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Adapting to Change: Digital Learning Practices and Accessibility in West Bengal Municipalities during the Pandemic

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ABSTRACT

This research looks at the ways society and technology affect how municipal learning is done over the Internet. More attention is paid to who the users are, what devices they prefer, top learning websites and the conditions surrounding their lives and money. The study tries to determine the factors that prevent or support better education using digital tools in all types of areas. Both interviews and surveys were used to collect information from municipal users and studies of available reports were carried out to understand the relevant educational and technological matters. The research studies how men and women are distributed in the labor force, their skills, how much they earn and their experience with technology. Most people use Android smartphones and tools like Google Meet, but there are still many difficulties in using digital learning tools caused by a lack of resources and access, high prices and other social issues (Giulianelli et al., 2011; Kundu, 2022). The study shows that there are big differences in digital literacy and problematic access to technology among people from lower-income groups and marginalized groups (Nastjuk et al., 2022). Although the government tries to raise girls' education levels, sex differences in college attendance and technology knowledge still exist, so more should be done to address them (Kundu, 2022). Things

like weak infrastructure, limited teacher quality and missing regional content are still big issues for bringing technology into education in less developed areas (Giulianelli et al., 2011). Based on the research, people should receive better internet support, attend digital education classes and be offered new policies that support all students in digital learning. For example, schools could be given less costly or donated technology, internet connections could be improved in necessary places, and teachers should be trained to use digital platforms to make all students part of the process.

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1. INTRODUCTION

Digital technology has made education better in different areas, mainly in municipal and semi-urban areas around the globe. They close the educational gap for people from different communities and make sure all students are involved. Nevertheless, earning different amounts and not knowing much about computers are major problems. It talks about these topics between municipalities and examines numerous digital learning practices, using types of data. It is meant to investigate the factors that either prevent or motivate people to take part in digital learning.

Digital learning technologies have brought significant changes to education all over the world, and these have been most obvious in municipal and semi-urban places (Henderson, 2011). Technological platforms today can help balance inequalities in school so diverse children can enjoy fair academic experiences (A. & Mohanty, 2024). Nonetheless, this potential is largely determined by the presence of socio-economic issues, lack of technology and a strong urge to teach and learn about technology in schools (Resta & Laferrière, 2008). As there are some challenges with digital learning, it is important to properly identify and solve them so that digital education is not limited by inequality and other factors. The paper focuses on how digital learning takes place in cities and explores different parts of digital education using a wide range of statistics and data. By doing this research, I want to discover the issues that keep digital learning from growing in many places and find out what supports its development. The researchers want to provide a better explanation of the conditions required for digital technology to help every student, without being influenced by their social or geographic settings (Kundu, 2022). It is

essential for policymakers to deal directly with the digital divide to give all students equal chances to use technology and benefit from fair learning after COVID (Alam & Mohanty, 2024). The current education policy of the country in 2020 proposes a comprehensive strategy to lessen such challenges (Kundu, 2022).

Because of digital technology being used in schools, education is different today and now allows education systems worldwide to choose for policies that boost ICT use in schools (Timotheou et al., 2022). People should learn how to be digitally literate, to think critically and to determine the quality of information found online, along with receiving digital resources. For technology in education to transform the process, it is necessary for students, teachers and faculty members to have good digital skills (Srivastava & Dangwal, 2021). Those who guide education should unite, as they are aware that the future of learning depends on getting rid of barriers, bringing people together and being inclusive.

A. Significance of the Study

Doing this research is important for academic projects and policy-making.

- ❖ According to research, unequal distribution of resources, discrimination based on gender and unsatisfactory infrastructure in the city stop people from using the internet.
- ❖ The research provides evidence-based insights to inform ongoing reforms under India's National Education Policy (NEP) 2020, aligning with the goals of inclusivity and digital transformation.
- ❖ By looking at how users interact with devices, those in education can make their platforms match the users' habits.
- ❖ Since it outlines the struggles experienced by those with little money and education, the study props up actions aimed at giving every person access to digital resources.

As a result, government and private organisations may make it possible for all people to use digital solutions by providing clear infrastructure, helpful resources and learning programs.

