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An Interactive File Sharing System to Support Collaborative Learning and Resource Management Among University Faculty and Students

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ABSTRACT

The COVID-19 pandemic accelerated the shift to remote learning, exposing the need for accessible and efficient file-sharing systems in academic environments. This study presents the development of a web-based interactive file-sharing system designed to support collaborative learning and resource management among university faculty and students. The system allows authorized users to upload, access, and organize learning materials while enabling communication through forums and messaging features. Developed using the Agile methodology and evaluated through descriptive research, the system was assessed in terms of accessibility, understandability, portability, and security. Results from 100 respondents showed consistently high ratings, with an overall mean score of 4.80. The findings affirm the system's usability and effectiveness as a practical tool for academic content sharing and communication.

INTRODUCTION

The demand for accessible digital learning tools has significantly grown, especially in higher education institutions. With the rise of blended and remote learning models, universities are now challenged to deliver educational content efficiently and inclusively. Central to this challenge is the need for platforms that allow seamless file sharing, resource organization, and communication between faculty and students.

In many academic settings, students rely on fragmented methods—such as messaging apps or email—for receiving assignments and lecture materials. These approaches often lack structure, security, and collaboration features. This study introduces a web-based file-sharing system designed specifically for the academic environment, with the goal of improving the delivery and management of learning resources. The system supports uploading, downloading, and organizing educational content and includes communication features such as forums and messaging to foster collaboration.

This paper details the development, implementation, and evaluation of the system using descriptive and applied research methods. It aims to offer an efficient solution for managing academic resources and improving interaction among users within a university context.

REVIEW OF RELATED LITERATURE

Various digital tools have been developed to support online learning, with file-sharing platforms playing a critical role in bridging the gap between educators and learners. Systems such as Google Classroom, Moodle, and Edmodo are widely used for their content delivery and classroom management features. However, these platforms often come with complex interfaces or functionalities that may not be necessary for all users, especially in localized academic settings.

For instance, Google Classroom integrates tightly with Google's ecosystem, offering robust features for assignments and grading but may overwhelm users with limited digital literacy or internet access. Moodle, while flexible and customizable, requires institutional support for hosting and maintenance. In contrast, this

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study's proposed system emphasizes simplicity, accessibility, and core file-sharing functionality, focusing on streamlined content delivery and ease of use. Unlike generalized platforms, it is designed specifically for internal use within the Nueva Ecija University of Science and Technology (NEUST), ensuring alignment with the institution's needs.

Haleem et al. (2022) emphasize the importance of knowledge exchange through digital systems, noting that user engagement and platform usability are critical success factors. Similarly, Mishra (2020) underlines the growing need for adaptive tools during crises such as the COVID-19 pandemic, where remote access and minimal learning curves become essential. Harasim (2012) also emphasizes the role of online collaborative learning theory in structuring effective digital education environments. In a broader theoretical lens, Siemens (2005) introduces connectivism as a modern learning framework grounded in the digital age. These theories support the collaborative and user-driven design of the proposed system.

In addition, Al-Fraihat et al. (2020) present empirical evidence on the critical success factors of e-learning platforms, including satisfaction, usability, and technological quality, while Sun et al. (2008) highlight learner satisfaction as a key factor for sustained system use. These perspectives are valuable in guiding the evaluation and continuous improvement of the system. Moore et al. (2011) further distinguish e-learning, online learning, and distance learning, contributing clarity to the system's positioning within the broader spectrum of technology-enabled education.

By comparing existing systems and recognizing their limitations, the proposed platform distinguishes itself through a context-specific approach that integrates necessary academic functions while maintaining ease of access and navigation.

Statement of the Problem

This study aims to develop an Interactive file-sharing system to Support Collaborative Learning and Resource Management Among University Faculty and Students. Specifically, this study seeks to answer the following questions:

How may the proposed Web application be developed in terms of:

- Planning
- Analysis
- Design
- Coding
- Testing
- Implementation
- Maintenance

How may the proposed system be evaluated by the group of respondents, as applied in terms of the following:

- Accessibility
- Understandability
- Portability
- Security

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What is the recommendation of the respondents to improve the proposed Interactive File Sharing System to Support Collaborative Learning and Resource Management Among University Faculty and Students?

