A Structural Equation Model of School Project Success of Public Schools in Soccsksargen, Philippines

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ABSTRACT

School project success remains a significant challenge in many educational institutions. Unsuccessful projects and inconsistencies in achieving desired outcomes are common issues that hinder the effective implementation of school initiatives. The prevalence of incomplete or underperforming projects underscores the persistent difficulties faced by schools in ensuring the success of their endeavors. This study aimed to determine a structural model of school project success by examining the project management, complexity management and project management competencies of public schools in SOCCSKSARGEN, Philippines. It employed a quantitative research predictive design with a descriptive-correlational approach and Structural Equation Modeling, using adapted questionnaires for endogenous and exogenous variables. This study collected data from 400 respondents selected through purposive sampling guided with criteria. Data analysis included mean computation, correlation, multiple regression, and SEM. Model 1 emerged as best-fit for Structural Functional Theory, demonstrating that cohesive management practices—specifically in project management, complexity management, and competencies—significantly influence school project success. The indices for CMIN/DF (1.16), p-value (0.28), NFI (0.99), TLI (0.99), CFI (1.00), GFI (0.99), RMSEA (0.02), and p-close (0.49) were all within the standard criteria, confirming the model's validity. Cohesive and well-integrated management practices are essential for achieving successful outcomes in school projects. By developing more forceful approaches to managing project complexities and enhancing the skills of project managers, schools can significantly improve overall project outcomes and better achieve their objectives.

Keywords: Project management, complexity management, project management competencies, school project success

INTRODUCTION

School project success remains a significant challenge in many educational institutions worldwide, with numerous projects failing to meet their intended goals or achieving inconsistent outcomes. Issues such as poorly executed initiatives, insufficient projects to address school needs, and incomplete or underperforming efforts persist across various countries (Ika & Donnelly, 2017; Samset & Volden, 2016). These challenges highlight the need for improved strategies and frameworks to ensure that educational projects deliver meaningful and sustainable results.

The struggle for consistent school project success is evident globally. In the United States, many school projects fall short of their objectives, yielding inconsistent outcomes (Newfield, 2018). Similar issues are observed in countries like Nigeria, where incomplete or underperforming projects are prevalent (Glyptis et al., 2020), and India, where unmet goals and execution failures are common (Mohanty et al., 2020). In the Philippines, particularly in Region XII, challenges such as delays, inconsistencies, and incomplete projects hinder the effective delivery of educational initiatives (Domingo & Reyes, 2017; Libdan et al., 2023). These shared difficulties emphasize the need for targeted solutions to improve project outcomes.

Failure to address these problems can result in inefficiencies that undermine the educational system and impede student learning and engagement (Marzagão & Carvalho, 2016). In Region XII, the inability to achieve successful project outcomes risks missing opportunities to enhance educational quality and maximize the potential of school initiatives (Baluran, 2023). This study underscores the urgency of identifying effective strategies for overcoming these challenges, as addressing them could lead to more sustainable projects that positively impact both educators and students (Englund & Graham, 2019).

Statement of the Problem

This study aimed to determine the structural model of School Project Success as attributed by Project Management, Complexity Management, and Project Management Competencies of Public Schools in Region XII. Specifically, this study focused on the following objectives:

1. To determine the level of Project Management of Public Schools in SOCCSKSARGEN Philippines as perceived by the teachers in terms of: integration management, scope management, time management, cost management, quality management, human resource management, communication management, risk management, procurement management, stakeholder management, and process group. The level of Complexity Management of Public Schools SOCCSKSARGEN Philippines as perceived by the teachers in terms of: structural complexity, sociopolitical complexity, and emergent complexity. The level of Project Management Competencies of Public Schools in SOCCSKSARGEN Philippines as perceived by the teachers in terms of: initiation, planning, execution, monitoring and controlling, closing, leading, communicating, managing, cognitive ability, effectiveness, and professionalism. And the level of School Project Success of Public Schools in SOCCSKSARGEN Philippines as perceived by the respondents in terms of: schedule, cost, quality, performance, safety, and operating environment.
2. To determine the significant relationship between the independent variable such as Project Management, Complexity Management, and Project Management Competencies and the dependent variable, School Project Success of Public Schools in Region XII.
3. To determine the significant influence on the independent variable such as Project Management, Complexity Management, and Project Management Competencies to the dependent variable, School Project Success of Public Schools in Region XII.
4. To determine the best fit model that explains the Project Success of Public Schools in Region XII.

