreneurship: Creating a supportive ecosystem for startups and entrepreneurs can drive innovation. This involves providing access to funding, mentorship, and networking opportunities (70).
Strengthening Industry-Academia Collaboration: Encouraging partnerships between industry and academic institutions can lead to research that is relevant to market needs and can be commercialized effectively (69).
Improving Research Infrastructure: Investing in state-of-the-art research facilities, laboratories, and technology parks can provide the necessary infrastructure for cutting-edge research (71).
Fostering an Innovation Culture: Cultivating a culture that values creativity, experimentation, and risk-taking can encourage individuals and organizations to pursue innovative ideas (70).
Government Policies and Incentives: Implementing policies that incentivize R&D investment by private companies and offering tax benefits for research activities can stimulate innovation (69).
Intellectual Property Rights (IPR): Strengthening the IPR regime to protect innovations can encourage more investment in research and development (69).
International Collaboration: Engaging in international research collaborations can bring in global expertise and open up new opportunities for innovation (69).

For more detailed strategies and insights into encouraging innovation and research for India's knowledge-based economy, you can refer to the following sources:

- A research paper from the National Academies Press that assesses India's knowledge economy in the global context and discusses the challenges and opportunities for cooperation (69).
- An article from The Economic Times that highlights how the Indian innovation ecosystem is driven by the knowledge economy, marketplace-led research, and disruptive technologies like AI (70).
- A report from the World Bank that provides an assessment of India's readiness to embrace the knowledge economy and highlights key constraints and emerging possibilities (71).
- An article discussing the transformation of Uttar Pradesh into a knowledge economy through human capital, innovation, and technology (72).

16. Supports interdisciplinary research :
Supporting interdisciplinary research is crucial for fostering innovation and achieving breakthroughs in various fields. Here are some strategies to support such research, along with sources for further reference:

Funding and Grants: Provide funding and grants specifically for interdisciplinary research projects. This can include dedicated funding streams for collaborative research between different disciplines (73).
Institutional Support: Universities and research institutions can create an environment that supports interdisciplinary work by establishing interdisciplinary centers, providing shared spaces for collaboration, and recognizing interdisciplinary research in promotion and tenure processes (74).
Policy Initiatives: Governments and funding agencies can develop policy initiatives that encourage interdisciplinary research. This can include challenge-based and mission-based funding streams that support research aimed at addressing complex societal challenges (75).
Collaborative Networks: Encourage the formation of collaborative networks and consortia that bring together researchers from different disciplines to work on common research goals (73).

Training and Education: Offer training programs and educational courses that promote interdisciplinary thinking and skills. This can help prepare the next generation of researchers to work across disciplinary boundaries (73).
Research Culture: Cultivate a research culture that values and rewards interdisciplinary approaches. This can involve changing the metrics used to evaluate research success to include the impact and innovation of interdisciplinary work (74).
Facilitating Communication: Develop platforms and forums for researchers from different disciplines to communicate and share ideas. This can help overcome language and conceptual barriers that often exist between disciplines (73).

For more detailed strategies and insights into supporting interdisciplinary research, you can refer to the following sources:

- The National Science Foundation's page on interdisciplinary research, which covers how NSF supports interdisciplinary research and how to prepare an interdisciplinary proposal (73).
- An article discussing five organizational features for successful interdisciplinary research, which provides insights into the best ways to build institutional capacity and structures that support interdisciplinary research (74).
- An analysis of the role of the UK Government in supporting interdisciplinary research, which emphasizes the importance of challenge-based and mission-based funding streams (75).

17. Enhancing the quality of higher education through Research integration :
Enhancing the quality of higher education by integrating research and education involves creating a symbiotic relationship between teaching and research activities. Here are some strategies to achieve this, along with sources for further reference:

Research-Informed Teaching: Incorporate the latest research findings into the curriculum to ensure that teaching is informed by current knowledge and practices in the field (76).
Undergraduate Research Opportunities: Provide opportunities for undergraduate students to engage in research projects, which can enhance their learning experience and prepare them for graduate studies or careers in research (77).
Faculty Research Engagement: Encourage faculty members to integrate their research into their teaching, which can enrich the educational experience for students and foster a culture of inquiry (76).
Interdisciplinary Curriculum: Develop interdisciplinary curricula that draw on research from multiple disciplines, promoting a broader understanding and innovative thinking among students (77).
Collaborative Projects: Facilitate collaborative projects between students and faculty that can lead to co-authored publications and conference presentations, enhancing the academic profile of the institution (76).
Professional Development: Offer professional development programs for educators to enhance their research skills and integrate research into their teaching practices (78).
Research Centers and Institutes: Establish research centers and institutes within higher education institutions that can serve as hubs for research activity and provide resources for both faculty and students (77).
Policy Co-Development: Engage in collaborative policy development processes to improve the quality and responsiveness of higher education institutions to diverse institutional needs (78).
For more detailed strategies and insights into enhancing the quality of higher education through research integration, you can refer to the following sources:

