JSSER
www.jsser.org

Journal of Social Studies Education Research
Sosyal Bilgiler Eğitimi Araştırmaları Dergisi

2026:17 (2), 88-122

School Environment, Stakeholder Engagement, and Collaborative Service in Preventing High School Dropouts: Evidence from Indonesia

Hermawan[1*], Abd. Qadir Muslim[2], Kadarisman Hidayat[3]

Abstract

High school dropout rates remain a significant issue in education systems globally, undermining students' future opportunities. This study examines the influence of the school environment, the role of stakeholders, and the concept of collaborative service on dropout prevention, focusing on the critical transition from junior high school to senior high school as a critical point for student retention. Utilizing Structural Equation Modeling—Partial Least Squares (SEM-PLS) analysis, data were collected from 100 school principals in Indonesia. The findings include both direct and indirect effects through collaborative service mechanisms. Collaborative service has been shown to play a central role in reducing dropout risk, with key factors including commitment, trust, and data-driven support among stakeholders. However, the empirical role of external stakeholders has not shown a significant effect, highlighting a need for better cross-actor governance. Overall, enhancing the quality of the school environment, strengthening collaborative governance, and implementing integrated, evidence-based transition policies are essential foundations for sustainable dropout prevention efforts. This study contributes to the educational literature on dropout prevention and opens opportunities for further research involving socio-economic factors and educational policy innovation at the regional level.

Keywords: *Dropout school environment, collaborative service, stakeholders, senior high school.*

Introduction

School dropout rates severely threaten the quality, equity, and sustainability of global education. This issue hinders individuals from developing essential skills and human capital while stalling national socioeconomic progress. Although the global percentage of out-of-school youth successfully declined from 26% in 2000 to 17% in 2018, recent trends show a concerning reversal. Since 2021, the out-of-school population has grown by roughly 6 million children and adolescents annually, with recent estimates ranging from 272 to 285 million (UNESCO, 2023, 2025; United Nations, 2025). Some research conducted among physically disabled learners, girls outside of

[1] *Corresponding author. Doctor of Administrative Sciences, Brawijaya University, Indonesia; hermawanfia@ub.ac.id*
[2] *Doctor of Educational Administration, Brawijaya University, Indonesia; qadirmuslim@ub.ac.id*
[3] *Professor of Administrative Sciences, Brawijaya University, Indonesia; kadaris_fia@ub.ac.id*

school, and offenders' education demonstrates that dropout can be viewed as an intersection of a variety of social, economic, accessibility, and policy barriers (Monyane & Kgothule, 2023; Mbatha & Khohliso, 2025; Seni, 2025). This means that dropout is an issue of equity, which poses a threat to learners' educational sustainability and their future prospects for livelihoods.

Governments around the world have responded to the dropout problem with diverse policy approaches. While Austria and Australia enforce structural reforms to target high completion rates of 95% and 90%, respectively (Markussen & Sandberg, 2011). Other countries that should already be free of dropout rates, such as Japan, focus on "Education Voucher" programs (Akabayashi & Araki, 2011), while South Korea focuses on early detection paired with vocational and alternative schooling South Korea emphasizes early identification for at-risk students, including alternative education and vocational training (Ji et al., 2024). In several other countries, such as Nigeria, a subsidy intervention policy, namely conditional cash transfers, provides free and compulsory 9 years of basic education for all children (Adewale & Okafor, 2025; Emordi & Ruth, 2023; Ihuoma, 2022). Conditional cash transfer policies are also implemented by Central American countries except Nicaragua (Szekely & Adelman, 2016). Meanwhile, Kenya mandates a strict 100% transition policy from primary to secondary school (Ngugi, 2024). Malaysia is developing early dropout identification through predictive instruments and dropout statistics, similar to India's National Education Policy 2020 (NEP), which aims to improve educational infrastructure, student-tracking mechanisms, and dropout-recall programs (Basumatary & Subudhi, 2022; Hashim et al., 2025).

To enhance education, the Indonesian government has deployed several initiatives, such as the 12-year compulsory education mandate, the Smart Indonesia Program (PIP), Regional School Operational Assistance (BOSDA), and a nutritious meal program (Romlah et al., 2023). These policies are accompanied by efforts to improve educational infrastructure and the quality of learning services, including strengthening counseling functions and learning support interventions (Roudoh et al., 2025). However, achievements are not evenly distributed across regions and socioeconomic groups. Inequality is also evident between urban and rural areas, reflecting differences in access to facilities, qualified teaching staff, and family support (Parker & Sudibyo, 2024). Consequently, upper secondary education stands out as a critical bottleneck, requiring students to navigate steeper academic demands, higher hidden costs, and increased socio-emotional challenges.

Table 1

Summary of Children not in School at the National and Local High School Level

No	Region	Number of Dropouts			Number of Passed Not Continued	Total
		Grade 10	Grade 11	Grade 12		
1	**National**	133,421	177,544	43,897	647,862	1,002,724
2	**Malang Regency**	1,253	1,706	306	8,826	12,091
3	**Malang City**	603	814	87	386	1,890
4	**Batu City**	114	146	27	290	577
	Total	**1,970**	**2,666**	**420**	**9,502**	**14,558**

Source: Ministry of education and culture (2025)

Data from the Ministry of Education and Culture in 2025 at the senior high school level shows a total of 1,002,724 senior high school-aged students are outside the education system. The composition is dominated by the "graduated–did not continue" category, amounting to 647,862 (≈65%), while dropouts in Grades 10, 11, and 12 are 133,421; 177,544; and 43,897, respectively. This pattern confirms that the main challenge is not only the retention of students already in senior high school, but also the bottleneck of the transition from junior high school to senior high school. This phenomenon illustrates the existence of structural barriers that require comprehensive interventions ranging from academic support and motivational strengthening to financial schemes that can keep students in the system.

In the local context of Malang (Malang Regency, Malang City, and Batu City), the total number of children not attending high school reached 14,558 cases, again dominated by graduates and non-continuers (9,502; >65%). The highest *dropout rate* occurred in Grade 11 (2,666), followed by Grade 10 (1,970) and Grade 12 (420). This configuration indicates two main problem areas: (i) the failure of continuity in the middle phase of high school due to academic pressure, social demands, and family economic conditions, and (ii) the weak transition mechanism from junior high school to senior high school, which should be the entry point for strengthening student readiness and engagement. These data also show that Greater Malang's status as an "education city" does not fully guarantee a low dropout rate, necessitating a more in-depth policy evaluation.

Interrelated factors include the quality of learning (teacher motivation, instructional strategies) that influence student engagement and achievement (Arman & Tahwin, 2025; Lestari, 2024); the financial strain of the families prompting early work (Yusuf & Hanif, 2025); the outcome of decentralization resulting in inconsistent operations and unequal resource allocation (Afandi et al., 2022); and while geographic constraints and restrictive school zoning policies severely limit access

to high-quality institutions (Wikantiyoso et al., 2022). This combination of factors underscores the urgency of systemic reforms to improve the quality, access, and governance of education at the regional level. Furthermore, empirical studies show that low teacher motivation and inadequate teaching skills can reduce student academic performance, weaken school engagement, and increase the risk of dropping out.

This study organizes the determinants of student attrition into two interrelated domains: the immediate school environment and the broader governance-support environment. From an ecological perspective, student persistence is influenced not only by individual characteristics but also by the interactions among school, family, community, policy, and socioeconomic contexts (Bronfenbrenner, 1979; Rumberger & Lim, 2008). Factors such as teacher motivation, instructional strategies, student engagement, academic support, and teacher-student interaction constitute the internal quality of the school environment. These elements determine whether students perceive school as academically meaningful, emotionally supportive, and socially inclusive, which are essential conditions for student engagement, achievement, and retention (Tinto, 1975; Wang & Degol, 2016; Konold et al., 2018). Second, factors such as household economic pressure, unequal resource allocation, geographic barriers, and zoning-related access constraints indicate broader structural and governance challenges that schools cannot address independently (Afandi et al., 2022; Wikantiyoso et al., 2022; Rumberger & Lim, 2008). Addressing these challenges requires the active participation of multiple stakeholders, including families, schools, communities, local government, and the private sector. Dropout prevention relies on the intersection of school, family, and community responsibilities, as well as collaborative governance across institutions (Epstein, 2011; Emerson et al., 2012). This study conceptualizes stakeholder roles as representations of external support and governance capacity, while collaborative service functions as the coordinating mechanism that integrates school-based and external supports to mitigate dropout risk (Epstein, 2011; Emerson et al., 2012; García-Carrión et al., 2017; Rodríguez-Muñiz et al., 2019; Pardoel et al., 2021). Zoning policy is considered within the broader context of regional access and governance, shaping the necessity for stakeholder engagement and collaborative service mechanisms, rather than as an isolated independent variable (Afandi et al., 2022; Wikantiyoso et al., 2022).

A positive school climate, supportive teacher-student relationships, and academic support have been shown to play a protective role against school dropout by increasing *engagement*, discipline,

and achievement (Gómez & Suárez, 2020; Pendergast et al., 2018). Caring pedagogical interactions increase motivation and ownership of learning (Duraku & Hoxha, 2021; Konold et al., 2018; Wibowo et al., 2020). Guidance, mentoring, and counseling services support students' psychosocial academic aspects (Piccolo et al., 2018; Wong et al., 2021). Within the context of this study, these dimensions operationalize the "School Environment" variable. They are conceptualized as critical buffers capable of mitigating dropout risks, even among student cohorts situated within highly vulnerable socioeconomic communities.