Theoretical Framework

This study is anchored on Herbert Spencer's Structural Functional Theory (1903), which asserts that society operates as a complex system composed of interdependent parts working together to maintain stability and achieve common goals. Schools, as social systems, rely on the effective functioning of their various components to ensure the success of their initiatives. Spencer's theory highlights the importance of coordination and collaboration, emphasizing that the achievement of organizational objectives depends on how well its elements interact and contribute to the overall system's efficiency.

School projects often face complexities stemming from diverse stakeholder expectations, limited resources, and varying educational priorities. Complexity management involves identifying and mitigating these complexities to prevent project delays and budget overruns. Effective complexity management strategies enable project managers to break down complex tasks into manageable components and anticipate potential challenges (Too & Weaver, 2018). This approach aligns with Spencer's theory by ensuring that the school system functions cohesively despite inherent complexities.

Project management competencies encompass a range of skills and attributes essential for effective project leadership. These competencies include communication, leadership, technical skills, and strategic thinking, among others (Project Management Institute, 2017). Research indicates that competent project managers can navigate project complexities, foster collaboration among stakeholders, and make informed decisions to

optimize project outcomes (Müller & Turner, 2017). Spencer's theory supports the idea that competent individuals within the school system contribute to its overall functionality and success.

Applying Spencer's Structural Functional Theory to school project management underscores the interconnectedness of project management practices, complexity management, and project management competencies in achieving project success. By viewing these elements as integral parts of a larger social system (the school), the theory highlights how effective coordination and alignment among these factors enhance the likelihood of successful project outcomes.

METHODOLOGY

This study employed a predictive design using Structural Equation Modeling (SEM) to examine the relationships among project management, complexity management, project management competencies, and school project success in public schools. The predictive approach focused on determining the levels of practices related to these variables and their associations, while the correlational aspect aimed to investigate the links among them without implying causality. The study identified project management, complexity management, and project management competencies as exogenous variables influencing the endogenous variable of project success. It employed a quantitative research predictive design with a descriptive-correlational approach and Structural Equation Modeling. It characterized the processes and practices in public schools based on literature-supported indicators and surveyed the population to gather data. Correlation was deemed the most suitable design for exploring these relationships and predicting outcomes based on existing knowledge. SEM, a robust multivariate technique combining factor and regression analyses, was selected as the best-fit model due to its ability to analyze complex relationships and assess direct and indirect effects, making it ideal for evaluating multivariate causal linkages in this context.

Region XII, also known as SOCCSKSARGEN, is located in south-central Mindanao and comprises South Cotabato, Cotabato, Sultan Kudarat, Sarangani, and General Santos City, known for its cultural diversity, scenic landscapes, and economic contributions in agriculture and industry. This study focused on public schools within the school divisions of Sarangani, General Santos, South Cotabato, Sultan Kudarat, and Tacurong, excluding independent unit schools not managed by division offices. These schools, supervised by division superintendents, are committed to delivering quality, free, and inclusive education aligned with R.A. 10533 (the K to 12 Law) and DepEd's vision-mission. They were selected based on specific criteria relevant to the study, reflecting the region's emphasis on improving educational access and quality through initiatives like inclusive education, technical-vocational training, and cultural integration.

This study collected responses from DepEd-managed schools in Region XII, focusing on those with recent projects funded by school funds or the Special Education Fund (SEF). A purposive sampling technique was used guided by the criteria set by the researcher. From the five DepEd schools division of Region XII, 400 respondents were selected, including teachers and staff directly involved in resource management, procurement, and decision-making processes. Key participants, such as supply officers, canvassers, purchasers, and teachers' association leaders, were chosen based on their expertise and experience as identified by their school head. Criteria for selection included regular/permanent employment with DepEd Sarangani, a minimum of three years of service at the school, participation in project implementation committees for three consecutive years, and willingness to participate in the study. The data was collected from the answers of the respondents in the questionnaire. This purposive approach ensured the inclusion of respondents whose insights were most relevant to the research objectives.Top of FormBottom of Form