- A CORE publication on enhancing the quality of higher education through research, which discusses shaping future policy and the role of research in improving education (76).
- An essay from the book "Reimagining Indian Universities" on measures to promote research and innovation in Indian universities, which provides a detailed discussion on enhancing research quality and promoting innovation (77).

- A Research Gate publication on enhancing quality in higher education through evidence-based and inclusive policy co-development, which underscores the significance of collaborative policy development processes (78).

18. Opportunities for young researchers to engage in cutting-edge research:

Providing opportunities for young researchers to engage in cutting-edge research and nurturing a new generation of scholars involves several key strategies:

Research Grants and Fellowships: Offering grants and fellowships specifically targeted at young researchers can provide the financial support they need to pursue innovative research projects. For example, the European Research Council (ERC) awards Starting Grants to young scientists and scholars across Europe to support their research in various fields (80).

Mentorship Programs: Establishing mentorship programs where experienced researchers guide young scholars can help them navigate the challenges of research and develop their careers (79).

Collaborative Projects: Encouraging young researchers to participate in collaborative projects with established research teams can provide them with valuable experience and exposure to cutting-edge research (79).

Research Networks: Creating research networks and consortia can facilitate connections between young researchers and senior scholars, as well as provide access to resources and knowledge exchange (79).

Professional Development: Offering workshops, seminars, and training programs focused on research skills, grant writing, and project management can enhance the professional development of young researchers (79).

International Conferences: Supporting young researchers to attend and present their work at international conferences can help them build networks and gain visibility in their field (79).

Access to Facilities: Providing access to state-of-the-art research facilities and laboratories can enable young researchers to conduct high-quality research and experiments (79).

Public Engagement: Encouraging young researchers to engage with the public and communicate their research can enhance their skills and also inspire the next generation of researchers (79).

For more detailed information and resources on providing opportunities for young researchers, you can refer to the following:

- The UKRI's guide "Engaging Young People with Cutting Edge Research," which provides information for researchers and teachers on how to work together and inspire the next generation (79).
- The ERC's announcement of the awarding of 400 Starting Grants to young scientists and scholars across Europe, supporting their cutting-edge research (80).

19. Establishing National Research Foundation Funding process:

Establishing the National Research Foundation (NRF) to fund competitive, peer-reviewed grant proposals across all disciplines involves several key steps:

Legislative Approval: The first step is to obtain legislative approval for the establishment of the NRF. The NRF Bill, 2023, has been approved by the Cabinet for introduction in the Parliament (81).

Governance Structure: The NRF will be governed by a Governing Board consisting of eminent researchers and professionals across disciplines. The Prime Minister will be the ex-officio President of the Board, and the Union Minister of Science & Technology & Union Minister of Education will be the ex-officio Vice-Presidents (81).

Administrative Department: The Department of Science and Technology (DST) will be the administrative Department of the NRF (81).

Executive Council: The functioning of the NRF will be governed by an Executive Council chaired by the Principal Scientific Adviser to the Government of India (81).

Funding Mechanism: The NRF will operate with a budget of Rs 50,000 crore for five years, of which 28% will be the government's share, and the remaining 72% will come from the private sector (84).

Collaborations: The NRF will forge collaborations among industry, academia, and government departments and research institutions, and create an interface mechanism for participation and contribution of industries and State governments in addition to the scientific and line ministries (81).
Peer-Reviewed Process: The NRF will fund research proposals through a rigorous peer-reviewed process to ensure that only high-quality research projects receive funding (82).
Research Capacity Building: The NRF aims to build research capacity in universities and colleges by encouraging active researchers to take up NRF professorships and work with existing faculty (81).
Scope of Research: The NRF will fund and promote research not only in natural sciences but also in humanities, social sciences, and art, thereby broadening the scope of research areas that can receive funding (82).

For more detailed information on the establishment and functioning of the NRF, you can refer to the detailed project report developed by the NRF Science and Technology Advisory Council (PM-STIAC) in consultation with the Ministry of Human Resource Development Department of Higher Education[2]. Additionally, articles discussing the significance of the NRF and its role in promoting research and development in India provide further insights into the process (81) (83) (85).