B. Objectives of the Study

1. To examine the demographic patterns (gender, income, education) among municipal users engaged in digital learning during the pandemic.
2. To identify the technological tools and platforms (such as Google Meet, YouTube, and smartphones) predominantly used for digital education.

3. To analyze the socio-economic constraints (income levels, device availability, network access) affecting participation in digital learning.
4. To assess students' knowledge and talents when using digital resources.
5. To ensure that policies and new services support all learners' access to the Internet and help reduce the digital gap in the community's schools.

C. Research Gap

Policymakers have mostly concentrated on the big picture of digital learning, but now our study seeks to address a key problem in understanding how to achieve success.

During the pandemic, digital lessons were arranged at several local spots in West Bengal.

- ❖ The ability to notice users' preferences across services, their reliance on various devices and any issues with using the internet in real time.
- ❖ Technology and education in semi-urban Regions are studied without taking into account differences in income and gender.
- ❖ Failing to talk about the effects of issues with digital platforms and the industry on making digital learning equal for all.

It fills the gaps by supplying precise information and explanations on the use of various online strategies.

D. Aim of the Study

The purpose of this study is to look at the ways advertising influences people.

This research aims to determine the issues that affected digital learning because of the pandemic in West Bengal municipal areas. The research looks into how different demographic, economic and technology elements can influence people's involvement with the platform, their use of digital tools and chances for inclusive digital education.

2. REVIEW OF LITERATURE

Since many schools and universities are now using digital learning technologies, this has attracted notice because it supports many students, helps them learn at the rate they prefer and increases

their engagement. Though digital education can be very beneficial, many difficulties remain due to severe differences in society, place and available resources.

UNESCO (2023), digital education plays a pivotal role in bridging disparities in access to quality learning, particularly in under-resourced and remote areas. Since students usually do not have to be in a classroom, digital learning gives them more options. At the same time, digital equality is a major problem, because not everyone can get the technology they need.

The World Bank (2022) underscores that socio-economic factors—including income level, parental education, and gender—significantly influence digital adoption. Because many lower-class households are lacking digital devices and internet, they are not involved in online learning.

Google (2021) emphasizes the critical role of user-friendly and accessible platforms like Google Meet in democratizing education. Virtual platforms allow teachers, students and parents to talk online and they are used in various education systems. As a consequence, it semaples that making all platforms useful in places with limited internet is required for those regions.

Smith and Jones (2020) argue that a lack of digital skills remains a barrier for many, especially among older populations and marginalized communities. To help everyone, they think it is important to provide extensive training in digital topics so people can stay involved.

The International Telecommunication Union (2022) identifies issues such as unreliable internet access, insufficient digital devices, and lack of electricity as core challenges that hinder the success of digital learning strategies in these areas.

World Bank (2022). In communities with low-income, it is now common for learners to depend on smartphones because they are fairly accessible. While they are easy to use and do not cost much, the restricted screen and CPU in them make it hard to do major tasks or work for a long period.

The pandemic caused digital learning to rise, though a lot of schools were not ready for it. Timotheou et al. (2022) report that schools with inadequate infrastructure and digital readiness experienced deeper learning losses and widening inequality gaps. These challenges disproportionately affected already marginalized populations.

Alam and Mohanty (2024) advocate for increased educational budgets aimed at improving infrastructure within institutions, including access to devices, high-speed internet, and learning management systems. Such investments are essential to create equitable learning environments.

In the Indian context, Kundu (2022) highlights significant variations in ICT access based on region, gender, administrative type, and teacher demographics. It is necessary to consider these differences during the creation and evaluation of digital education policies so as not to put some learners at an advantage.

Looking at the studies, noticed that social and economic elements, digital literacy, differences in platforms and good infrastructure all result in changes in digital learning. Failure to work on policy, pedagogy and technology together will limit digital tools help reach educational equality. They inform the reader about the need and importance of conducting this research study.

3. METHODOLOGY

This study relied on numbers and statistics to analyze the role of technology and society in digital learning in West Bengal's municipal areas. It consists of research design, methods for collecting information, choosing a sample and analysis of the collected data.

A. Research Design

The study utilized a descriptive and analytical research design. It was chosen to outline the growth of digital learning and to see how different demographic, socio-economic and technological factors relate to each other. Since the study was cross-sectional, all the data was collected at the same time during the pandemic period.