Objectives of the study

This project aims to develop an Interactive file-sharing system to Support Collaborative Learning and Resource Management Among University Faculty and Students. Specifically, this study has the following objectives:

To create an organized list of teachers' files and teaching materials that users can download.

To provide a quick, accessible, and user-friendly online file-sharing system.

To develop a website that has the capability to modify information details by the authorized user(s).

To create a website where students and teachers alike can interact through forums and a chat box.

Method of Research Used

The methods adopted by the proponent in this study are descriptive and applied research methods.

The project method is a form of systematic inquiry involving the practical application of science. It accesses and uses some part of the research communities' accumulated theories, knowledge, methods, and techniques, for a specific, often state-, business-, or client-driven purpose. It contrasted with pure research (basic research) in discussion about research ideals, methodologies, programs, and projects.

Applied research deals with solving practical problems and generally employs empirical methodologies. Because applied research resides in the messy real world, strict research protocols may need to be relaxed. For example, it may be impossible to use a random sample. Thus, transparency in the methodology is crucial. Implications for the interpretation of results brought about by relaxing an otherwise strict canon of methodology should also be considered.

Respondent Profiles

This section presents the demographic characteristics of the respondents who participated in the evaluation of the Web-Based Teacher–Student File Sharing System. The respondents were selected from Nueva Ecija University of Science and Technology and consisted of both faculty members, MIS staff, and students. Their profiles provide essential context for interpreting the assessment results and understanding the system's relevance to its intended users.

Table 1. Demographic Profile of Respondents

Category	Frequency	Percentage
Students	60	60%
Faculty	20	20%
IT Expert	20	20%
Male	68	68%
Female	32	32%
Age 18–25	70	70%

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Age 26 and above	30	30%
Total	**100**	**100%**

Research Locale

The project was held at Nueva Ecija University of Science and Technology, Cabanatuan City. The testing of its used was also held at the said university with the help of the teachers and the students that served as the testers of the system.

Figure 2. Nueva Ecija University of Science and Technology Sumacab Campus, Sumacab Este, Cabanatuan City

The Agile method/Web Development Life Cycle framework will be used by the developer in this study. A methodology should be followed in developing a software project to ensure the project's consistency, completeness, and effectiveness.

The Web Development Life Cycle includes the following phases: planning, analysis, design, coding, testing, implementation, and maintenance. Each phase itself is composed of a series of steps that rely on techniques.

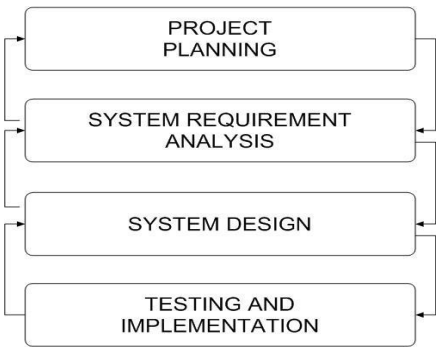

Figure 2 - WDLC Model

RESULT AND DISCUSSION

This study involved the following phases of the Web Development Life Cycle: Planning, Analysis, Design, Coding, Testing, Implementation, and Maintenance.

Planning

For the planning phase, the developer explained why this project should be built and how they will go about building it. The developer planned first for what was needed and what would be the best approach for the project.

Analysis

The Web-Based Teacher-Students File Sharing System has been developed and designed for students of the said university. The project served as a repository for the lectures, presentations, and other teaching materials that the teacher could provide for their students.

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The developer identified and specified the platform to be used and specified the system's features and functionalities. And related reviews as an additional source of information concerning the title content and project, which is essential to the study.

Design

In the design phase, the developer mainly discussed what the web application would look like. Here, the developer would draw some proposed designs on paper or generate them digitally. Once it was agreement on how the user interface would work, the developer made it into a prototype to see how it would look on web browsers and such. The developer tweaked the design as needed.

The developer also discussed what the web application will look like and how it will be responsive across different devices. The interface design specified how the users would move through the system.