20. National Research Foundation (NRF) India Societal impact Criteria:

Ensuring that the National Research Foundation (NRF) considers the societal impact of the proposed research as one of the criteria for funding involves several key steps:

Defining Societal Impact: Clearly define what constitutes societal impact within the context of research proposals. This can include factors such as the potential to address national challenges, improve quality of life, and contribute to economic development (86).
Incorporating Societal Impact in Evaluation Criteria: Include societal impact as a formal criterion in the evaluation process for grant proposals. This ensures that research projects are assessed not only on scientific merit but also on their potential to benefit society (86).
Stakeholder Engagement: Engage with stakeholders from various sectors, including government, industry, and civil society, to understand societal needs and priorities. This input can help shape the criteria for societal impact (86).
Interdisciplinary Research: Encourage interdisciplinary research that combines insights from science, technology, social sciences, and humanities to address complex societal issues (86).
Training and Guidance: Provide training and guidance for researchers on how to articulate the societal impact of their research in grant proposals (86).
Monitoring and Reporting: Implement mechanisms for monitoring and reporting on the societal impact of funded research projects. This can help assess the effectiveness of the research in addressing societal needs (86).
Feedback Loop: Establish a feedback loop where the outcomes of research are evaluated for their societal impact, and this evaluation informs future funding decisions (86).

For more detailed information on how the NRF will consider societal impact as a criterion for funding, you can refer to the detailed project report developed by the NRF Science and Technology Advisory Council (PM-STIAC) in consultation with the Ministry of Human Resource Development Department of Higher Education[1]. Additionally, articles discussing the significance of the NRF and its role in promoting research and development in India provide further insights into the process (87) (88).

21. National Research Foundation India funding mentoring coordination:

The National Research Foundation (NRF) will work towards creating a conducive environment for research through a multifaceted approach that includes adequate funding, mentoring, and national-level coordination. Here's how the NRF plans to achieve this:

Adequate Funding: The NRF will provide funding for competitive peer-reviewed grant proposals of all types, ensuring that researchers across disciplines have the financial support they need to pursue their research (89) (90).
Mentoring: The NRF aims to build research capacity in universities and colleges by encouraging active researchers to take up NRF professorships and collaborate with existing faculty. This initiative will help in nurturing a new generation of researchers who can contribute to industry-relevant projects (89) (90).
National-Level Coordination: The NRF will act as a liaison and coordinate amongst researchers, supporting various activities and initiatives for increasing the participation of women and other underrepresented groups in research. It will also create a central clearinghouse for the analysis of information and data, recognizing outstanding research and progress, and serving as a high-level think tank for the coordination, short- and long-term planning of research in the country (90).
Strategic Direction: The NRF will have statutory powers with the responsibility to provide strategic direction, coordination, and funding for research and innovation across the country. It will bring together research grants that are currently coordinated by separate bodies, such as individual ministries (91).
Infrastructure Development: Funding of research infrastructure is crucial to facilitate research. This includes providing state-of-the-art laboratories, equipment, and digital resources (90).
Policy Framework: The NRF will focus on creating a policy framework and putting in place regulatory processes that can encourage collaboration and increased spending by the industry on R&D (89).

For more detailed information on the NRF's role in creating a conducive environment for research, you can refer to the detailed project report developed by the NRF Science and Technology Advisory Council (PM-STIAC) in consultation with the Ministry of Human Resource Development Department of Higher Education[1]. Additionally, articles discussing the significance of the NRF and its role in promoting research and development in India provide further insights into the process (90) (91) (92).

22. Linkages between research and policy-making:
The National Research Foundation (NRF) aims to establish strong linkages between research and policy-making to ensure that research findings are translated into actionable policies. Here's how the NRF plans to achieve this:

Engagement with Policymakers: The NRF will actively engage with policymakers to ensure that research findings are communicated effectively and can inform policy decisions (93).
Policy-Relevant Research: The NRF will encourage researchers to conduct policy-relevant research that addresses pressing societal issues and aligns with national priorities (94).
Knowledge Exchange Platforms: The NRF will create platforms for knowledge exchange where researchers and policymakers can collaborate and share insights (93).
Translational Research: The NRF will support translational research that bridges the gap between academic research and practical policy implementation (94).
Policy Impact Assessment: The NRF will develop mechanisms for assessing the policy impact of research projects, ensuring that funded research has the potential to lead to policy changes (93).
Interdisciplinary Collaboration: The NRF will promote interdisciplinary collaboration, which is often essential for addressing complex policy issues (93).
Evidence-Based Policymaking: The NRF will advocate for evidence-based policymaking, where policies are designed and implemented based on the best available research evidence (94).