This study adapted and modified survey instruments from standardized tools provided by the Project Management Institute (PMI) to evaluate project management competencies, complexity management, and their relationship to school project success in Region XII. Key instruments included the Project Management Competencies Questionnaire (PMCQ) and the Complexity Assessment Tool (CAT), adjusted for cultural and situational relevance. A five-point Likert Scale was used for data interpretation, and the instruments underwent expert validation, pilot testing, and reliability testing. Using the Cronbach Alpha coefficient as a prevalent

method for assessing instrument reliability, the research tools were distributed to 30 teachers and staff. While some studies advocate for a minimum Cronbach Alpha threshold of 0.75 (Kennedy, 2022), other viewpoints suggest a standard as low as 0.60 (Trizano-Hermosilla & Alvarado, 2016). Considering these perspectives, the researcher opted for a conservative threshold of 0.70 Cronbach Alpha to ensure robustness in measurement. The administered questionnaires demonstrated good reliability, with Cronbach's Alpha coefficients of 0.883 for the endogenous variable, 0.868 for the exogenous variable, and 0.915 for the combined variables. This high level of reliability enhanced the trustworthiness of the study's results, indicating that the instruments used were reliable measures for assessing the targeted variables. Following these processes, revisions and modifications were made to certain items in the questionnaires. After incorporating corrections, comments, and suggestions from validators, the final questionnaires were prepared for administration.

Data collection for this study was meticulously conducted in public schools within the SOCCKSARGEN Division, following a structured process. After dissertation approval, the researcher obtained ethical clearance and necessary endorsements from institutional and education authorities, culminating in permissions from school heads. Informed consent was prioritized, with respondents oriented towards the study, potential risks, and their rights, including confidentiality and voluntary participation. Face-to-face data collection occurred in private, convenient settings, and the researcher personally distributed and retrieved all questionnaires to ensure oversight. Completed data were securely tabulated, analyzed using advanced software, and safeguarded through strict confidentiality measures, with physical and electronic copies securely destroyed after the study's completion.

The study employed statistical tools to analyze and interpret data effectively. The mean was used to measure the central tendency, providing insights into the levels of project management, complexity management, project management competencies, and project success in public schools in Region XII. The Pearson Product-Moment Correlation Coefficient assessed the strength and significance of relationships between project management, complexity management, project management competencies, and project success, using a p-value threshold of 0.05. Multiple regression analysis was conducted to identify which exogenous variable best predicted the endogenous variable, addressing key research questions.

When identifying the best-fit model in structural equation modeling (SEM) or similar statistical analyses, several key indices are used to evaluate model fit. The **CMIN/DF** (chi-square/degrees of freedom) should be below 5.0 to indicate a reasonable fit between the model and the data. A **p-value** greater than 0.05 suggests that the model's fit is not significantly different from the observed data, supporting its adequacy. Indices like **NFI** (Normed Fit Index), **TLI** (Tucker-Lewis Index), **CFI** (Comparative Fit Index), and **GFI** (Goodness of Fit Index) all need to exceed 0.95 to demonstrate an excellent model fit. The **RMSEA** (Root Mean Square Error of Approximation) should be less than 0.05, indicating minimal error in approximation, and a **p-close** value greater than 0.05 further confirms a close fit to the data. These combined thresholds ensure the model is both statistically robust and practically relevant (Rabe-Hesketh, S., et.al., 2004).

The study addressed potential risks to participants by implementing strict health protocols and emphasizing informed consent to ensure transparency and fairness. Privacy was safeguarded through data anonymization, and ethical sampling methods were employed to avoid bias. Cultural sensitivities and community traditions were respected, adhering to the ethical guidelines of SMILE at Holy Cross of Davao College Inc.

RESULTS

The data provides a detailed quantitative assessment of respondents' perceptions regarding project management, complexity management, and project success in public schools within Region XII. The overall high mean scores, ranging from 4.12 to 4.23, indicate that respondents perceive project management practices, competencies, and school project success as excellent or very good. Procurement management and structural complexity received the highest ratings, suggesting excellence in these areas, while communication management and emergent complexity scored slightly lower, yet still reflect very good perceptions.