This phase included the database together with normalization, data flow diagram, use case, and entity relationship diagram to determine exactly how the system would operate.

Data Flow Diagram

The figure below shows the data flow diagram of the Web Based Teacher-Students File Sharing System.

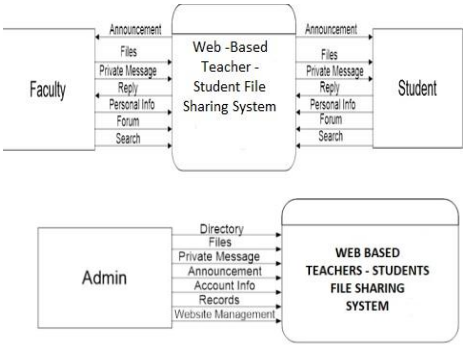

Figure 3. Context Diagram

Database Normalization

The table above shows the normalized forms of the database that the developers had used for the system. It is the visual form of the three normalized forms of all the tables that are included in the database of information.

UNNORMALIZED	
user_id	course
username	file
password	forum_id
email	
fname	
lname	
address	
gender	
atype	
profile_picture	
cover_picture	
position	
id_num	
post_id	
content	
date_created	
comment_id	
date_posted	
subject	
pm_id	
date_sent	
file_id	
file_type	
file_size	
notif_id	
message	

1NF	
*USER	*POST
user_id	post_id
username	content
password	date_created
email	comment_id
fname	date_posted
lname	ann_id
address	time_sent
gender	message_id
atype	date_sent
profile_picture	forum_id
cover_picture	category
position	
id_num	
course	
*TBL_UPLOADS	
file_id	
file_type	
file_size	
file	

2NF	
*USER	*POST
user_id	post_id
username	content
password	date_created
email	comment_id
fname	date_posted
lname	
address	*MESSAGE
gender	message_id
atype	date_sent
profile_picture	forum_id
cover_picture	category
position	ann_id
id_num	time_sent
*TBL_UPLOADS	
file_id	
file_type	
file_size	
file	

3NF		
*USER	*POST	*CHAT
user_id (PK)	post_id (PK)	user_id (FK)
username	content (FK)	time_sent
password	date_created	content
email	user_id (FK	chat_id (PK)
fname		
lname		*NOTIFICATION
address	*PM	notif_id (PK)
gender	pm_id (PK)	user_id (FK)
atype	user1 (FK)	date_posted(FK)
profile_picture	date_sent	position (FK)
cover_picture	subject	message
position	content	
id_num		
course	*ANNOUNCEMENT	
*TBL_UPLOADS	ann_id (PK)	
user_id (FK)	date_posted	
file_id	content	
file_type	title	
file_size	user_id (FK)	
file		
	*FORUM	
*COMMENT	forum_id (PK)	
comment_id (PK)	user_id (FK)	
post_id (FK)	description	
user_id (FK)	category	
forum_id (FK)		
date_posted		
content		

Figure 4. Normalization

Entity-Relationship Diagram

An Entity Relationship Diagram (ERD) is a specialized graphic that illustrates the relationships between the entities in a database. The figure below shows the relationship of each table used.

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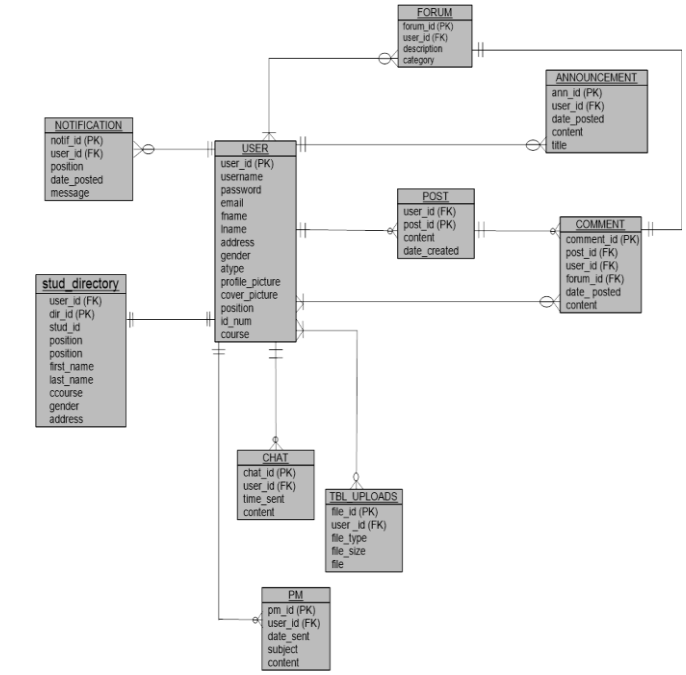