For more detailed information on establishing linkages between research and policy-making, you can refer to the following sources:

- An article discussing the relationship between research and policy, which provides insights into how research can influence policy through various models of research-policy relations (93).

- A paper analyzing the linkage between academic research and policy-making, which outlines the benefits of academic research for the policy-making process and provides recommendations for surmounting the limits (94).

23. NEP 2020 implications for research and innovation in India academic journals policy think tanks :

Articles and analyses published in academic journals and policy think tanks have provided critical insights into the New Education Policy (NEP) 2020 and its implications for research and innovation in India. Here are some key points from these publications:

Holistic and Multidisciplinary Approach: The NEP 2020 is recognized for its comprehensive framework aimed at transforming Indian education systems with a holistic and multidisciplinary approach, focusing on the development of students' cognitive, social, and emotional skills (95).

Challenges in Implementation: The implementation of NEP 2020 faces challenges such as lack of infrastructure, shortage of trained educators, inadequate funding, and the digital divide, which may limit the effectiveness of technology integration in education (95).

Promotion of Technology: The policy aims to promote the use of technology in education, but the digital divide in the country may limit its effectiveness. The NEP 2020 also envisions a significant shift towards vocational education (95).

Quality Higher Education: NEP 2020 provides for quality higher education through multidisciplinary universities and autonomous colleges. Critical examinations of the policy suggest changes to ensure a seamless continuum with its predecessor, boosting its importance (96).

Innovation and Research: Various innovations and predicted implications of NEP 2020 on the Indian higher education system are discussed, along with its merits. Suggestions are proposed for its effective implementation towards achieving its objectives (97).

Implications for Research, Innovation, and Startups: The NEP 2020 has implications for research, innovation, and startups, with major changes such as the establishment of the National Research Foundation (NRF), internationalization of education, evolution of standalone HEIs into multidisciplinary universities, and the creation of a National Education Technology Forum (NETF) (98).

These articles and analyses provide a theoretical and practical perspective on the NEP 2020, highlighting its potential to overhaul the education system and contribute to making India a knowledge-based society. However, they also emphasize the need for addressing the challenges of implementation to realize the policy's ambitious goals.

For more detailed analyses and discussions on the NEP 2020 and its implications for research and innovation in India, you can refer to the following sources:

- A critical analysis of NEP 2020 and its implementation, which discusses the comprehensive framework and challenges face (95).
- A theoretical analysis of NEP 2020, which examines the policy and proposes changes to ensure its effective implementation (96).
- An analysis of the Indian National Education Policy 2020 towards achieving its objectives, which discusses the innovations and implications for the higher education system (97).
- A presentation on NEP 2020's implications for research, innovation, and startups, which outlines the major changes and opportunities to redefine the education system (98).

24. Summary:

The study provides an overview of India's National Education Policy (NEP) 2020 and its strategic initiatives to enhance research and innovation in higher education. The NEP 2020 introduces the National Research Foundation (NRF) to support interdisciplinary research and align it with societal needs. The NRF aims to improve research quality, ensure equitable access, and translate findings into policies. Challenges like infrastructure gaps, educator shortages, and funding constraints are acknowledged, with solutions such as

leveraging technology and fostering public-private partnerships proposed. The study also emphasizes the need to balance traditional disciplines with emerging research areas and to create a conducive environment for young researchers. Reviews from academic journals and policy think tanks highlight the NEP's potential to transform India into a knowledge-based economy, despite implementation challenges. Overall, the NEP 2020 and the NRF are pivotal in India's vision to become a global research leader.

25. Conclusion:

The conclusion of the study on India's National Education Policy (NEP) 2020 and its impact on research and innovation is that the policy represents a transformative approach to revitalize the education system. The establishment of the National Research Foundation (NRF) is a key initiative aimed at fostering a robust research culture across disciplines, with a focus on societal impact and interdisciplinary collaboration. The NEP 2020 addresses challenges such as infrastructure deficits, educator shortages, and funding limitations, proposing solutions to bridge the digital divide and promote equitable access to research opportunities. The policy underscores the importance of aligning research with national priorities and societal needs, and it envisions enhancing the quality of higher education by integrating research and education. Reviews from academic journals and policy think tanks suggest that while the NEP 2020 faces implementation challenges, it holds the potential to significantly contribute to India's growth as a knowledge-based economy and establish the country as a global leader in research and innovation. Overall, the NEP 2020 and the NRF are critical to achieving India's educational and developmental goals in the 21st century.