B. Data Collection Methods

The questionnaire was structured and presented through Google Forms so that primary data could be collected. The questionnaire used a mix of closed-ended and multiple-choice questions that focused on several topics.

- Demographics (age, gender, income, education)
- Technological access (device type, internet reliability)

- Platform usage (Google Meet, YouTube, Google Classroom)
- Perceived challenges and engagement levels

The Google form was electronically distributed to students, teachers, and top individuals across various colleges, universities, and B.Ed. students.

C. Sample Selection

Socio-economic and educational diversity among municipalities in West Bengal was achieved through the use of purposeful sampling. A total of 234 respondents participated in the study.This study included people from a range of districts, so it could look at how geography affects outcomes. Approximately 70% of the participants were women, which pointed to gender-based patterns in the use of digital learning.

Educational backgrounds varied:

- 60% had undergraduate degrees (B.A., B.Sc., B. Com)
- 15% had completed high school
- 10% held postgraduate qualifications

This way of sampling included people with different levels of income, education and familiarity with technology.

D. *Data Analysis Techniques*

Different analysis methods were used to view and interpret patterns, relationships and differences in students' online learning.

The main purpose of descriptive statistics is to outline some of the most important aspects of a dataset: frequencies, percentages, mean and median. As a result, we could determine the spread of factors like gender, how much education people have, their income bracket and what devices they use.

The technique of cross-tabulation and comparative analysis can be used to see if there is a relationship between different variables, such as gender or education and which platforms people prefer. This helped identify specific user group behaviours and patterns.

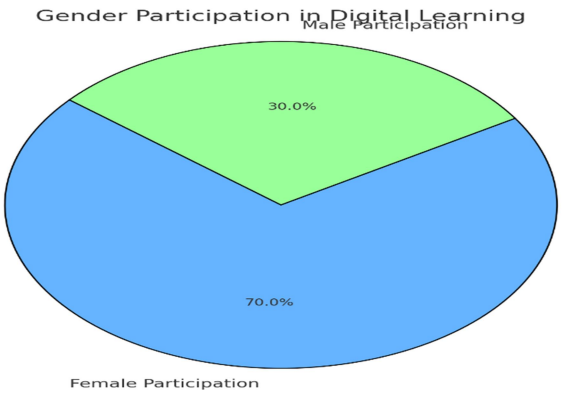
- *Looking at Patterns:* Analysis is concentrated on spotting recurring actions or top habits among users, such as having a high usage of smartphones or mainly relying on Google Meet.
- *Visual Representation (where applicable*): Data was organized into tables and charts for better visualization of trends, which supported the interpretation of user behaviour and digital access across socio-economic segments.

By using these methods, the researcher was able to study all aspects of digital learning in West Bengal's municipal regions, bringing out the main difficulties and promising solutions

4. RESULTS

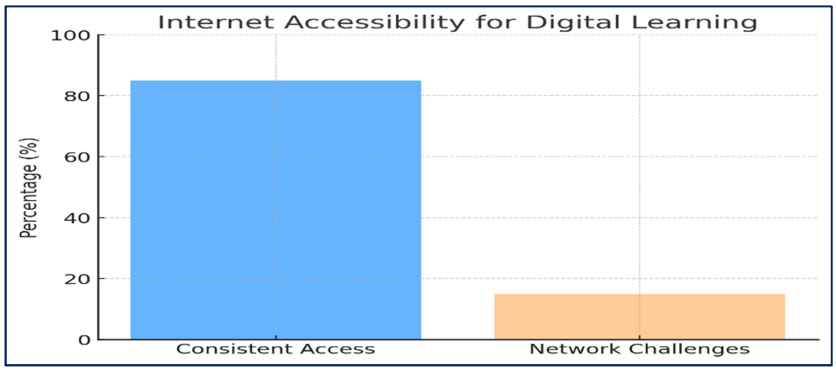
It is revealed in the study that digital learning and access to technology are different in rural and urban areas, mainly because of gender, educational status, income and usage of computers, tablets and smartphones. Female users constitute approximately 70% of the participant pool, indicating greater participation from women in online educational platforms, which may be attributed to socio-cultural factors like gender-specific educational priorities and relative access advantages (Scaradozzi et al., 2021). A significant portion of users (over 60%) hold undergraduate degrees (B.A., B.Sc., or B.Com.), suggesting that digital learning is predominantly accessed by individuals with higher educational backgrounds. However, a considerable percentage of users (15%) possess only high school diplomas, while postgraduate qualification holders make up a smaller proportion (10%). This finding underscores the challenges posed by digital literacy gaps and complex platform interfaces that may limit participation from those with lower educational attainment levels (Arrabal et al., 2021). Income distribution is another defining factor, with around 75% of participants belonging to the income category "Below ₹10,000." As a result of this financial barrier, many cannot get hold of needed devices, reliable internet and schooling materials. Furthermore, despite 85% of users reporting consistent internet access, the remaining 15% face network reliability issues, affecting their engagement and participation in real-time educational activities (Badiuzzaman et al., 2021). The platform analysis indicates that Google Meet is the most widely adopted platform (80%) due to its user-friendly interface and integration with other Google services. In contrast, YouTube (10%) and Google Classroom (5%) are secondary choices, reflecting limitations in platform usage due to specific educational needs or technical barriers. The overwhelming reliance on Google Meet further points to the demand for synchronous video-based interactions and the preference for easy-to-navigate, accessible platforms (Waoo & Waoo, 2022). According to trends in device use, most learners are using Android smartphones to view educational