The stakeholder roles variable encompasses the contributions of families, schools, communities, government, and business actors in delivering educational, psychosocial, financial, and institutional support to students at risk of dropping out. The inclusion of this variable is conceptually vital, as many primary determinants of student attrition—such as household economic distress, geographic barriers, structural resource inequities, and policy implementation gaps—exceed classroom boundaries and demand coordinated, multi-sectoral interventions. The collaborative service approach highlights shared decision-making, resource allocation, and service integration among family, school, community, business, and government actors to address local educational needs (GarcíaCarrión et al., 2017; RodríguezMuñiz et al., 2019; Pardoel et al., 2021).

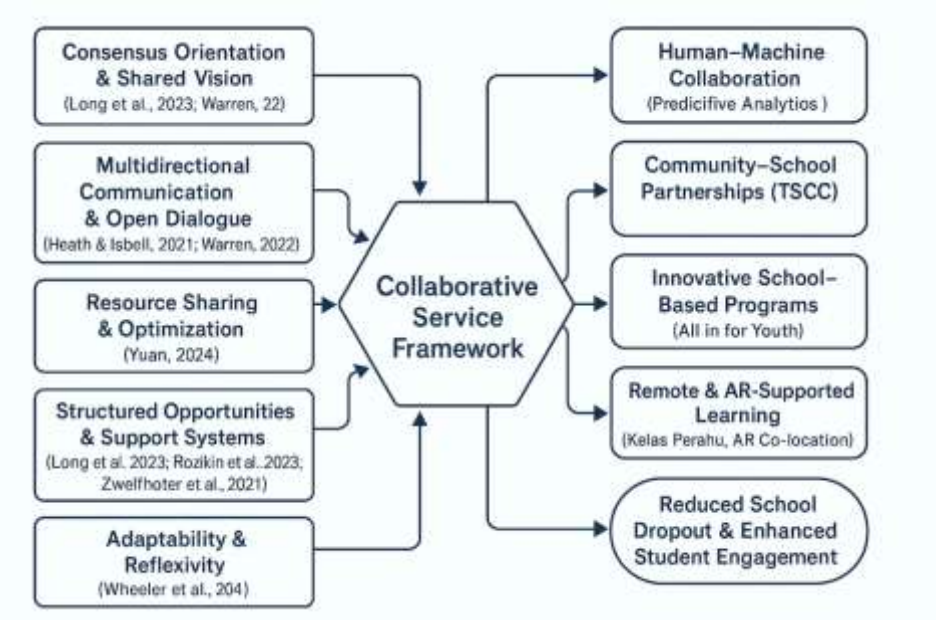

Figure 1. Collaborative Services in Education

As conceptualized in Figure 1, the collaborative service framework comprises six core dimensions: consensus orientation, multidirectional communication, resource sharing, structured opportunities,

support systems, adaptability, and organizational reflexivity. Within the context of dropout prevention, this framework demonstrates how fragmented support from various actors can be transformed into coordinated services. Collaborative service can enhance the school environment's influence by connecting students with mentoring, counseling, academic support, flexible learning opportunities, and psychosocial assistance. Additionally, it can amplify the stakeholders' impact by integrating their individual contributions into comprehensive interventions, such as scholarships, transportation support, school-community partnerships, school-based programs, predictive human-machine collaboration, and distance learning or augmented reality-based support. Structurally, therefore, collaborative service serves as a vital mediating mechanism that channels both school-level dynamics and external stakeholder capacities toward minimizing the risk of student dropout.

Viewing collaborative service as a mediating mechanism is justified because it is through collaboration among stakeholders that these roles are translated into integrated, learner-centered interventions. Whereas stakeholder roles point to the presence of actors and resources, collaborative service captures how these resources are coordinated through decision-making processes, two-way communication, resource sharing, referrals, mentoring, counseling, financial aid, transportation services, academic support, and flexibility in the provision of education. This structural pathway adheres to collaborative governance frameworks, which maintain that complex public issues are best resolved when diverse sectoral actors consolidate their resources and authority through structured, collective action (Emerson et al., 2012).

Interventions in developing countries demonstrate the effectiveness of social-emotional learning (SEL) programs in increasing student resilience and commitment (Wang & Degol, 2016). School feeding programs have been shown to encourage participation, although they require policy design that is sensitive to social and cultural contexts (Niyibizi, 2024). Conditional financial assistance/scholarships reduce economic barriers for low-income families (Kharisma et al., 2017). Meanwhile, Technical and Vocational Education and Training (TVET) programs aligned with the labor market increase educational relevance and motivate students to continue in school (Yi et al., 2015; Tudor et al., 2023). Collectively, these studies offer an empirical foundation for scalable, locally adaptable frameworks, illustrating that integrating financial, psychosocial, and vocational lifelines is instrumental in reducing dropout rates.

Despite various programs and discourses on collaboration such as SEL program (Wang & Degol, 2016), School feeding programs (Niyibizi, 2024), Conditional financial assistance/scholarships (Kharisma et al., 2017), and TVET programs (Yi et al., 2015; Tudor et al., 2023), a quantitative evidence specifically examining the influence of the school environment and the role of stakeholders on high school dropout rates, with collaborative service as a mediator in Malang Raya, remains limited. Therefore, this study aims to: (i) analyze the direct influence of school environment and the role of stakeholders on high school dropout rates; (ii) test the mediating role of collaborative service in the relationships between school environment and dropout rates, and between role of stakeholders and dropout rates; and (iii) formulate priority policy implications for strengthening support for transition and retention at the high school level. Consequently, this study contributes an empirical foundation to the discourse on educational equity, demonstrating how local governments can systematically curb student attrition by refining internal institutional quality, mobilizing external coalitions, and institutionalizing contextually sustainable collaborative governance frameworks.

The following is a framework for identifying relationships between variables and includes research hypotheses.

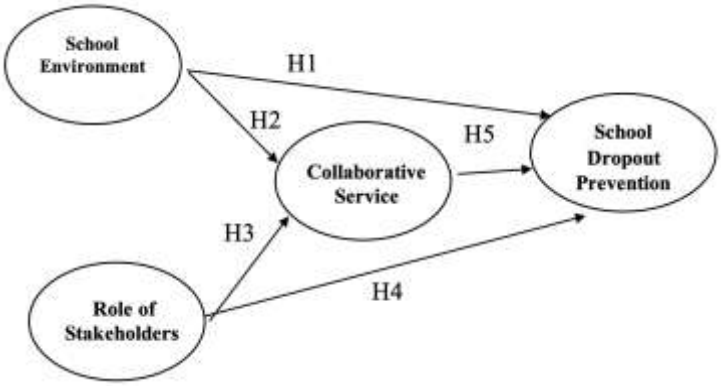

Figure 2. Conceptual Framework of the Research

H1: School environment has a significant influence on school dropout prevention
H2: School environment has a significant influence on collaborative service
H3: The role of stakeholders has a significant influence on collaborative service
H4: The role of stakeholders has a significant influence on preventing school dropouts
H5: Collaborative service has a significant influence on school dropout prevention
H6: School environment has a significant influence on preventing school dropouts through collaborative services
H7: The role of stakeholders has a significant influence on preventing school dropouts

through collaborative service

Method

Research Design

This study utilized a quantitative explanatory research design to assess the structural pathways connecting the school environment, stakeholder roles, collaborative service, and student dropout rates. Quantitative explanatory designs are appropriate when the objective is to test hypothesized relationships among variables using standardized numerical data (Creswell & Creswell, 2018). This survey design was chosen to facilitate the collection of standardized data from respondents concerning their perceptions and experiences of the variables in the proposed model. This survey design was selected in order to ensure that information regarding the perceptions and experiences of the participants about the variables in the above theoretical model would be collected in a systematic manner. This is because surveys are used to measure attitudes and perceptions systematically (Fowler, 2014). A cross-sectional survey approach was applied, utilizing a structured questionnaire to gather standardized data on the operational variables at a single point in time (Creswell & Creswell, 2018). Within the model, school environment and stakeholder roles were designated as exogenous variables, collaborative service as a mediating variable, and school dropout as the outcome variable. This design was appropriate for the examining direct and indirect associations between concepts via structural pathways analysis through mediation (Hayes, 2022; Kline, 2023). Specifically, it allowed the study to capture the precise mediating pathway through which institutional climates and multi-actor support systems are systematically translated into coordinated services that minimize student attrition.

Variables Operationalization

School Environment

The school environment plays a crucial role in determining student engagement with learning and the sustainability of education. Based on school climate theory and research on the factors causing school dropouts, Moos (1980); Cohen et al. (2009); (Rumberger, 2011; Lee & Burkam (2003) analyzed four main dimensions of school environment: (i) The physical environment includes the quality of infrastructure (classrooms, laboratories, libraries, sanitation) and the comfort of learning spaces (lighting, ventilation, cleanliness, security). Good facilities increase student motivation and attendance, while poor conditions can encourage dropout (Bronfenbrenner, 1979); (ii) The social

environment includes teacher-student relationships, relationships between students, and parental involvement. Teacher emotional support, open communication, and solidarity among students strengthen school engagement, while bullying, social exclusion, or lack of support increase the risk of dropout. Positive interactions between school and home (mesosystem) are also a protective factor (Epstein, 2010); (iii) The academic environment is related to teaching methods, teacher expectations, and remedial support. Innovative and relevant teaching increases engagement, while monotonous methods can decrease interest in learning (Finn, 1989). High but realistic academic expectations and remedial support have been shown to reduce the risk of dropping out.(Rosenthal & Jacobson, 1968; Rumberger, 1987); (iv) Finally, school culture and policies determine institutional safety, where equitable, inclusive disciplinary codes foster student connectedness, while rigid, punitive regulations exacerbate dropout risks (Cohen et al., 2009).

The Role of Stakeholders

Role of Stakeholders is assessed using the idea of stakeholders' involvement in helping to prevent students' dropout problem. The idea is based on Stakeholder Theory (Freeman, 2010) and on the School-Family-Community Partnership model (Epstein, 2010). Both theories suggest that education cannot be ensured by schools only; it requires synergic actions of the government, schools, parents, communities, private businesses, and many other stakeholders who care about educational continuity of students.