Figure 5. ERD Diagram

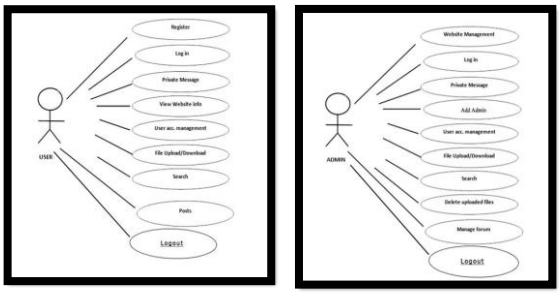

Figure 6. Use Case Diagram

Use Case Diagram

A use case is a software and system engineering term that describes how a user uses a system to accomplish a particular goal. It defines interactions between external actors and the system to attain particular goals. The figure below shows the Use Case diagram of the interaction between the user and the system.

Graphical User Interface

A Graphical User Interface is a visual interface that allows users to interact with electronic devices, software applications, and operating systems through graphical elements such as icons, menus, buttons, and windows. It provides a user-friendly and intuitive way for users to communicate with computers and other devices.

Figure 7. Home Page

The figure above shows the system's main homepage, where users can view the about us page, create and log into their own accounts.

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Figure 8 - Register

The figure above shows the registration form that the user will fill out to create their account.

Figure 13 - Login

The figure above shows the login page where users can log into their own accounts.

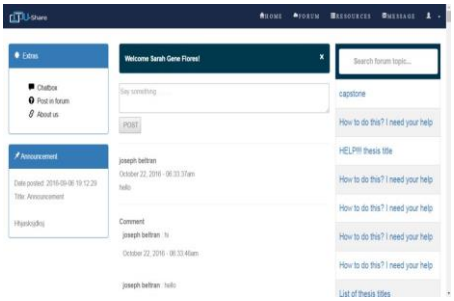

Figure 14 - User Page

The figure above shows the main user page of the system, where users can navigate through the website.

Testing

The following activities were accomplished during the coding phase;

Reviewing for accurate spelling and proofreading content, including page titles.

Checking links to ensure that they are not broken and are linked correctly

Checking graphics to confirm they display properly and are linked correctly.

Testing forms and other interactive page elements.

Testing pages to check for speed of loading on lower speed connection.

Testing each Web in different browser types and versions to verify they display correctly.

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Implementation

During this phase, the system construction takes place. User testing is conducted to assess the efficiency and effectiveness of the system's functionalities. The user interface design has been created, and coding is underway.

The developer evaluated the project using two distinct approaches. Firstly, she employed user testing, where individuals interacted with the web application. After the system's development, the developer assessed the design and functionalities by observing users' interactions to ensure compliance with the functional requirements set by the user.

Secondly, the system was evaluated by the staff or administrator to verify the proper functioning of the written code.

This evaluation preceded the integration of the code into the system.

Assessment of the An Interactive File Sharing System to Support Collaborative Learning and Resource Management Among University Faculty and Students

The assessment was based on the four web characteristics, namely: accessibility, understandability, portability, and security. Tables 1, 2, 3, and 4 show the results of the assessment of the respondents.

Accessibility

Accessibility is a crucial attribute of any web-based system, referring to the ease with which users can access, navigate, and utilize its features. In this study, respondents were asked to evaluate the Web-Based Teacher–Student File Sharing System based on its overall layout, navigation functionality, and the usefulness of internal links. These criteria are essential to ensure that users of varying technical skills can efficiently interact with the platform. Table 2 presents the results of the accessibility assessment.