content online, as 90% of users choose this method. This reliance highlights the affordability and accessibility of smartphones in municipal regions, but also signals the need for mobile-optimized content and platform designs (Waoo & Waoo, 2022). Most people did not use laptops or devices, saying that the technology they relied on was limited



Source: Google form responses

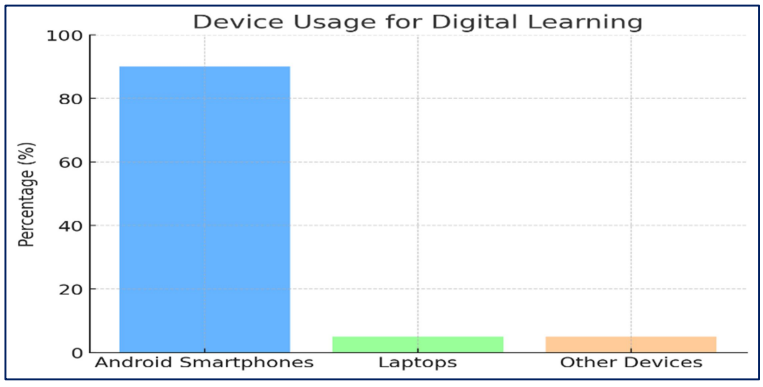
Gender: Female users constituted a majority (approximately 70%) of the dataset, highlighting higher participation in digital learning among women in municipal areas.



Internet Accessibility: While most users (85%) reported consistent internet access, 15% faced challenges in network reliability.

Source: Google form responses

Device Usage: Android smartphones were the most common device (90%), with limited use of laptops (5%) and other devices (5%).