In the current study, role of stakeholders is assessed using six indicators: role of the government, role of schools, parents' participation, role of communities, role of the private sector, and inter-stakeholder collaboration. Six indicators show how each stakeholder contributes to creation of policies, provision of educational programs, provision of tutoring, social assistance, resource availability, and other kinds of inter-stakeholder collaboration. Hence, role of stakeholders means creation of synergic conditions for formation of educational system that could prevent dropouts.

Collaborative Service

Collaborative service captures the strategic design and operational execution of interventions developed through the collective agency of multi-sectoral actors. Methodologically, this variable operationalizes the precise structural mechanisms through which multi-actor partnerships are institutionalized, managed, and sustained, alongside their subsequent impacts on service efficacy

and pedagogical innovation. This variable is typically defined by several dimensions: (1) the structure and governance of the collaboration network, (2) coordination and communication processes, (3) the extent of co-creation with customers and stakeholders, (4) the collaborative capabilities of the organization, and (5) outcomes related to service quality and innovation (Mihailović et al., 2024; Agarwal et al., 2009).

Drop out Prevention

Dropping out of school is when students stop formal education before completing the level they should have reached, a decision influenced by various factors. It will be measured based on factors that influence students' decisions to drop out of school.

Population and Samples

The target population for this study encompassed all senior high school principals within the Greater Malang region (Malang Raya). Due to the small, identifiable, and accessible nature of this population, a total sampling technique was utilized, ensuring that every member was included as a research respondent. The final sample comprised 100 principals, representing all Senior High Schools in Malang Raya. Specifically, the sample included 44 principals from Malang Regency, 44 from Malang City, and 12 from Batu City.

Table 2

Sample Adequacy Test

Criteria	Parameter	Minimum Limit	Research Sample	Status
10 × most predictor paths	3 paths → 3 × 10	30	100	Fulfil
***Power analysis* (G*Power)**	$\alpha = 0.05$; power = 0.80; predictor = 3; $R^2 = 0.25$	77	100	Fulfil

The sample adequacy in this study was tested using two approaches. First, the rule-of-thumb (Hair et al., 2019). The minimum sample size is determined by 10 times the number of the largest predictor paths to the endogenous construct. In this model, the School Dropout construct (Y) has three predictor paths, so the minimum required sample size is 30 (3 × 10). With 100 respondents, this study exceeds the minimum limit. Second, power analysis using G*Power. An a priori analysis was conducted with parameters $\alpha = 0.05$, power = 0.80, number of predictors = 3, and target R^2 =

0.25 (moderate effect). The calculation results indicate the minimum sample requirement is 77. The sample size of this study was 100, making it sufficient to detect the hypothesized effect. These results indicate that the study sample size has met or even exceeded the adequacy requirements for PLS-SEM model estimation.

Data Collection

Primary data were collected using a quantitative survey with a closed-ended questionnaire employing a Likert scale ranging from 1 to 5, where 1 indicates very low disagreement and 5 indicates a very high level of agreement. The measurement scales were operationalized based on established variable indicators derived from authoritative theoretical frameworks and empirical literature, thereby securing a strong foundation for internal validity and construct reliability. The survey was directly administered to Senior High School principals across the Greater Malang region (encompassing Malang City, Malang Regency, and Batu City, Indonesia). To mitigate response bias and social desirability effects, participants completed the instruments independently following a standardized briefing on the study's protocols and research objectives.

Data Analysis

Data analysis was conducted using Structural Equation Modeling Partial Least Squares (SEM-PLS), which is a statistical method for analyzing complex relationships among variables within a research model. SEM-PLS enables researchers to test structural models involving both latent variables (which cannot be measured directly) and observed variables (which can be measured) simultaneously (Hair et al., 2017). This method is particularly effective for more complex models, especially when the sample size is not very large and the data do not meet strict normality assumptions, making it a preferred choice in many social and business studies (Hair et al., 2017). SEM-PLS provides flexibility in model evaluation, both in terms of construct validity and reliability. Models generated from SEM-PLS can identify direct and indirect effects among variables, as well as deeper relationships that may not be detected with other analytical methods. Consequently, this analytical approach provides a highly precise evaluation of multi-variable frameworks, yielding deep empirical insights into the structural determinants and their relative effect sizes on the endogenous outcomes.

Findings

Based on the table 3, the data on work domicile indicate that respondents are distributed across three regions in East Java. A total of 44% of respondents are from Malang Regency, followed by 44% residing in Malang City. Meanwhile, only 12% of respondents are from Batu City. This suggests that the majority of respondents work in Malang Regency and Malang City, indicating a higher employment concentration in these two regions than in Batu City.

Table 3

Respondent Information

Information	Categories	Total (N)	Percentage
Workplace	Malang Regency	44	44%
	Malang City	44	44%
	Batu City	12	12%
Gender	Males	53	53%
	Females	47	47%
Total		**100**	**100%**

In terms of gender, respondents are almost evenly split between males and females. It is known that 53% of respondents are male, while the remaining 47% are female.This percentage difference demonstrates an almost equal gender diversity within the sample, providing a balanced overview of male and female participation in this study. Consequently, these two key demographic variables—work domicile and gender—establish a robust and comprehensive profile of the research participants.

Structural Equation Modeling – Partial Least Squares

The figure 3 presents the results of the Partial Least Squares (PLS) analysis of for outer loadings within the research model. Outer loading quantifies the extent to which the indicators in this study account for the variance in their respective latent variables. High outer loading values reflect a strong association between an indicator and its latent variable, whereas low values indicate a weaker relationship. In this model, outer loadings derived from the PLS analysis differ among indicators for various latent variables. For instance, for latent variable X1, indicators Adequacy of school facilities and learning infrastructure (X1-1) (0.877), Comfort and conduciveness of the learning environment (X1-2) (0.713), and Safety and security of the school environment (X1-3) (0.782) demonstrate relatively high loadings, signifying a substantial contribution to the

explanation of X1. Similarly, for A comparable trend is observed for construct X2, indicators Active involvement of schools in dropout prevention efforts (X2-1) (0.867), Parental participation in supporting students' educational continuity (X2-2) (0.816), and Contribution of school committees to student support programs (X2-3) (0.683) display strong factor loadings, confirming their efficacy in explaining the latent variance.

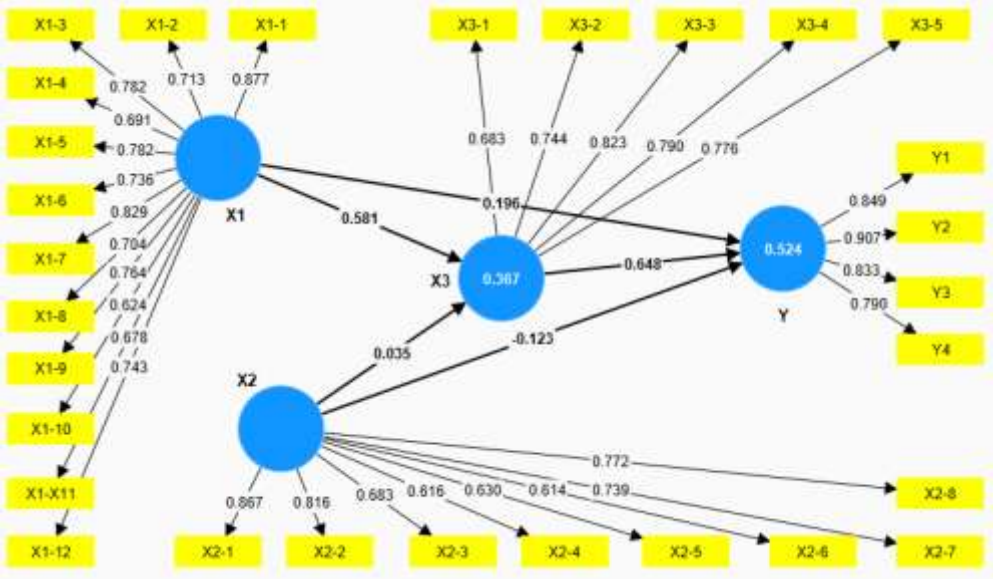

Figure 3. Outer Loading

For assessing outer loading, the following criteria are commonly used: an outer loading value above 0.70 is considered very good, between 0.50 and 0.70 is considered quite good, and below 0.50 is considered less good (Hair et al., 2017). Based on these criteria, indicators with values above 0.70, such as Adequacy of school facilities and learning infrastructure (X1-1) (0.877), Comfort and conduciveness of the learning environment (X2-1) (0.867), and Y2 (0.907), contribute significantly to their respective latent variables. Meanwhile, indicators with values below 0.70, such as X3 (0.196) and Contribution of school committees to student support programs (X2-3) (0.683), although still within acceptable criteria, show a moderate relationship with the latent variables they explain. In this analysis, the relationships between latent variables are also shown, including the influence of X1 on X2 (0.581) and of X3 on Y (0.524), indicating the extent to which each variable influences the others.

