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TODAY'S ANALYSIS

(31 January 2025)

TOPICS TO BE COVERED

- DEEPSEEK
- ASER REPORT, 2024
- MCQs

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DEEPSEEK

Overview:

- **DeepSeek is an AI startup based in Hangzhou, China**, that has recently **gained global attention for its innovative and low-cost AI models.**
- The company introduced its AI models—**DeepSeek-V3 and DeepSeek-R1 (a reasoning model)**—which are seen as potential competitors to OpenAI's advanced models like GPT-4.
- What sets DeepSeek apart is its ability to achieve **similar performance to OpenAI's models at a fraction of the cost.**

KEY FEATURES OF DEEPSEEK

- **Founding and Focus:**
    - DeepSeek is a **startup from Hangzhou, China, which has launched a series of AI models** that excel in tasks such as **math, coding, and reasoning.**

- Its models are powered by a **low-cost Large Language Model (LLM)** infrastructure, which makes them more affordable than many global counterparts.

- **Comparative Edge Over Global LLMs:**
  - DeepSeek's models are designed to be far **more cost-effective than competitors** like OpenAI's GPT-4.
  - **Training Cost Comparison:**
    - **DeepSeek**: $6 million
    - **Global LLMs (e.g., GPT-4 by OpenAI)**: ~$100 million
  - This significant cost difference is **primarily due to DeepSeek's use of older-generation hardware (NVIDIA H800 chips)** compared to the more advanced GPUs used in OpenAI's models.

- **Cost and Accessibility:**
  - **Subscription Cost:**
    - **DeepSeek**: $0.50 per month
    - **OpenAI's ChatGPT:** $20 per month

- The affordability of DeepSeek's services allows for broader accessibility, especially in regions with budget constraints.

- **Training and Performance:**
  - **Training Approach**: **DeepSeek uses reinforcement learning to enable its models** to **self-improve** and adapt, which contrasts with the supervised learning model used by OpenAI.
  - **Performance**: DeepSeek's models are comparable to **OpenAI's o1 model in many performance metrics,** though they are not yet as advanced as the **o3** model.
  - **Scalability**: DeepSeek focuses on creating smaller, faster models (SLMs), which are more resource-efficient and scalable.

DEEPSEEK'S AI MODEL

DeepSeek has developed a series of open-source models, each tailored to different tasks:

- **DeepSeek Coder**: A model designed for coding-related tasks.
- **DeepSeek LLM**: A 67-billion-parameter model intended to compete with other large language models.

- **DeepSeek-V2**: A cost-effective model with strong performance in a variety of tasks.
- **DeepSeek-Coder-V2**: A 236-billion-parameter model designed for complex coding challenges.
- **DeepSeek-V3**: A 671-billion-parameter model capable of coding, translation, and generating essays/emails.
- **DeepSeek-R1**: A reasoning model aimed at challenging OpenAI's o1 model.
- **DeepSeek-R1-Distill**: A fine-tuned version of DeepSeek-R1, based on synthetic data generated by R1.

CHALLENGES & CONCERN

- **Censorship and Bias:**
    - **DeepSeek adheres to China's strict digital content regulations**, which means **it avoids providing direct answers on sensitive political topics.**
    - This adherence to **government censorship raises concerns about biases in the AI's output.**
    - There are **fears that DeepSeek's models might carry a pro-China bias** due to government influence over the technology.

- **Security Risks:**
    - Experts have expressed concerns over potential security risks, particularly related to data privacy and the **ethical use of AI.**
    - Given DeepSeek's origin in China, these **concerns are amplified due to the broader context of global geopolitical tensions.**

WHAT IS LLM?

- A **Large Language Model (LLM)** is a type of **artificial intelligence model that is trained on massive datasets containing text data.**
- **LLMs use deep learning techniques, particularly neural networks, to understand**, generate, and process human language.
- These **models have billions (or even trillions) of parameters,** which allow them to perform a **wide range of language-related tasks**, including **text generation, translation, question answering, and more.**
- **Examples**: OpenAI's GPT-4, DeepSeek's models, and Google's PaLM are examples of LLMs that have revolutionized natural language processing (NLP) tasks.

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GLOBAL IMPACT & GEOPOLITICAL CONSIDERATIONS

- **Sputnik Moment**: The launch of DeepSeek has been compared to the impact of the **Soviet Union's Sputnik launch in the 1950s**, marking a shift in the **technological competition between global powers**, particularly between the US and China.
- **Market Disruption**: The introduction of **DeepSeek's AI models caused a significant drop of $600 billion** in the **market value of Nvidia, a** leading manufacturer of AI chips.
- This highlights the **growing importance of AI in shaping the tech market** and how companies like DeepSeek are challenging established industry giants.
- **Policy Implications**: DeepSeek's rapid **advancements could trigger further restrictions on AI** and semiconductor technology exports from the US to China, heightening the ongoing rivalry between the two nations.