Sources:

1) CRITICAL ANALYSIS OF NEP 2020 AND ITS IMPLEMENTATION. https://www.ijnrd.org/papers/IJNRD2306594.pdf.
2) CHALLENGES FOR RURAL INSTITUTIONS IN ADOPTING NEP 2020 AND THEIR SOLUTIONS. https://www.ijim.in/wp-content/uploads/2023/08/Vol-8-Issue-IV-28-31-Paper-4-Bhawna-Singla-Challenges-For-Rural-Institutions-in-Adopting-NEP-2020-And-their-Solutions.pdf.
3) A reality check on NEP 2020: 6 major challenges in ... - India Today. https://www.indiatoday.in/education-today/featurephilia/story/a-reality-check-on-nep-2020-major-challenges-in-implementation-1711197-2020-08-14.
4) About National Education Policy | Government of India, Ministry of.... https://www.education.gov.in/nep/about-nep.
5) National Education Policy, 2020 - Press Information Bureau. https://pib.gov.in/Pressreleaseshare.aspx?PRID=1778503.
6) National Research Foundation - ClearIAS. https://www.clearias.com/national-research-foundation/.
7) Cabinet approves Introduction of National Research Foundation Bill.... https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1935895.
8) About National Research Foundation (NRF) | Legacy IAS Academy. https://www.legacyias.com/about-national-research-foundation-nrf/.
9) National Research Foundation - दृष्टि आईएएस. https://www.drishtiias.com/daily-updates/daily-news-analysis/national-research-foundation.
10) National Research Foundation Bill 2023: Building a Foundation for a.... https://organiser.org/2023/07/03/181815/bharat/national-research-foundation-bill-2023-building-a-foundation-for-a-futuristic-and-self-reliant-india/.
11) National Research Foundation - https://www.drishtiias.com/daily-updates/daily-news-analysis/national-research-foundation.
12) National Research Foundation – in pursuit of science – gets its. https://www.indiascienceandtechnology.gov.in/listingpage/national-research-foundation-%E2%80%93-pursuit-science-%E2%80%93-gets-its-wings.

13) Indian parliament approves new National Research Foundation. https://opportunities-insight.britishcouncil.org/news/news/indian-parliament-approves-new-national-research-foundation.
14) Cabinet approves Introduction of National Research Foundation Bill.... https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1935895.
15) Parliament passes the Anusandhan National Research Foundation (NRF .... https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1947230.
16) Union Budget 2021 | ₹50,000 crore for National Research Foundation. https://www.thehindu.com/business/budget/union-budget-2021-50000-crore-for-national-research-foundation/article33720164.ece.
17) National Education Policy and the state of research in India. https://www.newindianexpress.com/opinions/2020/sep/01/national-education-policy-and-the-state-of-research-in-india-2190912.html.
18) Can India's new billion-dollar funding agency boost research? - Nature. https://www.nature.com/articles/d41586-023-02336-8.
19) National Research Foundation: The beginning of India's academic.... https://www.indiatoday.in/education-today/featurephilia/story/national-research-foundation-the-beginning-of-indias-academic-renaissance-2434761-2023-09-12.
20) An Analysis of the Factors Influencing Research Capacity Developments.... https://www.ajol.info/index.php/udslj/article/view/210675/198617.
21) Building a Culture of Research - Recommended Practices. https://www.hanoverresearch.com/media/Building-a-Culture-of-Research-Recommended-Practices.pdf.
22) Building Educational Research Capacity: Challenges and Opportunities.... https://journals.sagepub.com/doi/pdf/10.1177/21582440211032668.
23) Research Capacity Building In Indian Higher Education Institutions.... https://www.edtechreview.in/research/research-capacity-building-in-indian-higher-education-institutions-the-need-and-way-forward/.
24) Building Capacity in Institutional Research and Decision Support in.... https://link.springer.com/book/10.1007/978-3-319-71162-1.
25) Building research capacity: Changing roles of universities and ... - AARE. https://www.aare.edu.au/data/publications/2008/bai08493.pdf..
26) Challenges in Indian Education System – Geeks for Geeks. https://www.geeksforgeeks.org/challenges-in-indian-education-system/.
27) Indian Education System - Issues And Challenges - BYJU'S. https://byjus.com/free-ias-prep/indian-education-system-issues-and-challenges/.
28) Challenges and progress in the Indian education system - Times of India. https://timesofindia.indiatimes.com/readersblog/vedasnee/challenges-and-progress-in-the-indian-education-system-50151/.
29) Schools in India | Challenges faced by Indian Education System - Blogs. https://www.lis.ac.in/blogs/schools-in-india/.
30) Five Problems in Indian Education System | 21K School. https://www.21kschool.com/in/blog/problems-in-indian-education-system/.
31) Internally Incentivized Interdisciplinarity: Organizational.... https://link.springer.com/article/10.1007/s11024-020-09431-4.
32) Incentivising interdisciplinary research collaboration: evidence from.... https://www.tandfonline.com/doi/pdf/10.1080/1360080X.2023.2267719.
33) Promoting Interdisciplinary Research Collaboration among Mathematics.... https://www.mdpi.com/2227-7102/13/11/1150.
34) Promoting interdisciplinary research collaboration: a systematic review.... https://research.monash.edu/en/publications/promoting-interdisciplinary-research-collaboration-a-systematic-r.