Table 4

Outer Loading, Cronbach Alpha, Composite Reliability, rho_A, and AVE

Latent Variables	Indicator	Outer Loading	Cronbach Alpha	Composite Reliability	rho_A	AVE
School Environment (X1)	Adequacy of school facilities and learning infrastructure (X1-1)	0.877	0.927	0.937	0.939	0.557
	Comfort and conduciveness of the learning environment (X1-2)	0.713				
	Safety and security of the school environment (X1-3)	0.782				
	Cleanliness and physical condition of the school environment (X1-4)	0.691				
	Supportive teacher–student relationships (X1-5)	0.782				
	Positive peer relationships among students (X1-6)	0.736				
	Parental support and involvement in students' education (X1-7)	0.704				
	Communication between school and families (X1-8)	0.624				
	Quality of teaching and learning processes (X1-9)	0.678				
	Availability of academic support and remedial programs (X1-10)	0.743				
	Inclusive and supportive school climate (X1-11)	0.829				
	Fair and student-centered school policies (X1-12)	0.764				
Stakeholder Role (X2)	Active involvement of schools in dropout prevention efforts (X2-1)	0.867	0.886	0.896	0.925	0.522
	Parental participation in supporting students' educational continuity (X2-2)	0.816				
	Contribution of school committees to student support programs (X2-3)	0.683				
	Community involvement in supporting education (X2-4)	0.616				
	Support from local government for dropout prevention initiatives (X2-5)	0.630				
	Contribution of private sector and external institutions (X2-6)	0.614				
	Collaboration among stakeholders in addressing student risks (X2-7)	0.739				
	Routine communication and information exchange among stakeholders (X2-8)	0.772				
Collaborative Service (X3)	Communication and coordination among stakeholders (X3-1)	0.683	0.822	0.875	0.833	0.584
	Information and data sharing regarding at-risk students (X3-2)	0.744				
	Integrated support services (counseling, academic support, social assistance) (X3-3)	0.823				
	Joint decision-making and collaborative problem solving (X3-4)	0.790				
	Shared commitment and sustainability of collaborative programs (X3-5)	0.776				

School Dropout Prevention (Y)	Student retention and continuation in school (Y1-1)	0.849	0.866	0.909	0.873	0.715
	Effectiveness of dropout prevention interventions and support systems (Y1-2)	0.907				

Table 4 summarizes the results of the Outer Loading, Cronbach Alpha, Composite Reliability, rho_A, and AVE analyses for the four latent variables examined in this study: School Environment (X1), Stakeholder Role (X2), Collaborative Service (X3), and School Dropout Prevention (Y). The outer loading values reflect the strength of the association between each indicator and its corresponding latent variable. For instance, indicator Adequacy of school facilities and learning infrastructure (X1-1) demonstrates a very strong relationship with X1, as evidenced by an outer loading value of 0.877. Other indicators, such as Comfort and conduciveness of the learning environment (X1-2) (0.713) and Safety and security of the school environment (X1-3) (0.782), also exhibit strong, albeit slightly lower, associations. Similarly, the outer loadings for Stakeholder Role (X2) and Collaborative Service (X3) indicate robust relationships between their respective indicators and latent variables.

Cronbach's Alpha and Composite Reliability are used to measure internal consistency and reliability. All the variables exhibit excellent reliability, with Cronbach Alpha values above 0.70, such as X1 (0.927), X2 (0.886), X3 (0.822), and Y (0.866), and Composite Reliability values also exceeding 0.70, such as X1 (0.937), X2 (0.896), and X3 (0.875). These values demonstrate strong internal consistency. rho_A is another measure of internal consistency reliability, and it is reported alongside Composite Reliability. For example, School Environment (X1) has a rho_A value of 0.939, Stakeholder Role (X2) has 0.925, and Collaborative Service (X3) has 0.833, all of which indicate good consistency and support the validity of the constructs. The School Dropout Prevention (Y) variable has a rho_A of 0.873, further supporting its strong internal consistency.

Finally, the Average Variance Extracted (AVE) values evaluate the extent to which indicators explain their respective latent variables. The AVE for School Environment (X1) is 0.557, which is acceptable though slightly below the ideal threshold of 0.60. Stakeholder Role (X2) has an AVE of 0.522, also within an acceptable range. Collaborative Service (X3) reports an AVE of 0.584, indicating adequate explanatory power. School Dropout Prevention (Y) achieves the highest AVE of 0.715, demonstrating a strong indicator-explanation. Overall, the results indicate that all latent variables exhibit good reliability and validity, with minor variations in AVE values, supporting the model’s robustness.

Table 5

The Result of Fornell–Larcker Criterion

Variables	X1	X2	X3	Y
X1	**0.746**			
X2	0.723	**0.690**		
X3	0.436	0.765	**0.605**	
Y	0.713	0.846	0.765	**0.503**

Note: X1: School environment; X2: Stakeholders; X3: Collaborative service; Y: Drop out prevention

Table 5 presents the results of the Fornell–Larcker Criterion, which assesses the convergent and discriminant validity of the latent variables in the research model. The diagonal values (for example, 0.746 for X1 or School Environment) represent the square root of the Average Variance Extracted (AVE) for each variable, reflecting the extent to which each variable explains the variance of its indicators. Off-diagonal values, such as 0.723 between X1 and X2 (Stakeholders) or 0.765 between X2 and X3 (Collaborative Service), indicate the relationships between the latent variables. The relationships among latent variables lower than the square root of the AVE values on the diagonal establish discriminant validity. In this analysis, all off-diagonal relationship values are lower than the corresponding diagonal values, confirming that the model satisfies the discriminant validity criteria. Furthermore, the high relationship values between Y (Dropout Prevention) and X2 (0.846) and X3 (0.765) indicate that these two variables have a strong influence on Dropout Prevention. These findings collectively demonstrate robust discriminant validity in the model, with indicators that significantly explain each latent variable (Fornell & Larcker, 1981; Hair et al., 2019).

Table 6

The Result of HTMT Criterion

Variable	X1	X3	Y	Variable
X1	–	0,660	0,535	X1
Z	0,660	–	0,834	Z
Y	0,535	0,834	–	Y

Table 6 presents the results of the Heterotrait-Monotrait Ratio (HTMT), which is used to assess discriminant validity by examining correlations among latent variables. The values in the table indicate the correlations between pairs of latent variables. For example, the correlation between X1 (School Environment) and X3 (Collaborative Service) is 0.660, while the correlation between

X1 and Y (Dropout Prevention) is 0.535. The value of 0.660 between Z and Y shows a strong correlation as well.

In the HTMT criterion, to confirm discriminant validity, the HTMT value must be below a threshold, typically 0.85. In this case, the values of 0.660 (between X1 and X3) and 0.535 (between X1 and Y) are well below the 0.85 threshold, indicating that the relationships between these pairs of variables do not pose a problem for discriminant validity. However, the value of 0.834 between X3 and Y is closer to the threshold, suggesting a stronger correlation between the two variables, yet it still meets the acceptable level of discriminant validity. Overall, the table indicates that the model meets the requirements for discriminant validity based on the HTMT criterion, as suggested by Henseler et al. (2015), who recommend HTMT values below 0.85 as an indicator of acceptable discriminant validity.

Table 7

The Results of Q-square and Q-square

	R-square	R-square adjusted	SSO	SSE	Q^2 (=1-SSE/SSO)
X3	0.367	0.354	500.000	401.084	0.198
Y	0.524	0.509	400.000	254.921	0.363

The inner model test results indicate that the Collaborative Service (X3) variable has an R^2 of 0.367 (36.7%), which falls within the moderate range (Hair et al., 2019). This data indicate that the School Environment (X1) and Stakeholder Roles (X2) variables together account for 36.7% of the variance in Collaborative Service, with the remaining variance influenced by other factors not included in the model. Meanwhile, the Dropout Prevention (Y) variable has an R^2 of 0.524 (52.4%), also in the moderate range, indicating that the School Environment, Stakeholder Roles, and Collaborative Service variables collectively explain more than half of the variance in Dropout Prevention.

Moreover, the Q^2 values for the model's predictive relevance are 0.198 for Z and 0.363 for Y. According to Chin's (1998) criteria, a Q^2 value greater than 0 signifies that the model holds predictive relevance. It suggests that the model can make reasonable predictions, though its predictive strength is moderate. Therefore, the research model demonstrates a solid ability to predict the variations in Collaborative Service and Dropout Prevention, with moderate predictive strength.

Hypotheses Testing

Hypothesis testing in this study was conducted to evaluate the relationships and effects among the variables included in the proposed model. The hypothesis-testing process used bootstrapping to calculate the t-statistic, p-value, and the original sample for each path coefficient. In this hypothesis test, a t-statistic greater than 1.96 and a p-value less than 0.05 indicate that the tested variable has a significant effect on other variables. Conversely, if the t-statistic is less than 1.96 and the p-value is greater than 0.05, it can be concluded that there is no significant effect between the variables.

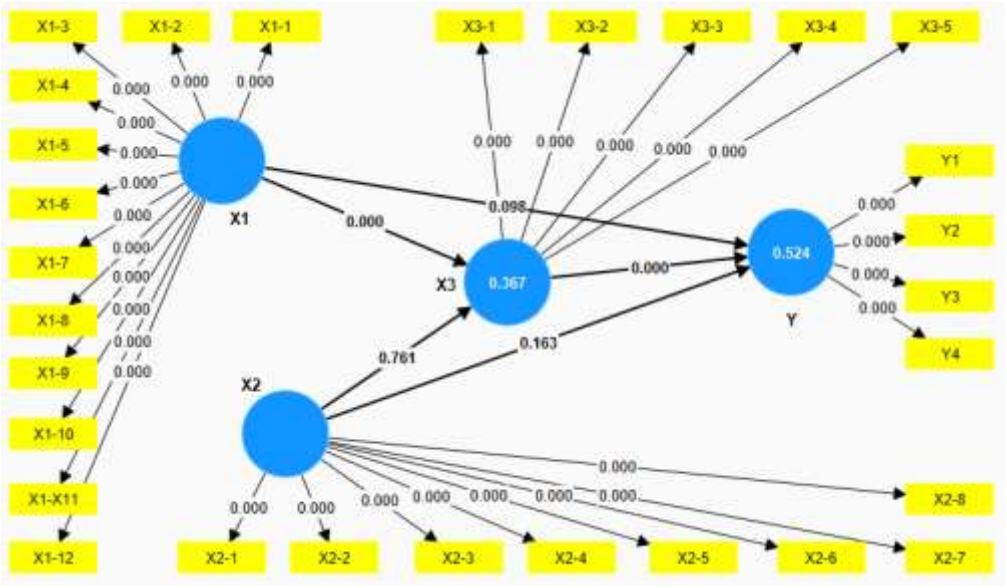

Figure 4. The Result of Hypotheses Testing

Table 8

Path Coefficients (Direct effect)