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Similarly, project management competencies like closing a project and indicators of project success, such as cost management, are highly rated, signifying their effectiveness. While quality and initial project stages received comparatively lower scores, these still reflect a strong positive perception. The findings underscore robust project and complexity management practices in Region XII, demonstrating effective implementation and favorable outcomes as observed by respondents.

Table 1: Descriptive Levels

Variables	**Mean**	**Description**
Project Management	4.23	Very High
Integration Management	4.01	High
Scope Management	4.35	Very High
Time Management	4.15	High
Cost Management	4.15	High
Quality Management	4.37	Very High
Human Resource Management	4.44	Very High
Communication Management	3.67	High
Risk Management	4.2	Very High
Procurement Management	4.46	Very High
Stakeholder Management	4.24	Very High
Process Groups	4.24	Very High
Complexity Management	4.22	Very High
Structural Complexity	4.26	Very High
Socio-Political Complexity	4.2	Very High
Emergent Complexity	4.19	High
Project Management Competencies	4.12	High
Initiating a Project	4.09	High
Planning a Project	4.09	High
Executing a Project	4.09	High
Monitoring and Controlling a Project	4.1	High
Closing a Project	4.15	High
Leading	4.12	High
Communicating	4.12	High
Managing	4.12	High
Cognitive Ability	4.12	High
Effectiveness	4.1	High
Professionalism	4.12	High
School Project Success	4.2	Very High
Schedule	4.29	Very High
Cost	4.42	Very High
Quality	4.05	High
Performance	4.13	High
Safety	4.28	Very High
Operating Environment	4.1	High

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The analysis revealed significant relationships between project management, complexity management, project management competencies, and school project success, as all computed p-values were 0.000, well below the 0.05 threshold. While project management exhibited a statistically significant relationship with school project success, the weak correlation coefficient (r = 0.206) indicated minimal practical impact. Conversely, complexity management demonstrated a robust positive relationship with school project success, supported by a strong correlation coefficient (r = 0.903), highlighting its critical role in project success. Similarly, project management competencies showed an even stronger positive correlation (r = 0.923), underscoring their substantial influence on successful project outcomes. These findings emphasize the varying degrees of impact that different managerial factors have on the success of school projects, with complexity management and competencies playing more pivotal roles than general project management practices.

Table 2: Table of Correlation

Variable	**r**	**p-value**	**Decision on H_0**	**Interpretation**
Project Management	0.206	0	Reject	Significant
Complexity Management	0.903	0	Reject	Significant
Project Management Competencies	0.923	0	Reject	Significant

The regression model demonstrated strong explanatory power, with an R^2 value of 0.930, indicating that the independent variables accounted for 93% of the variance in school project success. Statistically significant results (F-value of 1756.94, p-value of 0.000) confirmed the model's effectiveness. The analysis revealed significant relationships between project management, complexity management, and project management competencies, all positively impacting project success. Specifically, project management had a coefficient of 0.09, complexity management 0.36, and project management competencies 0.44, all with p-values of 0.00, suggesting direct and meaningful influences. However, the remaining 7% variance points to other factors that should be explored in future research.

Table 3: Table of Degree of Influence

School Project Success							
		Unstandardized				**Standardized**	
		Coefficients				**Coefficients**	
	B	**Std Error**	**B**	**t**	**Sig**	**Decision on Ho**	**Interpretation**
Constant	0.49	0.11		4.6	0		
Project Management	0.09	0.03	0.05	3.84	0	Reject	Significant
	0.36	0.02	0.44	19.79	0	Reject	Significant
Project Management Competencies	0.44	0.02	0.56	25.37	0	Reject	Significant