35) Promoting Interdisciplinary Research Collaboration: A Systematic Review.... https://www.tandfonline.com/doi/pdf/10.1080/02691728.2023.2172694.
36) Improving the Quality of Research by Faculty and Creation - UGC. https://www.ugc.gov.in/pdfnews/5816125_Promoting-and-Improving.pdf.
37) MEASURES TO PROMOTE RESEARCH AND INNOVATION IN INDIAN UNIVERSITIES - AIU. https://aiu.ac.in/documents/AIU_Publications/Reimagining%20Indian%20Universities/19.%20Measures%20to%20Promote%20Research%20and%20Innovation%20in%20Indian%20Universities%20by%20Talat%20Ahmad,%20Vc,%20University%20of%20Kashmir,%20Srinagar,%20J&K.pdf.
38) Enhancing the Practical Relevance of Research. https://www.hbs.edu/ris/Publication%20Files/Enhancing%20the%20Practical%20Relevance%20of%20Research%202016-03-06%20working%20paper_a7e6dfa7-e7ca-4e07-a33a-9fca2198d52f.pdf.
39) Enhancing Relevance of Research - Harvard Business School. https://www.hbs.edu/ris/Publication%20Files/Toffel_relevance_POMS2015d_f73b3aa8-43f2-4296-870e-a29595eb1762.pdf.
40) National Research Foundation – in pursuit of science – gets its. https://www.indiascienceandtechnology.gov.in/listingpage/national-research-foundation-%E2%80%93-pursuit-science-%E2%80%93-gets-its-wings.
41) Scheme for Promotion of Academic and Research Collaboration. https://www.vikaspedia.in/education/policies-and-schemes/scheme-for-promotion-of-academic-and-research-collaboration.
42) Government of Resource Development Department of Education. https://www.aicte-india.org/sites/default/files/SPARC.pdf.
43) Scheme for Promotion of Academic and Research Collaboration SPARC. https://www.drishtiias.com/daily-updates/daily-news-analysis/scheme-for-promotion-of-academic-and-research-collaboration-sparc.
44) MEASURES TO PROMOTE RESEARCH AND INNOVATION IN INDIAN UNIVERSITIES - AIU. https://aiu.ac.in/documents/AIU_Publications/Reimagining%20Indian%20Universities/19.%20Measures%20to%20Promote%20Research%20and%20Innovation%20in%20Indian%20Universities%20by%20Talat%20Ahmad,%20Vc,%20University%20of%20Kashmir,%20Srinagar,%20J&K.pdf.
45) School Education in India: Challenges, Solutions, & Government.... https://educationforallinindia.com/school-education-in-india-challenges-solutions/.
46) Sustainable school infrastructure: Challenges and Solutions - Varthana. https://varthana.com/school/sustainable-school-infrastructure-challenges-and-solutions/.
47) Addressing Teacher Shortages in the Short- & Long-Term. https://edtrust.org/resource/addressing-teacher-shortages-in-the-short-long-term/.
48) NEA survey: Massive staff shortages in schools leading to educator.... https://www.nea.org/about-nea/media-center/press-releases/nea-survey-massive-staff-shortages-schools-leading-educator-burnout-alarming-number-educators.
49) Inequality in Public School Funding | American University. https://soeonline.american.edu/blog/inequality-in-public-school-funding/.
50) Education 4.0 India Report Highlights Solutions to Strengthen Digital.... https://www.weforum.org/press/2022/10/education-4-0-india-report-highlights-solutions-to-strengthen-digital-infrastructure-for-learning-in-india/.
51) Why Are We in a Teacher Shortage and How Can We Fix It? https://www.wgu.edu/heyteach/article/why-are-we-teacher-shortage-and-how-can-we-fix-it1806.html.
52) Addressing the Digital Divide: Access and Use of Technology in Education. https://www.researchgate.net/publication/371575436_Addressing_the_Digital_Divide_Access_and_Use_of_Technology_in_Education.