Relationship between variables	β (O)	t	P	95% CI Lower	95% CI Upper	Decision
X1 → X3	0.581	5,187	0.000	0.350	0.788	Accepted
X2 → X3	0.035	0.304	0.761	−0.194	0.250	Rejected
X1 → Y	0.196	1,647	0.098	−0.065	0.407	Rejected
X2 → Y	−0.123	1,398	0.163	−0.317	0.035	Rejected
X3 → Y	0.648	6,894	0.000	0.431	0.807	Accepted

Note: X1: School environment; X2: Stakeholders; X3: Collaborative service; Y: Drop out prevention

Based on Figure 3 and Table 8 (Direct Effect of Path Coefficients), the two-way 95% CI BCa bootstrapping test shows that School Environment (X1) has a positive and significant effect on Collaborative Service (X3) (β = 0.581; t = 5.187; p = 0.000; 95% CI [0.350; 0.788]). This finding confirms that strengthening the school environment is directly correlated with increased

collaborative practices among the school's stakeholders. Furthermore, Collaborative Service (X3) also has a positive and significant effect on Dropout Prevention (Y) (β = 0.648; t = 6.894; p = 0.000; 95% CI [0.431; 0.807]), which indicates that collaborative governance includes shared commitment, data/resource sharing, effective communication, and joint work protocols are strongly related to strengthening efforts to retain students in school. Stakeholder Role (X2) did not show a significant direct effect on either X3 (β = 0.035; t = 0.304; p = 0.761; 95% CI [−0.194; 0.250]) or Y (β = −0.123; t = 1.398; p = 0.163; 95% CI [−0.317; 0.035]). The confidence intervals crossing zero for both paths indicate that stakeholder involvement, in the form present in the research context, is not yet consistent/structured enough to produce a statistically detectable direct effect. The direct path X1 → Y is not significant at the 5% level (β = 0.196; t = 1.647; p = 0.098) because the 95% CI [−0.065; 0.407] crosses zero; This implies that the contribution of the School Environment to Dropout Prevention is more strongly mediated by the collaboration mechanism (X3) than by working directly.

Table 9

Specific indirect effects (Mediation)

Indirect Effects	β_indirect (O)	t	P	95% CI Lower	95% CI Upper	Decision
X2 → X3 → Y	0.023	0.299	0.767	−0.130	0.167	Rejected
X1 → X3 → Y	0.376	3.760	0.000	0.210	0.608	Accepted

Note: X1: School environment; X2: Stakeholders; X3: Collaborative service; Y: Drop out prevention.

Based on Specific Indirect Effects (mediation), only the indirect path X1 (School Environment) → X3 (Collaborative Service) → Y (Dropout Prevention) is significant (β_indirect = 0.376; t = 3.760; p = 0.000; 95% CI [0.210; 0.608], does not cross 0). The results indicate that School Environment contributes to Dropout Prevention primarily by enhancing Collaborative Service, rather than exerting a direct effect. In other words, a supportive school environment encourages more structured collaboration (shared commitment, data/resource sharing, and effective communication), which in turn promotes student school sustainability. Because the direct path X1 → Y is not significant at the 5% level (95% CI crosses 0). Meanwhile, the indirect path is significant. This pattern is consistent with indirect-only mediation: the effect of X1 on Y is fully mediated by X3. In contrast, the indirect path X2 (Stakeholder Role) → X3 → Y is not significant (β_indirect = 0.023; t = 0.299; p = 0.767; 95% CI [−0.130; 0.167], crossing 0). It means that in

this data configuration, the measured stakeholder engagement is not yet consistent/structured enough to strengthen Collaborative Service to produce a detectable impact on Dropout Prevention.

Discussion

The Role of the School Environment through Collaborative Service

Structural model analysis shows that the School Environment has a positive and significant influence on Collaborative Service. This finding indicates that a conducive school climate characterized by supportive teacher-student relationships, a safe learning atmosphere, academic support such as remedial programs, and a sense of student attachment and pride in the school is closely related to the formation of shared commitment, coordination, and trust among educational stakeholders. Within the framework of organizational theory, the concept of school climate not only plays a role in determining the quality of students' learning experiences, but also serves as a foundation for the emergence of collective efficacy —the shared belief of school members that they can achieve collective goals (Bandura, 1997; Bryk & Schneider, 2002). Collective efficacy is social capital that facilitates the exchange of information, the building of trust, and the formulation of collective goals, all of which are important prerequisites for effective and sustainable collaboration in schools.

These findings are consistent with research on school climate and organizational structures, which emphasizes that a positive environment is essential for effective collaboration, as it promotes trust, facilitates information sharing, and supports the development of shared goals that contribute to educational sustainability (Gray, 2016; Kolleck et al., 2021; Lundberg & Abdelzadeh, 2019; Qu, 2024). These findings not only confirm the central role of school climate, which has been widely discussed in the literature, but also emphasize that a good school environment serves as an institutional foundation for strengthening collaborative capacity in dropout prevention efforts (Duckenfield & Reynolds, 2013; Urszula, 2017; National School Climate Center, 2007). Thus, the roles of school climate and collective efficacy are complementary: a supportive school climate strengthens collective beliefs and organizational capacity, which in turn facilitates the implementation of effective, impactful collaborative practices in the context of dropout prevention.

Furthermore, Collaborative Service was shown to have a strong and significant positive effect on Dropout Prevention (Y), meaning collaborative governance is directly related to a reduced risk of dropping out. When schools, parents, local governments, and others work within a structured

collaborative framework—for example, through program coordination, at-risk student referral mechanisms, regular cross-actor meetings, and clear role allocation—efforts to retain students in school become more effective. This finding aligns with studies on collaborative governance and collaborative services in education, which emphasize that complex issues such as school dropout cannot be addressed by a single actor, but require cross-sector synergy to enable rapid response and multi-layered support for vulnerable students (Effendi et al., 2025; Flowers et al., 2018; Lail Rosyidatul Mu et al., 2024; Lyon et al., 2016).

The mediation analysis reveals an indirect-only mediation pattern between School Environment and Dropout Prevention. The direct effect of School Environment on Dropout Prevention was not statistically significant after accounting for Collaborative Service, while the indirect effect through Collaborative Service was significant. According to Zhao et al. (2010), this pattern indicates that, within the current empirical model, the impact of the school environment on dropout prevention is primarily conveyed through collaborative service. This finding should not be viewed as evidence that the school environment does not contribute to dropout prevention. Rather, it suggests that its contribution operates predominantly through collaborative service, which absorbs the variance that might otherwise appear as a direct effect in the model.

This interpretation is significant because educational literature has consistently demonstrated that factors such as school environment, school organization, academic support, teacher-student relationships, and school structure are associated with student persistence and dropout risk (Lee & Burkam, 2003; Rumberger, 2011). The present finding does not contradict previous studies; rather, it clarifies a potential mechanism. A positive school environment may contribute to dropout prevention when operationalized through coordinated, collaborative practices. While a supportive school climate can strengthen student attachment, trust, and academic engagement, its practical effect on dropout prevention is likely enhanced when schools institutionalize collaborative mechanisms, including case management, counseling, academic intervention, family-school communication, referral systems, and cross-sector support.

These findings indicate that, within the current empirical model, a positive school environment alone may not yield a statistically significant direct effect on dropout prevention unless it is operationalized through coordinated collaborative practices. Such practices encompass case management for at-risk students, cross-institutional coordination among schools, education agencies, social services, and families, as well as joint monitoring systems that facilitate early

identification and timely intervention (Flowers et al., 2018; Lyon et al., 2016; Patana, 2020). This pattern aligns with a multi-level organizational perspective, wherein school climate serves as a critical proximal condition, and its influence on student outcomes is enhanced through organizational processes such as collaboration, trust, collective capacity, and coordinated service delivery (Bryk & Schneider, 2002; Leithwood & Jantzi, 2006; Qu, 2024).

Although the direct effect of School Environment on Dropout Prevention is not significant, the total effect of X1 → Y remains large and significant due to the strong contribution of the mediation pathway through Collaborative Service, in line with the concept that mediation effects can dominate even when the direct pathway is insignificant (Zhao et al., 2010). In other words, the school environment remains a key factor in dropout prevention, but its primary strength lies in the process pathway rather than in its direct influence on students' decisions to persist in school (Bryk & Schneider, 2002; Leithwood & Jantzi, 2006; Qu, 2024). The findings indicate that policy interventions are unlikely to be effective if they focus exclusively on facilities, classroom climate, or teacher–student relationships in isolation rather than addressing these factors in an integrated manner; there needs to be a conscious effort to transform this positive environmental capital into an institutionalized collaborative system, so that the potential of the school environment can be fully translated into a reduction in dropout rates (Lyon et al., 2016; Patana, 2020).

National education policies such as the School Operational Assistance (BOS) and various dropout prevention programs have established frameworks that support cross-sector collaboration among schools, local governments, parents, and communities (Kemendikbud, 2020; Patana, 2020). Although these policies normatively recognize the importance of collaboration as a key asset for strengthening student retention, their implementation on the ground often faces various obstacles (Bryson et al., 2014; Kania & Kramer, 2011). In Greater Malang, for example, significant challenges remain in institutionalizing collaborative practices, ranging from a lack of structured collaborative working mechanisms and unclear roles and responsibilities among stakeholders, to limited resources and capabilities for sustainable implementation (Effendi et al., 2025; Patana, 2020). These obstacles require a policy approach that not only establishes norms but also provides adequate facilities, training, and monitoring to ensure the effectiveness of collaboration in daily practice (Bryson et al., 2015; Kania & Kramer, 2011).