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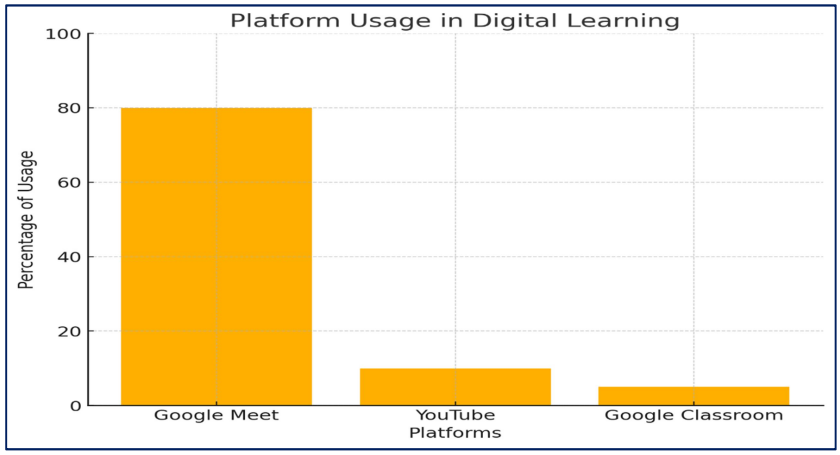
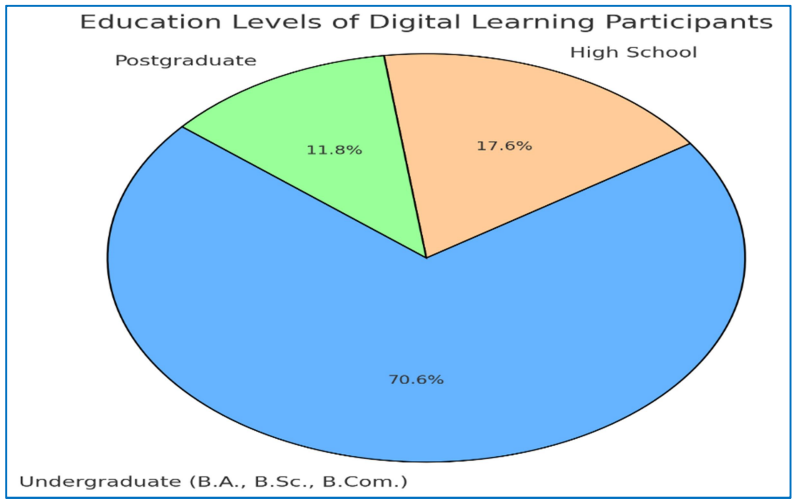


Technological Access and Platform Usage Preferred Platforms: Google Meet was the predominant platform used for digital learning (80%), followed by YouTube (10%) and Google Classroom (5%).

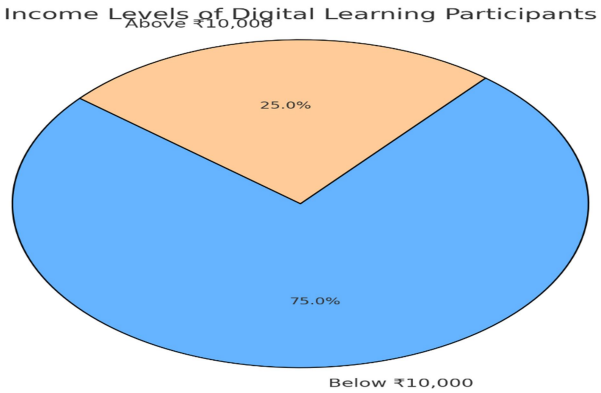
Source: Google form responses



Education Levels: Most users (over 60%) had completed undergraduate education (B.A., B.Sc., or B.Com.), while a smaller fraction reported high school (15%) or postgraduate (10%) qualifications.

Source: Google form responses

Income Levels: The majority of users (around 75%) belonged to the income category "Below ₹10,000," indicating financial constraints among participants.



Source: Google form responses

A. Major Findings

1. Digital learning platforms are mostly used by females, making up 70% of all participants, which reveals that women generally take more part in such activities.

2. Google Meet is heavily used in digital learning since it is the choice of 80% of users for holding live sessions, and it is easy to access and understand.

3. Digital Learning is done mainly on Android smartphones by 90% of people, underlining how mobile phones make it easier for people to use technology.

4. A large proportion of users (75%) belong to the "Below ₹10,000" income group, highlighting the economic constraints that influence access to digital learning tools.

5. Most of the respondents, or over 60%, hold undergraduate degrees, pointing to the prevalence of digital learning in groups of educated people.

6. Though the majority of users say they are always online, some experience unreliable connections that affect their learning online.

7. Not Much Use of Google Classroom and YouTube. Because just 5% and 10% of students used Google Classroom and YouTube in the study, it is clear that they were underused or difficult to apply in the given situation.

8. Variations in participation across districts (District A: 30% participation, District E: 10%) highlight the influence of regional infrastructure differences, particularly in terms of internet speed and device availability.

It is clear from these results that people's involvement, what platforms they like to use and their overall experience are affected by factors such as their socio-economic level and technology access, which affects attempts to address the digital divide.

5. DISCUSSION

A. Interpretation of Results

According to the study, digital learning in West Bengal's cities is affected by having both advantages and disadvantages. The widespread use of Google Meet (80%) as the dominant platform reflects a strong preference for real-time, synchronous learning experiences, likely due to its ease of use and integration with other Google services. Similarly, the heavy dependence on Android smartphones (90%) indicates that affordability and portability drive technology choices, particularly in economically constrained households.