53) Addressing The Digital Divide In Education: Technology and Internet.... https://www.forbes.com/sites/forbestechcouncil/2021/12/03/addressing-the-digital-divide-in-education-technology-and-internet-access-for-students-in-underserved-communities/.
54) How Does Digital Divide in Education Affect Our Children? - GoStudent. https://insights.gostudent.org/en/digital-divide-in-education.
55) Ways We Can Improve the Digital Divide's Impact on Education. https://www.globalcitizen.org/en/content/digital-divide-education-impact-improve/.
56) Some Emerging Areas of Discipline-Based Education Research.... https://nap.nationalacademies.org/read/13362/chapter/11.
57) Cross-Disciplinary Collaboration and Scholarly Independence in.... https://link.springer.com/article/10.1007/s11024-020-09397-3.
58) How to value research that crosses more than one discipline. https://theconversation.com/how-to-value-research-that-crosses-more-than-one-discipline-45324.
59) What is a discipline? The conceptualization of research areas and their. https://www.researchgate.net/profile/Bjoern-Hammarfelt/publication/327344547_What_is_a_discipline_The_conceptualization_of_research_areas_and_their_operationalization_in_bibliometric_research/links/5b8939e4299bf1d5a73392ac/What-is-a-discipline-The-conceptualization-of-research-areas-and-their-operationalization-in-bibliometric-research.pdf?origin=publication_detail.
60) Best Practices for Equitable Research at Each Step of the ... - ITHS. https://www.iths.org/wp-content/uploads/Equitable-research-best-practices-12.20.2021.pdf.
61) A Guide for ensuring inclusion and equity in education - UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000248254.
62) Equity and inclusivity in research: co-creation of a digital platform.... https://researchinvolvement.biomedcentral.com/articles/10.1186/s40900-021-00313-x.
63) Equitable Access to Opportunities - R2 Resilience. https://r2.resilienceresearch.org/wp-content/uploads/2022/02/Equitable-Access-to-Opportunities.pdf
64) Aligning Research With Societal Needs - Issues in Science and Technology. https://issues.org/aligning-research-with-societal-needs/.
65) Achieving greater impact by aligning with national priorities. https://www.icrisat.org/achieving-greater-impact-by-aligning-with-national-priorities/.
66) Priority Setting for Health Policy and Systems Research. https://ahpsr.who.int/docs/librariesprovider11/briefing-notes/alliancehpsr_briefingnote3.pdf.
67) From thematic to organizational prioritization: the challenges of.... https://academic.oup.com/spp/article/44/5/599/2907804.
68) Elevating national research for health priorities recommendations. https://www.who.int/docs/default-source/documents/elevating-national-research-for-health-priorities-recommendations.pdf.
69) Transforming UP into a knowledge economy through human capital.... https://government.economictimes.indiatimes.com/blog/transforming-up-into-a-knowledge-economy-through-human-capital-innovation-and-technology/98119959.
70) Indian innovation ecosystem driven by knowledge economy, marketplace.... https://economictimes.indiatimes.com/news/economy/policy/indian-innovation-ecosystem-driven-by-knowledge-economy-marketplace-led-research-ai-saraswat/articleshow/86397714.cms.
71) Research Paper: India's Knowledge Economy in the Global Context.... https://nap.nationalacademies.org/read/11924/chapter/11.
72) India: India and the Knowledge Economy, Leveraging Strengths and .... https://openknowledge.worldbank.org/handle/10986/8565.
73) Learn About Interdisciplinary Research - Research Approaches | NSF.... https://new.nsf.gov/funding/learn/research-types/learn-about-interdisciplinary-research.