To maximize the contribution of Collaborative Services in reducing school dropout rates, it is essential to enhance collaborative leadership capabilities at both the school and local government

levels. School principals and education leaders should receive transformational leadership training that focuses on fostering partnerships among multiple stakeholders and promoting effective coordination across sectors (Bass, 1999; Spillane, 2006). The establishment of regular collaborative forums involving all relevant stakeholders can promote strategic coordination, strengthen two-way communication, and define roles more clearly, thereby supporting the implementation of a more integrated school dropout prevention program (Bryson et al., 2015). In the digital era, information technology plays a role as a communication platform, data collection, and real-time monitoring that can accelerate decision-making and increase transparency and accountability in services—for example, the use of at-risk student management applications that have been piloted in several development areas (Patana, 2020; Effendi et al., 2025). These recommendations are expected to address current practical shortcomings and strengthen the governance of policy implementation holistically.

Along with technological advances and changing educational paradigms, digital innovation has become a crucial aspect in strengthening educational collaboration. The development of integrated online platforms enables the monitoring of at-risk student cases, fast and secure cross-institutional data exchange, and more structured and transparent program coordination. Furthermore, evidence-based partnership models that prioritize continuous evaluation and collaborative reflection have proven highly effective across various international educational contexts. Implementing these models in Greater Malang could be a strategic way to address the limited communication and coordination that have been major obstacles to preventing school dropout.

Why is the role of stakeholders not yet significant?

The modeling results show that the role of stakeholders (X2) has not made a significant contribution to Collaborative Service (X3) or to school dropout prevention (Y), or through the mediation pathway X2 → X3 → Y; even the total effect of X2 on Y also remains insignificant. This finding is not due to instrument weaknesses, as all X2 indicators have met the criteria for convergent validity (AVE ≥ 0.50), discriminant validity, and composite reliability, according to PLS-SEM recommendations (Afthanorhan et al., 2020; Hair & Alamer, 2022; Hair et al., 2021). Thus, the insignificance of X2 needs to be read as an empirical characteristic of the dropout prevention system in Malang Raya, namely that the role of stakeholders in the current configuration has not been effectively integrated into the service mechanism, not as a measurement

artifact or technical error of the model (Becker et al., 2018; Hair et al., 2017). This finding also contrasts with various normative recommendations that place stakeholders as key actors in school dropout mitigation (Saputra & Fauzi, 2022), thus indicating a gap between the expected role of stakeholders and that which was actually operationalized in practice.

Substantively, these results indicate that stakeholder involvement in the research context still tends to be symbolic and oriented towards fulfilling administrative requirements, in line with previous findings that many cross-sector partnerships in education stop at ceremonial participation without in-depth cooperation mechanisms (Acar & Robertson, 2004; Epstein & Sheldon, 2023). Many partnership programs involving parents, school committees, businesses, and local governments are more prominent in the presence of forums and ceremonial activities, while joint work mechanisms such as data exchange of vulnerable prospective students, cross-level referral protocols, and joint monitoring of the risk of dropping out have not been institutionalized (Patana, 2020; Sanders, 2014). When collaboration stops at the level of formal participation without program coordination, target agreements, and concrete follow-up, stakeholder contributions are difficult to reflect as a significant influence on the quality of Collaborative Service (X3) or the achievement of dropout prevention (Y) (Bryson et al., 2014).

In contrast to several studies that found parent and community involvement could be important predictors of student learning success and retention when school-parent relationships are intensive and structured (Epstein, 2018; Fan & Chen, 2001; Hoover-Dempsey et al., 2005). The Malang Raya context demonstrates a different configuration. Normatively, the role of stakeholders has been recognized as important in various national policies and guidelines, but in practice, the quality and intensity of collaboration vary widely across schools and are often not supported by a clear governance framework (Bryson et al., 2014; Patana, 2020). This finding opens a further research agenda to measure not only the presence of stakeholders, but also the quality, frequency, and depth of collaborative practices (Sanders, 2014), for example through data sharing indicators, referral mechanisms, and joint monitoring systems, so that the real influence of stakeholders on dropout prevention can be mapped more accurately in the future.

The path analysis shows that the direct effect of the School Environment on Dropout Prevention is not significant at the 5% level, but the indirect effect through Collaborative Service is significant. It means the result fits an indirect-only mediation pattern, rather than showing that the school environment has no direct theoretical impact on dropout prevention. In this study, Collaborative

Service serves as the primary mechanism by which school environmental quality leads to dropout prevention. These findings should be seen as specific to this context and model. In Malang Raya, the school environment helps prevent dropouts mainly when it is linked to coordinated services, such as mapping at-risk students, counseling, support for transitions between school levels, joint case handling, and monitoring by stakeholders.

Theoretically, this pure mediation finding is in line with the view that educational organizations operate through an input–process–output chain, where the school environment (academic climate, culture, remedial services, and social support) serves as input, Collaborative Service as process, and dropout prevention as output (Creemers, 2008; Leithwood & Jantzi, 2006). A supportive environment creates the prerequisites for the emergence of trust, shared commitment, and coordination across actors, but without being operationalized in the form of concrete Collaborative Services such as the development of cross-level transition programs, mapping of at-risk students, and joint case handling, the impact on student retention remains limited (Leithwood & Jantzi, 2006; Qu, 2024). Thus, these results strengthen the argument that policy interventions should not stop at improving the school climate, but must be intentionally designed to strengthen collaborative capacity and practices as the main channel connecting the school environment with the success of preventing dropouts (Bryson et al., 2014; Creemers, 2008).

Characteristics of the School Environment and Collaboration

Descriptively, the analysis of school environment indicators (X1) in Malang Raya shows an average that is in the high category, especially in the aspects of remedial services, teacher academic capacity, and the creation of a safe and supportive learning atmosphere for students (Bryk & Schneider, 2002; Fan & Chen, 2001; Schneider & Bowen, 2010). Conversely, in the stakeholder role dimension (X2), the indicator of routine communication and formal information exchange among schools, parents, and the community consistently recorded the lowest mean, indicating that cross-actor connectivity remains a major challenge in the dropout prevention ecosystem (Epstein, 2010; Sanders, 2014). In Collaborative Service (X3), support from various parties for at-risk students, including counseling, social assistance, and additional learning support, is relatively strong. Still, consistency in implementing inclusive programs and the continuity of integrated services are in the moderate or neutral category (Patana, 2020).

This pattern indicates that internally, schools in Greater Malang have built a solid foundation for providing remedial services and academic mentoring, as well as in maintaining a social climate that supports the learning process (Fan & Chen, 2001). However, in the aspect of external collaboration, especially cross-actor communication and program coordination among schools, parents, school committees, the business world, and local governments, significant heterogeneity remains among schools, often not supported by structured collaborative governance (Bryson et al., 2015; Sanders, 2014). This phenomenon is evident in the absence of a structured coordination forum for mapping vulnerable students, the lack of established cross-level referral protocols, and the weak joint monitoring that is crucial for early detection and multi-layered handling of dropout cases (Patana, 2020).

These findings, when considered alongside national and regional policies such as the School Operational Assistance (BOS) policy, the program to prevent children from dropping out, and the school-community partnership guidelines, these findings highlight the gap between normative recognition of the importance of stakeholders and the quality of their implementation in the field (Bryson et al., 2015; Patana, 2020). Although various policy documents have positioned local governments, parents, and communities as key elements of the education system, data on X1, X2, X3, and Y in Greater Malang indicate that strengthening the school climate and support for students has not been fully accompanied by systematic consolidation of collaborative governance. Thus, descriptive statistics not only present the relative position of each indicator but also reflect the depth of internalization of collaborative policies into dropout prevention practices in the local context (Bryk & Schneider, 2002; Sanders, 2014).

Theoretical Implications

This research makes an important contribution to broadening theoretical understanding of the role of the school environment and collaborative mechanisms in preventing dropout at the high school level. The findings of collaborative service mediation demonstrate that the influence of school climate is indirect, operating through effective collaborative governance processes among stakeholders, thereby reinforcing the input–process–output model in the education literature (Bryk & Schneider, 2002; Leithwood & Jantzi, 2006). It underscores the importance of organizational processes as critical intermediaries that transform environmental conditions into sustainable learning outcomes.

Furthermore, this study highlights that the involvement of external stakeholders does not necessarily lead to meaningful outcomes unless collaboration is supported by robust structures, clear procedures, and adequate support mechanisms (Bryson et al., 2015). Thus, this study adds to the empirical evidence on the complexity of multi-actor collaboration in educational contexts, encouraging researchers and practitioners to focus not only on the presence of stakeholders but also on the quality of their relationships and collaborative mechanisms.

Specifically, the results of this study reinforce the concepts of collective efficacy and social capital in education as the primary assets that must be built through collaborative service to achieve sustainable and inclusive educational goals (Bandura, 1997; Coleman, 1988). Furthermore, this study creates opportunities to develop theories that integrate social, organizational, and information technology dimensions within a dropout prevention framework.

Practical Recommendations

To enhance school dropout prevention and reinforce the education system, several targeted measures are recommended. First, collaborative leadership capacity should be developed through transformational leadership and collaborative management training, emphasizing the formation of multi-stakeholder partnerships and cross-sector coordination, with school principals serving as key change agents. Second, establishing a cross-institutional working forum that includes schools, education offices, school committees, parents, and the community is necessary to facilitate effective two-way communication and clarify task distribution, and be supported by data and risk analyses of vulnerable students. Third, the integration of digital technology in monitoring and evaluation processes is essential, utilizing an information system that collects and analyzes real-time data to expedite decision-making and enhance accountability. Fourth, implementing early detection and intensive mentoring programs for at-risk students, including personalized remedial and counseling services, is critical. Fifth, a comprehensive and adaptive transition policy between middle and high school should be formulated to provide orientation, mentoring, and training in learning readiness and social-emotional skills. Finally, strengthening stakeholder engagement through formal collaboration structures with clearly defined roles, responsibilities, and transparent joint evaluation mechanisms is vital to achieving optimal educational outcomes.