Table 2: Accessibility Evaluation by Respondents

Criteria	Mean Score	Verbal Interpretation
Standard Layout and Navigation	4.85	Strongly Agree
Easy Site Navigation	4.90	Strongly Agree
Helpful Internal Links	4.80	Strongly Agree
Overall Mean	**4.85**	**Strongly Agree**

As shown in Table 2, the respondents strongly agreed that the system is highly accessible. The highest rating was given to the item "Easy Site Navigation" with a mean score of 4.90, indicating that users found it easy to move around and locate content within the platform. The criteria "Standard Layout and Navigation" and "Helpful Internal Links" also received high scores of 4.85 and 4.80, respectively, reflecting a consistent and user-friendly interface. The overall mean score of 4.85 reinforces the finding that the system's design promotes efficient user interaction and meets accessibility expectations for both students and teachers.

Understandability

Understandability refers to how easily users can comprehend and navigate the content and layout of the system. For a web-based platform to be effective, its content must be clear, logically organized, and visually distinguishable. In this evaluation, respondents were asked to assess whether the system's textual content was

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readable and understandable, whether the information was well-labeled and structured, and whether graphics and files were clearly identified. The summary of their responses is presented in Table 3.

Table 3: Understandability Evaluation by Respondents

Criteria	Mean Score	Verbal Interpretation
Content is readable and Understandable	4.90	Strongly Agree
Information is clearly labeled and organized.	4.75	Strongly Agree
Graphics and files are clearly identified.	4.85	Strongly Agree
Overall Mean	**4.83**	**Strongly Agree**

As shown in Table 3, the respondents strongly agreed that the Web-Based Teacher–Student File Sharing System is understandable and user-friendly. The item "Content is readable and understandable" received the highest mean score of 4.90, indicating that the users found the text highly comprehensible. The criteria "Graphics and files are clearly identified" and "Information is clearly labeled and organized" also received high mean scores of 4.85 and 4.75, respectively. These results suggest that the system presents its content in a clear and structured manner, making it easy for users to navigate and retrieve relevant information. The overall mean score of 4.83 confirms the respondents' strong positive perception of the system's understandability, which is essential in enhancing user experience and learning efficiency.

Portability

Portability refers to the system's ability to function effectively across various platforms, devices, and browser environments. In this study, the evaluation focused on how well the Web-Based Teacher–Student File Sharing System adapts to different technological settings. The respondents were asked to assess whether the system could be browsed using the latest versions of popular web browsers, whether it displayed properly on various devices, and if it could accommodate the functional requirements of users from the Nueva Ecija University of Science and Technology. The results of their evaluation are presented in Table 4.

Table 4: Portability Evaluation by Respondents

Criteria	Mean Score	Verbal Interpretation
The System can be browsed with the latest version of the browser	4.75	Strongly Agree
The system can be viewed with different types of devices	4.90	Strongly Agree
The system is flexible, which could meet the requirements of the respondent	4.80	Strongly Agree
Overall Mean	**4.81**	**Strongly Agree**

Based on Table 4, the respondents strongly agreed that the system performed well in terms of portability. It can be accessed using the latest browsers, viewed on various devices such as laptops, tablets, and smartphones, and is flexible enough to meet institutional requirements. The overall mean score of 4.81 further affirms the system's cross-platform compatibility and usability.

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Security

Security addresses the system's ability to protect data integrity, ensure user accountability, and restrict unauthorized access. For the Web-Based Teacher–Student File Sharing System, respondents evaluated three key aspects: (1) whether user actions can be uniquely traced or accounted for, (2) whether the platform reliably identifies users and resources, and (3) whether it effectively prevents unauthorized access or data modification. Table 5 summarizes the results of this assessment.