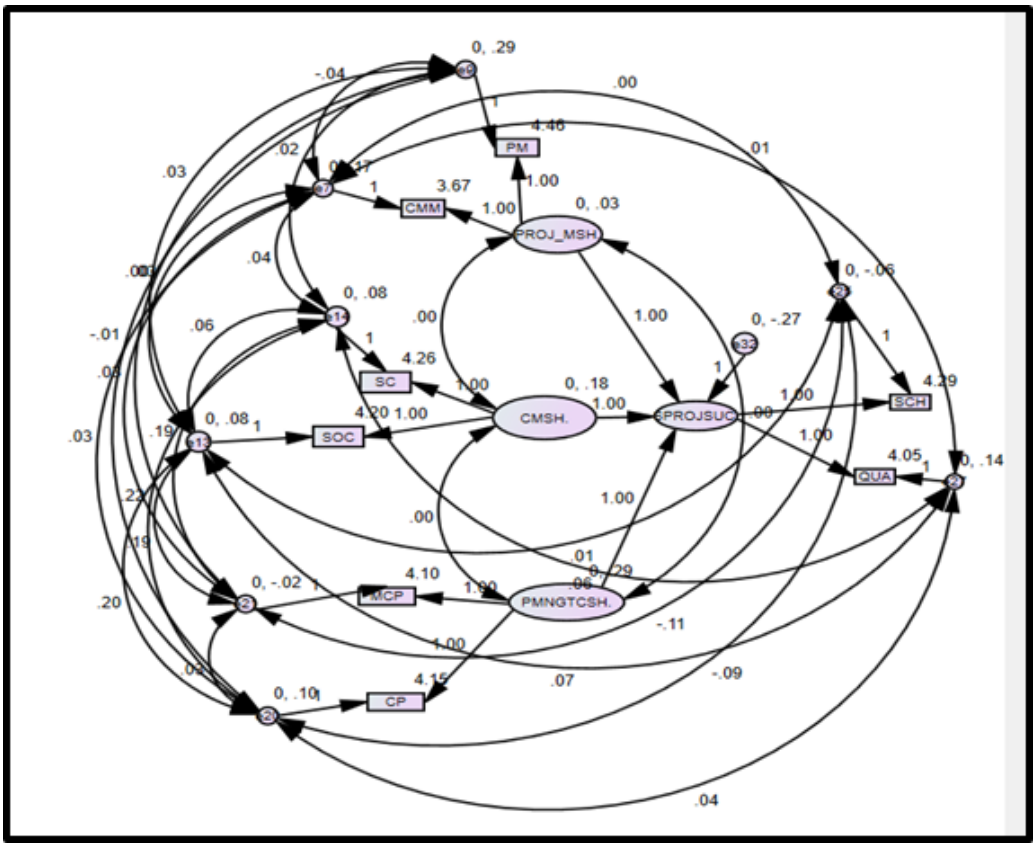
R= 0.964; R^2 = 0.93; F-value= 1756.94; p-value= 0.000

Among the five hypothesized models, Model 1 emerged as the best fit based on various goodness-of-fit indices, including CMIN/DF (1.16), P-VALUE (0.28), NFI (0.99), TLI (0.99), CFI (1.00), GFI (0.99), RMSEA (0.02), and P-CLOSE (0.49), all of which met the acceptable range for the standard criteria. In contrast, Models 2, 3, 4, and 5 demonstrated poor fits, with high CMIN/DF values and low NFI, TLI, CFI, and GFI scores, as well as high RMSEA values, indicating poor model fit. Additionally, these models all had P-CLOSE values of 0.00, further confirming their inadequacies.

Table 4: Best Fit Model for Project Success

			MODEL			
INDEX	**CRITERION**	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**
CMIN/DF	<5	1.16	16.01	17.018	18.45	17.11
P-VALUE	>0.05	0.28	0	0	0	0
NFI	>0.95	0.99	0.91	0.89	0.88	0.89
TLI	>0.95	0.99	0.8	0.79	0.77	0.78
CFI	>0.95	1	0.91	0.89	0.89	0.89
GFI	>0.95	0.99	0.87	0.83	0.86	0.86
RMSEA	<0.05	0.02	0.19	0.2	0.21	0.2
P-CLOSE	>0.05	0.49	0	0	0	0

The best-fit model for school project success in Region XII highlights key relationships among project management, complexity management, and competencies. Project management positively influenced success (β = 1.5, error = 2.3), while complexity management had a negative impact (β = -0.75, error = 0.38), suggesting that increased complexity hinders success. Project management competencies also showed a slight negative effect (β = -0.07, error = 0.18). Significant interrelationships were found: project management negatively correlated with complexity management (-0.49, p = 0.001), complexity management was positively linked to competencies (0.295, p = 0.000), and project management had a negative interaction with competencies (-0.034, p = 0.001).