Conclusion

This research demonstrates the significant contribution of the school environment to preventing high school dropouts in Malang, Indonesia, with collaborative service playing a crucial role. A conducive school climate encompasses supportive teacher-student relationships, effective remedial services, and student engagement and pride, creating a strong foundation for productive and sustainable collaboration. Collaborative service has been shown to significantly reduce dropout risk, underscoring that strengthening collaborative governance is a key strategy for maintaining educational sustainability. However, the role of external stakeholders has not been empirically effective, indicating the need for more formal and organized cross-actor collaboration structures and mechanisms. These findings correspond with the measures implemented by the Malang City Government and the Malang Education Office, including scholarships, mentoring, and cross-sector collaboration initiatives aimed at improving student retention. These efforts are also linked to the importance of data-based monitoring and information technology as supporting educational policies. Developing cross-actor collaboration capacity and implementing a systematic data-based support system are key priorities for improving high school student retention in Malang. This strategy requires not only internal improvements to the school environment but also the ongoing establishment of effective collaboration mechanisms between schools, policymakers, parents, and the community. It emphasizes the urgency of strengthening educational governance through a holistic approach that has been tested in research and field practice.

Limitations

Several limitations should be acknowledged in this study. First, the cross-sectional survey design restricts the ability to establish strong causal relationships, particularly concerning the mediating role of collaborative service. Second, the sample was limited to principals of Senior High Schools in Malang Raya, and thus did not directly capture the perspectives of students, parents, teachers, counselors, government officials, or community stakeholders. Third, the model examined only school environment, stakeholder roles, and collaborative service, excluding other potential determinants of dropout, such as family income, student motivation, parental education, geographic distance, transportation access, zoning policy, and labor-market pressures as separate variables. Fourth, the mediation finding should not be interpreted as evidence that the school environment lacks direct theoretical relevance to dropout prevention; rather, within this empirical

model, its influence was primarily reflected through collaborative service. Finally, as the study was conducted within the specific context of Malang Raya, the findings should be generalized with caution and further validated in other regional contexts using longitudinal and multi-informant research designs.

Acknowledgements

The authors would like to acknowledge all respondents for their valuable participation in this study and extend their appreciation to Universitas Brawijaya for supporting the ongoing implementation of this research.

Declaration

AI tools, including Grammarly, were employed to evaluate language quality and improve the manuscript's readability, clarity, and sentence structure. The use of Grammarly during the editing process ensured that the manuscript accurately reflects the authors' original research, ideas, and intellectual contributions. The authors maintain full responsibility for the content of the publication.

Conflict of Interest

The authors state that no conflict of interest exists in relation to the publication of this manuscript. The research was conducted independently and did not involve any commercial relationships that might be interpreted as a potential conflict of interest.

References

Acar, M., & Robertson, P. J. (2004). Accountability Challenges in Networks and Partnerships: Evidence from Educational Partnerships in the United States. *International Review of Administrative Sciences*, *70*(2), 331–344. https://doi.org/10.1177/0020852304044260

Adewale, O. T. A., & Okafor, I. M. (2025). Educational Policy in Nigeria: Analyzing the Impact of the 9-Year Basic Education Policy on School Enrollment and Retention Rates. *Research and Advances in Education*, *4*(1), 11–21. https://doi.org/10.56397/RAE.2025.01.02

Afandi, M., Erdayani, R., Afandi, S. A., & Rafi, M. (2022). Analysis of education autonomy policy in Indonesia. *Journal of Government Science (GovSci)*, 3(2), 85–99. doi: 10.54144/govsci.v3i2.32.

Afthanorhan, A., Awang, Z., & Aimran, N. (2020). Five common mistakes for using partial least squares path modeling (PLS-PM) in management research. *Contemporary Management Research*, *16*(4), 255–278. https://doi.org/10.7903/CMR.20247

Akabayashi, H., & Araki, H. (2011). Do education vouchers prevent dropout at private high schools? Evidence from Japanese policy changes. *Journal of the Japanese and International Economies*, *25*(3), 183–198. https://doi.org/10.1016/j.jjie.2011.07.003

Arman, A. H. R. D., & Tahwin, M. (2025). Analisis kinerja guru: Kompetensi, motivasi, lingkungan kerja, dan disiplin kerja. *Jurnal Ilmiah Manajemen, Ekonomi, & Akuntansi (MEA)*, 9(2), 669–683. doi: 10.31955/mea.v9i2.5696.

Basumatary, N., & Subudhi, S. C. (2022). Status of Dropout Rates in the Present Perspectives of Elementary Education with Special Reference to NEP 2020. *International Journal For Multidisciplinary Research*, *4*(6). https://doi.org/10.36948/ijfmr.2022.v04i06.1064

Becker, J.-M., Ringle, C. M., & Sarstedt, M. (2018). Journal of Applied Structural Equation Modeling estimating moderating effects in pls-sem and PLSc-SEM: interaction term generation*data treatment. In *Journal of Applied Structural Equation Modeling* (Vol. 2, Issue 2).

Bronfenbrenner, U. (1979). *The ecology of human development: Experiments by nature and design*. Harvard University Press. https://doi.org/10.2307/j.ctv26071r6

Bryk, A., & Schneider, B. (2002). *Trust in Schools: A Core Resource for Improvement*. Russell Sage Foundation. https://books.google.co.id/books?id=fOSFAwAAQBAJ

Bryson, J. M., Crosby, B. C., & Bloomberg, L. (2014). Public Value Governance: Moving Beyond Traditional Public Administration and the New Public Management. *Public Administration Review*, *74*(4), 445–456. https://doi.org/10.1111/puar.12238

Bryson, J. M., Crosby, B. C., & Stone, M. M. (2015). Designing and Implementing Cross-Sector Collaborations: Needed *and* Challenging. *Public Administration Review*, *75*(5), 647–663. https://doi.org/10.1111/puar.12432

Cohen, J., McCabe, Michelli, N., & Pickeral, N. M. (2009). School Climate: Research, Policy, Teacher Education and Practice. *Teachers College Record*, *Vol 111*, 180–213. https://doi.org/10.1177/016146810911100108

Creemers, B. P. M. (2008). *The dynamics of educational effectiveness: a contribution to policy, practice and theory in contemporary schools*. Routledge.

Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches (5th ed.)*. SAGE Publications.

Duckenfield, M., & Reynolds, B. (2013). *School climate and dropout prevention*. www.schoolclimate.org

Effendi, R., Ruhana, F., & Azikin, A. (2025). Collaborative Governance in the Implementation of Education in Rokan Hilir Regency, Riau Province. *Journal of Humanities and Social Sciences Studies,* 7(3). 119-142. https://doi.org/10.32996/jhsss

Emerson, K., Nabatchi, T., & Balogh, S. (2012). An integrative framework for collaborative governance. *Journal of Public Administration Research and Theory*, 22(1), 1–29. https://doi.org/10.1093/jopart/mur011

Emordi, A. T. O., & Ruth, O. I. (2023). SDG Goal 4: Out-of-School Children and All-Inclusive Development in South West Nigeria. *Human Nature Journal of Social Sciences*, *4*(3), 11–20. https://doi.org/10.71016/hnjss/s7jtt206

Epstein, J. L. (2011). *School, family, and community partnerships: Preparing educators and improving schools (2nd ed.).* Westview Press.

Epstein, J. L. (2018). *School, Family, and Community Partnerships*. Routledge. https://doi.org/10.4324/9780429494673

Epstein, J. L., & Sheldon, S. B. (2023). *School, family, and community partnerships : preparing educators and improving schools*. Routledge.

Epstein, J. L. (2010). School/Family/Community Partnerships: Caring for the Children We Share. *Phi Delta Kappan*, *92*(3), 81–96. https://doi.org/10.1177/003172171009200326

Fan, X., & Chen, M. (2001). Parental Involvement and Students' Academic Achievement: A Meta-Analysis. *Educational Psychology Review*, *13*(1), 1–22. https://doi.org/10.1023/A:1009048817385

Finn, J. D. (1989). Withdrawing from School. *Review of Educational Research*, *59*(2), 117–142. https://doi.org/10.2307/1170412

Flowers, C., Test, D. W., Povenmire-Kirk, T. C., Diegelmann, K. M., Bunch-Crump, K. R., Kemp-Inman, A., & Goodnight, C. I. (2018). A Demonstration Model of Interagency Collaboration for Students With Disabilities: A Multilevel Approach. *Journal of Special Education*, *51*(4), 211–221. https://doi.org/10.1177/0022466917720764

Fowler, F. J., Jr. (2014). *Survey research methods (5th ed.)*. SAGE Publications.

Freeman, R. E. (2010). *Strategic Management*. Cambridge University Press. https://doi.org/10.1017/CBO9781139192675

Gray, J. (2016). Investigating the Role of Collective Trust, Collective Efficacy, and Enabling School Structures on Overall School Effectiveness. *NCPEA Education Leadership Review*, *17*(1). 114-128.

Hair, J., & Alamer, A. (2022). Partial Least Squares Structural Equation Modeling (PLS-SEM) in second language and education research: Guidelines using an applied example. *Research Methods in Applied Linguistics*, *1*(3), 100027. https://doi.org/https://doi.org/10.1016/j.rmal.2022.100027

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, Marko. (2017). *A primer on partial least squares structural equation modeling (PLS-SEM)*. Sage.