Table 5: Security Evaluation by Respondents

Criteria	Mean Score	Verbal Interpretation
The system can uniquely trace or account for an action or event of an entity	4.50	Strongly Agree
The system can be used to identify its users and resources	4.70	Strongly Agree
The system prevents unauthorized access to information resources or modification of data	4.90	Strongly Agree
Overall Mean	**4.70**	**Strongly Agree**

Table 5 shows that respondents strongly agreed on the overall security of the system, yielding an overall mean of 4.70. The highest rating, 4.90, was given to "The system prevents unauthorized access to information resources or modification of data," indicating strong confidence in the platform's safeguards against intrusion and tampering. The criterion "The system can be used to identify its users and resources" also received a very high mean score of 4.70, reflecting reliable authentication and resource management mechanisms. Meanwhile, "The system can uniquely trace or account for an action or event of an entity" garnered a mean score of 4.50, still within the "Strongly Agree" range but comparatively lower, suggesting that audit-trail features could be further enhanced for even more granular accountability. Overall, these findings affirm that the system has robust security controls that satisfy user expectations for protecting sensitive educational data.

To provide a comprehensive view of the system's overall performance, the average scores of all four evaluation criteria—accessibility, understandability, portability, and security—were summarized. This summary reflects the general perception of the respondents regarding the Web-Based Teacher–Student File Sharing System's usability, functionality, and reliability. Table 6 presents the consolidated evaluation results based on the assessments provided by the respondents.

Table 6: Summary of Evaluation by Respondents

Criteria	Mean Score	Verbal Interpretation
Accessibility	4.85	Strongly Agree
Understandability	4.83	Strongly Agree
Portability	4.81	Strongly Agree
Security	4.70	Strongly Agree
Overall Mean	**4.80**	**Strongly Agree**

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As reflected in Table 6, the Web-Based Teacher–Student File Sharing System received consistently high ratings across all evaluated categories. Accessibility scored the highest with a mean of 4.85, indicating that users found the system easy to navigate and interact with. Understandability and Portability followed closely with mean scores of 4.83 and 4.81, respectively, highlighting the system's clarity of content and compatibility with various devices and browsers. Security, although slightly lower at 4.70, still received a "Strongly Agree" interpretation, signifying user confidence in the platform's protective features. The overall mean score of 4.80 demonstrates that the system is well-received by its users and is considered highly effective in supporting collaborative learning and resource management among faculty and students.

CONCLUSION

The emergence of the Web-Based Teacher-Student File Sharing System has been particularly significant during the COVID-19 pandemic, as it has served as a crucial tool in enabling remote education. With schools and universities transitioning to online learning, this file-sharing system has provided a platform for teachers and students to share and access educational materials regardless of physical distance. (Mishra, 2020) (Mishra, Online Teaching-Learning in Higher Education during Lockdown Period of COVID-19 Pandemic, 2020) One of the primary advantages of this system is its ability to facilitate the seamless sharing of teaching materials. Teachers can easily upload lecture notes, presentations, assignments, and other relevant resources to the system, making them readily available to students. This ensures that students have continuous access to educational materials, even outside the traditional classroom setting. As a result, learning can take place anytime and anywhere, accommodating different schedules and allowing for self-paced learning.

Furthermore, the system supports effective communication between teachers and students. Through features such as private messaging and forums, teachers can provide individualized support, answer questions, and engage in discussions with students. This fosters a sense of community and collaboration, creating an interactive learning environment even in the virtual space. Another significant advantage of the system is its ability to support personalized learning experiences. Students can access the materials that align with their specific needs, interests, and learning styles. They can review the content at their own pace, replay lectures if needed, and delve deeper into the topics that interest them. This flexibility promotes autonomy and empowers students to take ownership of their learning journey.

Looking ahead, it is clear that the Web-Based Teacher-Student File Sharing System will continue to be an invaluable tool in education. Even beyond the pandemic, it offers numerous benefits such as enhancing education accessibility and flexibility. Students in remote areas or with physical limitations can still access quality educational resources. Moreover, the system allows for the integration of multimedia elements, interactive features, and adaptive learning technologies, further enhancing the learning experience.

In conclusion, the Web-Based Teacher-Student File Sharing System has revolutionized education during the pandemic by enabling seamless sharing of teaching materials, promoting effective communication, and supporting personalized learning experiences. Its impact will continue to be felt as it contributes to enhancing education accessibility and flexibility, ensuring that education remains resilient and adaptable to future challenges.

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