74) Five organizational features for successful interdisciplinary research.... https://i2insights.org/2021/01/26/context-for-successful-interdisciplinarity/.
75) The role of the UK Government in supporting interdisciplinary research.... https://www.sciencecampaign.org.uk/analysis-and-publications/detail/role-of-govt-supporting-interdisciplinary-research/.
76) Enhancing the Quality of Higher Education through - CORE. https://core.ac.uk/download/pdf/300374216.pdf.
77) MEASURES TO PROMOTE RESEARCH AND INNOVATION IN INDIAN UNIVERSITIES - AIU. https://aiu.ac.in/documents/AIU_Publications/Reimagining%20Indian%20Universities/19.%20Measures%20to%20Promote%20Research%20and%20Innovation%20in%20Indian%20Universities%20by%20Talat%20Ahmad,%20Vc,%20University%20of%20Kashmir,%20Srinagar,%20J&K.pdf.
78) Enhancing Quality in Higher Education Through Evidence-Based and.... https://www.researchgate.net/publication/375363114_Enhancing_Quality_in_Higher_Education_Through_Evidence-Based_and_Inclusive_Policy_Co-Development/fulltext/65479c97b86a1d521bbac4f3/Enhancing-Quality-in-Higher-Education-Through-Evidence-Based-and-Inclusive-Policy-Co-Development.pdf.
79) ERC Starting Grants: 400 bright minds awarded over €628 million. https://erc.europa.eu/news-events/news/erc-2023-starting-grants-results.
80) Engaging young people with cutting edge research – UKRI. https://www.ukri.org/publications/engaging-young-people-with-cutting-edge-research/.
81) National Research Foundation - ClearIAS. https://www.clearias.com/national-research-foundation/.
82) National Research Foundation (NRF) Bill, 2023 | Current Affairs. https://www.iasparliament.com/current-affairs/national-research-foundation-nrf-bill-2023.
83) National Research Foundation - Invest India. https://static.investindia.gov.in/s3fs-public/2020-09/English%20NRF.pdf.
84) Cabinet approves National Research Foundation, Rs.50,000 crore budgeted .... https://www.forbesindia.com/article/news/cabinet-approves-national-research-foundation-rs50000-crore-budgeted-for-rd-over-five-years/86255/1.
85) Can India's new billion-dollar funding agency boost research? - Nature. https://www.nature.com/articles/d41586-023-02336-8.
86) National Research Foundation - Invest India. https://static.investindia.gov.in/s3fs-public/2020-09/English%20NRF.pdf.
87) National Research Foundation – in pursuit of science – gets its. https://www.indiascienceandtechnology.gov.in/listingpage/national-research-foundation-%E2%80%93-pursuit-science-%E2%80%93-gets-its-wings.
88) National Research Foundation – Clear IAS. https://www.clearias.com/national-research-foundation/.
89) National Research Foundation - Invest India. https://static.investindia.gov.in/s3fs-public/2020-09/English%20NRF.pdf.
90) National Research Foundation 2020 in pursuit of science: An initiative.... https://www.indiascienceandtechnology.gov.in/stihighlights/national-research-foundation-2020-pursuit-science-initiative-office-principal-scientific-adviser.
91) Indian parliament approves new National Research Foundation. https://opportunities-insight.britishcouncil.org/news/news/indian-parliament-approves-new-national-research-foundation.
92) National Research Foundation – in pursuit of science – gets its. https://www.indiascienceandtechnology.gov.in/listingpage/national-research-foundation-%E2%80%93-pursuit-science-%E2%80%93-gets-its-wings.
93) What is The Relationship Between Research and Policy?. https://www.methodspace.com/blog/relationship-research-policy.
94) CREATING A LINKAGE BETWEEN ACADEMIC RESEARCH AND POLICY-MAKING. http://europolity.eu/wp-content/uploads/2014/05/Vol.7.No_.2.89-102.pdf.

95) CRITICAL ANALYSIS OF NEP 2020 AND ITS IMPLEMENTATION. https://www.ijnrd.org/papers/IJNRD2306594.pdf.
96) New Education Policy 2020 of India: A Theoretical Analysis. https://www.researchgate.net/publication/355365803_New_Education_Policy_2020_of_India_A_Theoretical_Analysis.
97) PDF Analysis of the Indian National Education Policy 2020 towards.... https://www.researchgate.net/publication/343769198_Analysis_of_the_Indian_National_Education_Policy_2020_towards_Achieving_its_Objectives.
98) National Education Policy (NEP) 2020-_Implications for Research.... https://www.academia.edu/45589999/National_Education_Policy_NEP_2020_Implications_for_Research_Innovation_and_Start_ups.

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Areas of Research:

1. Academic Performance and Text Anxiaty in Indian Students.
2. Effects of Big Data Characteristics on Security – Leveraging Existing Security Mechanisms and Exploring New Techniques for Protection.
3. Voice call transfer service between Wi-Fi enabled Android Smartphone and Tablets without using internet.
4. Dynamic Navigation of Query Results based on concept hierarchies using improved Distance Rank Algorithm.
5. A Novel security for ATM framework by using digital image processing.
6. Understanding the Cognitive processes involved in technological entrepreneurial opportunity recognition.
7. A Novel Approach for Location based Services using Wireless Ad- hoc Networks (Manets).
8. Stenography to improve authentication using mobile phone as security Token.

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