The figure illustrates the best-fit model for school project success in public schools in Region XII. This model estimated the effects between measured and latent variables using regression weights. Project management has a direct effect on school project success, with an estimated beta of 1.500 (or 1.5) and an error of 2.3. This means that a one-unit increase in project management was expected to enhance school project success by

1.500 or 1.5, considering a margin of error of 2.3. Similarly, complexity management influences school project success, with a beta of -0.754 (or -0.75) and an error of 0.38, suggesting that a one-unit increase in complexity management results in a -0.754 or -0.75 change in school project success, accounting for a margin of error of 0.38. Additionally, project management competencies impacted school project success, with a beta of -0.074 (or -0.07) and an error of 0.18, indicating that a one-unit increase in project management competencies was expected to change school project success by -0.074 or -0.07, with a margin of error of 0.18.

Besides, the model revealed interrelationships among project management, complexity management, and project management competencies. The covariance indicated a significant relationship between project management and complexity management, with an estimated influence of -049, significant at alpha 0.05 (p-value of 0.001). Similarly, the covariance between complexity management and project management competencies showed a significant influence of 0.295 at alpha 0.05 (p-value of 0.000). Additionally, the interaction between project management and project management competencies was also significant at alpha 0.05, with an estimated influence of -0.034 and a p-value of 0.001.

DISCUSSIONS

A significant relationship exists between project management, complexity management, project management competencies, and school project success in Region XII public schools. Although project management itself showed a minimal impact, complexity management and project management competencies had strong positive correlations with success, highlighting their essential role. This supports Structural Functional Theory, originally proposed by Herbert Spencer, which views organizational components like project management as integral to overall stability and success. Effective management of complexities aligns well with Project Success Theory, where adaptability and resilience are crucial for meeting objectives amid challenges, as noted by Müller and Turner (2017). Consequently, project success in schools depends on aligning project activities with organizational goals, managing resources efficiently, and meeting key constraints like time and budget.

The regression analysis findings align with Herbert Spencer's Structural Functional Theory, which views schools as integrated systems where each part contributes to stability and success. According to this theory, project management ensures school projects are effectively planned and executed, with clear goals, efficient resource use, and structured methods essential to success, as noted by Pinto & Slevin (2018) and Joslin & Müller (2016). Complexity management, which addresses challenges like stakeholder expectations and resource limitations, further supports project success, as Too & Weaver (2018) observe, by anticipating issues to avoid delays. Additionally, project management competencies, such as leadership and strategic thinking, are crucial for managing these complexities and fostering collaboration, aligning with Spencer's theory on the interconnectedness of effective management practices in supporting school project outcomes.

The Best Fit Model aligns with Spencer's Structural Functional Theory, viewing schools as cohesive systems where each part contributes to success. It highlights how project management, complexity management, and competencies drive school project success. Complexity management prevents delays and cost overruns, reinforcing system cohesion. Key competencies—communication, leadership, and strategy—aid collaboration, though their impact may be underutilized. Effective management practices ensure proper planning, resourcing, and monitoring, increasing project success. Overall, the model supports Spencer's theory by demonstrating how integrated management fosters successful school projects.

CONCLUSION

It is concluded in this study that among the hypothesized models, Model 1 emerged as the best-fit model vis-a-vis the theory of Herbert Spencer's Structural Functional Theory (SFT). Model 1 obtained the P-value that is not statistically significant. Its independent variables namely, project management, complexity management, and project management competencies have a combined significant degree of influence on school project success. Thus, Model 1 fits the assertion of SFT emphasizing that the achievement of organizational objectives depends on how well its elements interact and contribute to the overall system's

efficiency highlighting the importance of cohesive and well-integrated management practices towards project success.

RECOMMENDATIONS

To advance Sustainable Development Goal 4 (Quality Education), educational leaders should utilize the study's findings to refine project management strategies, aligning school projects with long-term goals and missions. Emphasizing collaboration among faculty, staff, and stakeholders can improve project practices, promoting inclusivity and equity in education. Policymakers are encouraged to integrate complexity management and project management competencies into professional development programs, empowering educators to overcome challenges in project implementation and fostering a more resilient and adaptive education system. These efforts support sustainable development in education, enhancing both local and global outcomes. Future research should investigate the impacts of these practices in diverse educational contexts to further improve school project success and address global educational challenges.

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