About 75% of the study participants earn below ₹10,000 a month which confirms that money is still a big obstacle to getting digital education. The financial limit keeps many learners from getting good technology or strong internet, thus reducing the success of their education. In addition, approximately 15% of the participants regularly experience internet connection problems which makes it hard for them to fully join in online classes.

The information demonstrates that people have different rates of educational achievement. More than 60% of users have an undergraduate degree, but just 15% graduated from high school. Therefore, we can conclude that digital learning adoption is widely used by people who have a good education and may miss the people who stand to gain the most from it.

Additionally, alternative platforms such as YouTube (10%) and Google Classroom (5%) were significantly underutilized. Not using the platform much may mean it does not match users' needs or that they are not very comfortable online.

B. Comparison with Existing Literature

The findings of this study align with earlier research emphasizing the central role of digital platforms like Google Meet in democratizing access to education (Google, 2021), particularly in regions with limited educational infrastructure. Alam and Mohanty (2024) also highlight the role of synchronous video learning in fostering interactive experiences, a point echoed by this study's participants.

The dependence on smartphones is consistent with observations by the World Bank (2022), which noted the prevalence of mobile phone use in low-income and developing regions due to their cost-effectiveness. But this research shows that using smartphones to do complex academic projects is hard due to their limited features.

Similar to Kundu (2022) and Badiuzzaman et al. (2021), this study reinforces the impact of socio-economic inequalities and unreliable internet infrastructure on digital learning adoption. The findings also support Smith and Jones (2020), who argue that digital literacy gaps, particularly among users with lower education, remain a critical barrier.

Despite the Indian government's push for gender equity in education (Kundu, 2022), this study reveals a higher rate of female participation (70%), indicating positive progress in female engagement. Even so, it would be beneficial to investigate why this trend is happening.

C. Implications of the Study

- From a policymaker's perspective, the findings clarify that internet packages and computer devices should be made more available to lower-income people.
- Teacher training programs should include up-to-date technology and effective ways to teach students who are not all alike.
- For those who build platforms: When YouTube and Google Classroom are not suitable for many students, it is important to improve their digital platforms to make them simpler to use.
- Equity considerations are supported in the study, which highlights the importance of finding ways to support students with little to no educational background and unreliable internet access, thus making information available to everyone.

6. CONCLUSION

The study has found that many socio-technological patterns play a big role in digital learning in West Bengal's municipal regions. According to the research, Google Meet is the most popular tool for online classes, most users are Android smartphone owners and there are clear differences based on the participants' income, gender and education. Although digital sites make education possible for many, certain people still struggle because of money, unreliable internet and a lack of devices. In addition, learners with higher qualifications seem to use digital tools more often, even though YouTube and Google Classroom are rarely used.

This research adds to existing studies on digital education by giving special insights from a local authority during the COVID-19 pandemic. It allows us to understand better how social, economic and

infrastructure-related things impact the adoption of digital learning in semi-urban and urban fringe communities. Digital inequality needs to be tackled with actions on technology as well as changes in society, the economy and education. As a result of looking into platform details, habits and who uses them, the study gives meaningful advice to education leaders, administrators and industries below:

Recommendations for Future Research

1. After the pandemic, future research should examine digital learning outcomes for a longer period to find out how continuous access to technology affects students' future success.
2. Research should consider looking at regions that are rural or urban, as this could offer a better understanding of digital education everywhere.
3. If researchers conduct in-depth qualitative studies, they may gain deeper insights into what users feel, think and face.
4. Research into what educators face is important too, including how they feel prepared, what help they may need and what challenges they encounter in digital learning settings.
5. A further study should analyze the success of various platforms and tools in promoting learning, remembering lessons and ease of use, especially among people who are not proficient with technology.

To sum up, for digital learning to be effective for everyone, making technology accessible to all is very important. Policymakers must prioritize the development and maintenance of comprehensive technological infrastructure, including reliable internet access, upgraded platforms, and strong cybersecurity (Alam & Mohanty, 2024). Setting up a strong digital system at schools could allow everyone to access technology with ease. Bringing every student into the digital era will require governments, companies, institutions and communities to all work together.

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