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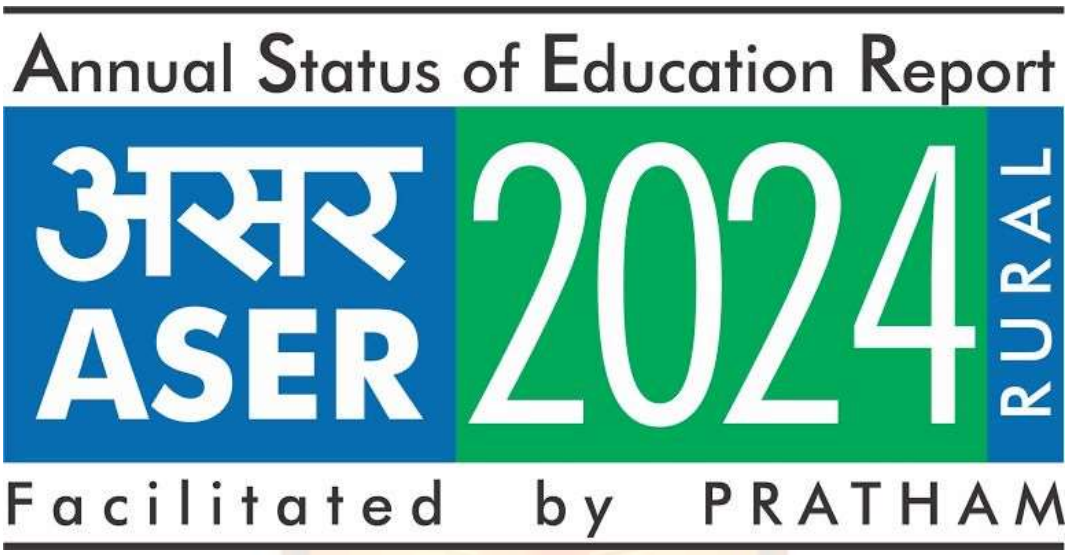
ASER REPORT, 2024



- **ASER 2024** is the **14th nationwide field-based survey** that evaluates the **status of children's enrollment and learning outcomes** in rural India.
- This survey reached **6,49,491 children** in **17,997 villages** across **605 rural districts**.
- ASER 2024 is the **2nd report released after the COVID-19 pandemic**, with the **previous one being in 2022.** It highlights the **recovery of school education from pandemic-related disruptions.**

WHAT IS ASER?

- ASER is a **nationwide citizen-led household survey on** children's schooling and learning in rural India.

- **Conducted by Pratham since 2005, annually until 2014**, then **biennially since 2016**; **no survey in 2020 due to the pandemic, resumed in 2022 and 2024.**
- It measures basic reading and arithmetic skills, school attendance, and other indicators, influencing government policy.

KEY FEATURES OF THE METHODOLOGY OF ASER

- A household survey covering rural children in India, with a focus on three age groups: **under 6, school-going children (6-14), and older children (15-16).**
- Randomly **selects 30 villages per district** and **20 households per village** using the **2011 Census frame.**
- Conducts one-on-one assessments of basic reading and arithmetic skills for **children aged 5-16, with an additional "Beyond Basics**" assessment for **14-16-year-olds**.
- District-level organizations or institutions partner with ASER for implementation in each district.

KEY FINDINGS

1. Improvement in Learning Outcomes:

- **Learning Loss Recovery:**

- The share of children in **standards III, V, and VIII** who could read a **Standard II-level text** or perform basic **subtraction** and **division** had **declined between 2018 and 2022 due to COVID-19 disruptions**.
- By 2024, **this share has either recovered to pre-pandemic levels or improved.**
- **Arithmetic Skills Improvement:**
  - **Standard III:**
    - **33.7% of children can perform basic subtraction** in **2024 (up from 25.9% in 2022).**
    - This is higher than the pre-pandemic **rate of 28.2% in 2018.**
  - **Standard V:**
    - **30.7% of children can solve a 3-digit by 1-digit division** problem (up from 25.6% in 2022).
    - This marks improvement from pre-pandemic rates as well.
- **Reading Skills Improvement:**
  - **Standard III:**

- **27%** of children can read a Standard II-level text in 2024, up from **20.5%** in 2022.

- **Standard V:**
  - **48.8%** of children can read a Standard II-level text in 2024, up from 42.8% in 2022.

- **Government vs. Private Schools:**
  - **Government Schools:**
    - **44.8%** of Standard V children can read a Standard II-level text in 2024 (up from 38.5% in 2022).
    - This is nearly at the pre-pandemic level of 44.2% in 2018.
  - **Private Schools:**
    - **59.3%** of Standard V children can read a Standard II-level text in 2024 (up **from 56.8% in 2022).**
    - However, this still lags behind the pre-pandemic level of 65.1% in 2018.

2. Enrollment Rates:

- **Early Childhood Education (Ages 3-5):**
  - Enrollment in preschool is near **80%** for children aged **3** and **4**.

- **Primary School (Ages 6-14):**
    - Enrollment remains high at **98%** in the age group **6-14 years**.
- **Secondary School (Ages 14-16):**
    - The out-of-school percentage for **15-16-year-olds** is now **8% or less** for both boys and girls.
    - The **gender gap** is less than **1%**.
- **Pre-Primary Schools:**
    - States with above **90% enrollment** for children aged five in pre-primary schools include **Karnataka, Gujarat, Maharashtra, Kerala,** and **Nagaland**.