Hair, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., Danks, N. P., & Ray, S. (2021). *Partial Least Squares Structural Equation Modeling (PLS-SEM) Using R*. Springer International Publishing. https://doi.org/10.1007/978-3-030-80519-7

Hayes, A. F. (2022). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach (3rd ed.).* The Guilford Press.

Hoover-Dempsey, K. V., Walker, J. M. T., Sandler, H. M., Whetsel, D., Green, C. L., Wilkins, A. S., & Closson, K. (2005). Why Do Parents Become Involved? Research Findings and Implications. *The Elementary School Journal*, *106*(2), 105–130. https://doi.org/10.1086/499194

Ihuoma, C. (2022, September). Achieving Sustainable Development Goal (SDG) 4 among Female Nomadic Children in Nigeria using Open and Distance Learning Strategies. *Tenth Pan-Commonwealth Forum on Open Learning*. https://doi.org/10.56059/pcf10.5898

Ji, M., Lee, H., & Park, C. (2024). Comparative Analysis of Dropout Prevention Policies in South Korea and Japan. *Korean Comparative Education Society*, *34*(5), 129–160. https://doi.org/10.20306/kces.2024.34.5.129

Kania, J., & Kramer, M. (2011). Collective Impact. *Stanford Social Innovation Review*, *9*(1), 36–41. https://doi.org/10.48558/5900-KN19

Ministry of education and culture. (2025). *Dasbor Verifikasi Validasi Anak Tidak Sekolah (Sumber Data Induk Pendidikan)*. Jakarta: Pusat Data dan Informasi (Pusdatin). https://pd.data.kemdikbud.go.id/ATS/index.php/rangkuman/ats-by-sekolah/050000?tabulasi=wilayah

Kline, R. B. (2023). *Principles and practice of structural equation modeling (5th ed.)*. The Guilford Press.

Kolleck, N., Schuster, J., Hartmann, U., & Gräsel, C. (2021). Teachers' professional collaboration and trust relationships: An inferential social network analysis of teacher

teams. *Research in Education*, *111*(1), 89–107. https://doi.org/10.1177/00345237211031585

Konold, T. R., Cornell, D., Jia, Y., & Malone, M. (2018). School climate, student engagement, and academic achievement: A latent variable, multilevel multi-informant examination. *AERA Open,* 4(4), 1–17. DOI: 10.1177/2332858418815661

Lail Rosyidatul Mu, N., Pugu, M. R., & Nelza. N. (2024). School-community collaboration: an education management approach to strengthening community-based schools. *Prosiding Seminar Nasional Indonesia*, *2*(2), 276–289.

Lee, V. E., & Burkam, D. T. (2003). Dropping out of High School: The Role of School Organization and Structure. *American Educational Research Journal*, *40*(2), 353–393. http://www.jstor.org/stable/3699393

Leithwood, K., & Jantzi, D. (2006). Transformational school leadership for large-scale reform: Effects on students, teachers, and their classroom practices. *School Effectiveness and School Improvement*, *17*(2), 201–227. https://doi.org/10.1080/09243450600565829

Lestari, I. (2024). Analisis motivasi guru terhadap prestasi belajar siswa di SD Negeri 149 Palembang. *Journal of Innovation in Teaching and Instructional Media*, 5(1), 169–176. doi: 10.52690/jitim.v5i1.923.

Lundberg, E., & Abdelzadeh, A. (2019). The Role of School Climate in Explaining Changes in Social Trust Over Time. *Scandinavian Journal of Educational Research*, *63*(5), 712–724. https://doi.org/10.1080/00313831.2018.1434824

Lyon, A. R., Whitaker, K., French, W. P., Richardson, L. P., Wasse, J. K., & McCauley, E. (2016). Collaborative care in schools: enhancing integration and impact in youth mental health. *Advances in School Mental Health Promotion*, *9*(3–4), 148–168. https://doi.org/10.1080/1754730X.2016.1215928

Markussen, E., & Sandberg, N. (2011). Policies to Reduce School Dropout and Increase Completion. In *School Dropout and Completion* (pp. 391–406). Springer Netherlands. https://doi.org/10.1007/978-90-481-9763-7_22

Mbatha, S., & Khohliso, X. (2025). Probing beneath the iceberg: An exploration of factors attributed to offenders' school dropout in South Africa. *Journal of Culture and Values in Education*, 8(1), 188–207. https://doi.org/10.46303/jcve.2025.11

Moos, R. H. (1980). Evaluating classroom learning environments. *Studies in Educational Evaluation*, *6*(3), 239–252. https://doi.org/https://doi.org/10.1016/0191-491X(80)90027-9

Monyane, M., & Kgothule, R. (2023). Pondering Collaborative School Board Roles in Alleviating Dropout among Learners with Physical Disabilities in Schools. *Research in Social Sciences and Technology*, 8(4), 283-300. https://doi.org/10.46303/ressat.2023.43

National School Climate Center. (2007). *The School Climate Challenge Narrowing the Gap Between School Climate Research and School Climate Policy, Practice Guidelines and Teacher Education Policy*.

Ngugi, M. N. (2024). Sustainable Development Goal for Education: The Case of Kenya's Efforts towards Universal Basic Education. *International Journal of Research and Innovation in Social Science*, *VIII*(IIIS), 3185–3196. https://doi.org/10.47772/IJRISS.2024.803227S

Niyibizi, O., Micomyiza, A., Bibakumana, G., Uwitatse, M. C., & Mutarutinya, V. (2024). Teachers' perceptions of influence of daily school feeding programs on student participation and dropout rates. *Journal of Classroom Practices*, 3(1), 26–39. https://doi.org/10.58197/prbl/hiha7266

Parker, L., & Sudibyo, L. (2024). Why young people leave school early in Papua, Indonesia, and education policy options to address this problem. *Compare: A Journal of Comparative and International Education*, *54*(1), 146–162. https://doi.org/10.1080/03057925.2022.2084037

Patana, P. (2020). *Inclusive education and cross-sectoral collaboration between education and other sectors*.

Qu, G. (2024). Perceived school climate, collective teacher efficacy, self-compassion, and subjective well-being in Chinese university teachers: a mediation analysis. *Humanities and Social Sciences Communications*, *11*(1), 1600. https://doi.org/10.1057/s41599-024-04074-2

Rosenthal, R., & Jacobson, L. (1968). Pygmalion in the classroom. *The Urban Review*, *3*(1), 16–20. https://doi.org/10.1007/BF02322211

Roudoh, Salsabilah, W. S., Wahyudin, A., & Hidayati, S. (2025). Rethinking the Indonesia Smart Program (PIP): A Policy Review and Solutions for Better Student Outcomes. *Nidhomul Haq : Jurnal Manajemen Pendidikan Islam*, *9*(3), 769–780. https://doi.org/10.31538/ndhq.v9i3.43

Rumberger, R. W. (1987). High School Dropouts: A Review of Issues and Evidence. *Review of Educational Research*, *57*(2), 101–121. https://doi.org/10.2307/1170232

Rumberger, R. W. (2011). *Dropping Out: Why Students Drop Out of High School and What Can Be Done About It*. Harvard University Press. https://books.google.co.id/books?id=xc7qzKoMCCMC

Rumberger, R. W., & Lim, S. A. (2008). *Why students drop out of school: A review of 25 years of research* (California Dropout Research Project Report No. 15). University of California, Santa Barbara.

Sanders, M. G. (2014). Principal Leadership for School, Family, and Community Partnerships: The Role of a Systems Approach to Reform Implementation. *American Journal of Education*, *120*(2), 233–255. https://doi.org/10.1086/674374

Saputra, A., & Fauzi, M. (2022). Integration of Education Planning Funds Base on Philanthropy: Drop Out School Mitigation. *International Journal of Humanities, Management and Social Science*, *5*(1), 8–17. https://doi.org/10.36079/lamintang.ij-humass-0501.333

Schneider, B., & Bowen, D. (2010). *Winning the Service Game* (pp. 31–59).

https://doi.org/10.1007/978-1-4419-1628-0_4

Seni, A. (2025). Challenges faced by out of school female street children and teenagers engaged in begging in Tanzania. *Theory and Practice in Child Development*, 5(2), 84–107. https://doi.org/10.46303/tpicd.2025.12

Szekely, M., & Adelman, M. (2016). *School Dropout in Central America: An Overview of Trends, Causes, Consequences, and Promising Interventions*. World Bank, Washington, DC. https://doi.org/10.1596/1813-9450-7561

Tinto, V. (1975). Dropout from higher education: A theoretical synthesis of recent research. *Review of Educational Research*, 45(1), 89–125. https://doi.org/10.3102/00346543045001089

Urszula, D. (2017). Teacher and student perceptions of school climate. Some conclusions from school culture and climate research. *Journal of Modern Science*, 1(32), 63-82.

Wang, M.-T., & Degol, J. L. (2016). School climate: A review of the construct, measurement, and impact on student outcomes. *Educational Psychology Review*, 28, 315–352. DOI: 10.1007/s10648-015-9319-1

Wikantiyoso, R., Suhartono, T., Tutuko, P., & Sulaksono, A. G. (2022). Mobility patterns consideration of educational facilities distribution model formulation in Southeast Malang Regional development plan. *ARTEKS: Jurnal Teknik Arsitektur,* 7(3), 387–398. doi: 10.30822/arteks.v7i3.1870.

Yusuf, A., & Hanif, M. (2025). Dampak desentralisasi pendidikan terhadap ketimpangan akses di Indonesia. *Jurnal Inovasi Penelitian Ilmu Pendidikan Indonesia*, 2(3), 153–166. doi: 10.31004/mnhraz85.

Zhao, X., Lynch, J. G., & Chen, Q. (2010). Reconsidering Baron and Kenny: Myths and Truths about Mediation Analysis. *Journal of Consumer Research*, *37*(2), 197–206. https://doi.org/10.1086/651257