3. Private vs. Government Schools:

- **Private School Enrollment:**
    - Enrollment in private schools increased from **25.1%** in 2022 to **30.6%** in 2024 for children aged **6-14**.
    - This **rise is likely due to higher income levels in rural areas after the pandemic**, leading to an increased preference for private schools.
- **Government School Enrollment:**
    - A **decline in the share of children enrolled in government schools was observed,** as more families shifted to private schools.

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4. Attendance Rates:

- **Student Attendance:**
  - Increased from **72.4%** in 2018 to **73%** in 2022 and further to **75.9%** in 2024.
- **Teacher Attendance:**
  - Increased from **85.1%** in 2018 to **86.8%** in 2022 and **87.5%** in 2024.

5. Digital Access and Skills:

- **Smartphone Access:**
  - Over **90%** of rural adolescents (aged **14-16**) have access to a **smartphone**.
- **Digital Skills:**
  - **82.2%** of children aged **14-16** can use a smartphone.
- **Gender Gaps:**
  - **36.2% of boys** own a smartphone compared to **26.9% of girls**.
  - **80.1% of boys** can browse the internet for information, while **78.6% of girls** can.
- **Usage of Digital Devices:**
  - **57%** of teenagers use smartphones for **education-related activities**.
  - **76%** use smartphones for **social media**.

6. Improvement in School Facilities:

- **Midday Meals, Toilets, Drinking Water, Libraries:**
    - **Consistent improvements in services such as midday meals**, drinking water, usable toilets, and libraries in schools.
    - **Usable toilets:** 79% of schools had usable toilets in 2024, an increase from **74.2%** in 2018.
    - **Libraries:** 17.5% of schools had no library in 2024, down from **25.8%** in 2018.

IMPACT OF NEP

The **National Education Policy (NEP) 2020** prioritizes **Foundational Literacy and Numeracy (FLN)**, particularly for primary school children. This has significantly influenced the recovery in learning outcomes.

- **NIPUN Bharat Mission (2021):**
    - Aimed at improving **foundational literacy and numeracy** by 2026-27.
    - By Grade 3, every child should be able to:
        - Read with comprehension,
        - Perform basic math operations.

- Write,
- Learn life skills.

- **Government Initiatives Under NEP 2020:**
  - **83% of schools** reported receiving directives to implement **FLN activities**.
  - **78% of schools** had at least one teacher trained in **FLN**.
  - **75% of schools** received relevant **learning materials**.
  - **Three-month "school readiness" programs** for incoming first-grade children were conducted in government schools.

These efforts have contributed to the improvements in learning outcomes observed in ASER 2024.

CHALLENGES AS PER ASER

- **Learning Gaps:**
  - Despite progress, many students still face significant learning challenges:
    - **76.6% of Class III students** in government schools cannot read a **Class II-level text**.
    - **55.2% of Class V students** in government schools cannot read a **Class II-level text**.

- **State Disparities:**
    - Significant differences in educational performance across states:
        - **For example,** reading ability in **Standard III** in **more than half** of the states is still behind **2018 levels** in 2024.
- **Gender Gaps:**
    - **Digital Divide:**
        - Gender gaps are visible in both **smartphone ownership** and **digital skills**.
        - **36.2% of boys** own smartphones, compared to **26.9% of girls**.
        - Similarly, **80.1% of boys** are proficient in browsing the internet for information, compared to **78.6% of girls**.
- **Infrastructure Gaps:**
    - **Inadequate Infrastructure:**
        - **77% of schools** have **drinking water facilities**.
        - **79% of schools** have **usable toilets**.
        - Schools in rural areas continue to face challenges with basic infrastructure.

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MCQs

1. Consider the following statements and mark the correct option:

Assertion (A): Deepseek is more cost effective as compared to Open AI/

Reasoning (R): DeepSeek uses of older-generation hardware.

(A) Both A & R are true and R is the correct explanation of A.

(B) Both A & R are true and R is not the correct explanation of A.

(C) A is true R is false

(D) A is false R is true

Ans. (C)

2. Which of these are correctly matched?

1. DeepSeek Coder: A 67-billion-parameter model intended to compete with other large language models.
2. DeepSeek LLM: A model designed for coding-related tasks.

(A) Only 1

(B) Only 2

(C) Both 1 & 2

(D) Neither 1 nor 2

Ans. (D)

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3. Which organisation publishes the ASER Report?

(A) Ministry of Education

(B) PRATHAM NGO

(C) Ministry of Science

(D) Teach India Foundation.

Ans. (B)

4. Consider the following statements wrt ASER and mark the correct one:

1. It is a survey related to education at the primary level only.

2. It is an annual survey.

(A) Only 1

(B) Only 2

(C) Both 1 & 2

(D) Neither 1 nor 2

Ans. (D)

5. What is the aim of NIPUN Bharat?

(A) Increasing access to vocational studies

(B) Skill Development at school level

(C) Improving foundational literacy & numeracy

(D) None of the above

Ans. (C)