Cogent Education

ISSN: 2331-186X (Online) Journal homepage: www.tandfonline.com/journals/oaed20

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To cite this article: Gideon Mazuruse, Brighton Nyagadza, Nomalanga Mpofu-Hamadziripi, Retius Chifurira & Ashley Muvuti (2026) Structural equation modelling (SEM) in predicting student performance factors post introduction of new curriculum in Zimbabwe: a case study of Mashonaland East Province, Cogent Education, 13:1, 2664813, DOI: 10.1080/2331186X.2026.2664813

To link to this article: https://doi.org/10.1080/2331186X.2026.2664813

Published online: 04 May 2026.

COGENT EDUCATION
2026, VOL. 13, NO. 1, 2664813
https://doi.org/10.1080/2331186X.2026.2664813

CURRICULUM & TEACHING STUDIES | RESEARCH ARTICLE

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Structural equation modelling (SEM) in predicting student performance factors post introduction of new curriculum in Zimbabwe: a case study of Mashonaland East Province

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ABSTRACT

Zimbabwe successfully implemented the competency-based curriculum in 2015 with the goal of enhancing national curriculum outcomes and fostering skill development that aligns with the demands of the country's 2030 National Development Strategy. This initiative aims to equip students with practical skills and knowledge that are essential for driving sustainable socio-economic growth and meeting the evolving needs of the job market. This research aims to identify the factors, and their interplay of student performance post the introduction of the new curriculum. The Structural Equation Model (SEM) is used to identify the factors and their interaction. A Closed ended question questionnaire was administered to randomly selected students in Mashonaland East Province in Zimbabwe to gather the data on respondents' views on students' academic performance due to factors such as learning resources and student engagement. In this study, a stratified sampling method was utilized to ensure a correct representative of all the people affected by the curriculum development within Mashonaland East Province in Zimbabwe. Results confirm that student engagement, learning resources, teacher quality, curriculum development and student attitude positively influence academic performance. The study also reveals the interdependence of these factors in shaping the education system in Zimbabwe. The study managed to relate the complex relationships of student engagement, learning resources, teacher quality, curriculum development, student attitude and academic performance. The results of this study will be of great benefit to the government to enhance resource allocation equally, improve the training of teachers and adjust the curriculum development.

IMPACT STATEMENT

For the current investigation, Structural Equation Modelling (SEM) was used to assess the influence of teachers' quality, learning resources, curriculum development and student involvement on academic performance within the context of curriculum reforms in Zimbabwe, where student attitude serves as an important mediating variable. The findings of the analysis have provided strong evidence indicating that the improvement in the quality of instruction, availability of adequate resources, and learner involvement influences students' attitudes, which consequently enhances their performance. Through identifying the direct and indirect relationships, the study offers a comprehensive understanding of the process by which the reforms in the curriculum are implemented into better academic performances. The importance of the current analysis comes from the potential ability to guide the policymakers, educators and curricula developers in Zimbabwe, and other similar developing countries about what areas should be prioritized in order to achieve effective reforming in addition to creating positive attitudes among the learners.

ARTICLE HISTORY
Received 20 October 2024
Revised 25 March 2026
Accepted 21 April 2026

KEYWORDS
Academic performance; curriculum development; structural equation modeling (SEM); Zimbabwe

JEL CODES
A21; C1; C6

SUBJECTS
Teachers & Teacher Education; Theory of Education; Curriculum Studies

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PUBLIC INTEREST STATEMENT

This research aims to identify the factors, and their interplay of student performance post the introduction of the new curriculum. The Structural Equation Model (SEM) is used to identify the factors and their interaction. The study also reveals the interdependence of these factors in shaping the education system in Zimbabwe. The study managed to relate the complex relationships of student engagement, learning resources, teacher quality, curriculum development, student attitude and academic performance.

1. Introduction

The Zimbabwean education system has been changing in the past decade due to several factors like socioeconomic and environmental factors (Muwaniki et al., 2022). Many educators have come up with some suggestions on how to revamp the education system, taking for example, the Nziramasanga to improve the curriculum's applicability to changing requirements (Kamete, 2022). Not only were the primary and secondary education systems affected alone, but there were some efforts to improve the educational material at universities in Zimbabwe to support the nation's progress. The changes would focus on areas that will transform the nation into a competitive country in the region and abroad for effective growth (Phuthi, 2022). The present study focused on examining the complex relationships that influence the academic performance of students.

Despite the involvement of various stakeholders, the implementation of these changes faced obstacles such as the absence of explicit policies and strategies for establishing operational frameworks at academic institutions (So et al., 2022). Furthermore, the execution of the curriculum in primary and secondary schools is hindered by factors such as teachers with low experience, inadequate resources, and a lack of family engagement (Matowo & Tenha, 2023). Despite these obstacles, the changes are important for improving academic excellence and hence promoting the lifelong abilities of the graduates (Nyikadzino & Vyas-Doorgapersad, 2022). It is necessary to develop a structural equation model that reflects on the factors that influence the academic performances of the learners to understand the interplay of main factors such as the learning resources, student engagement, student attitude and teacher quality.

The updated curriculum aims to include entrepreneurial skills that result in the economic development of the country (Saiden, 2017). The updated curriculum in Zimbabwe, a competency-based curriculum, is similar to that of South Africa and Zambia, but faces different challenges. In the case of Zimbabwe, the effective implementation of learner-centered approaches has not been facilitated due to challenges like a lack of teaching and learning resources, a high number of learners, and inadequate teacher training. In addition, the gap between rural and urban schools has resulted in unequal opportunities for the implementation of the curriculum. Furthermore, a lack of infrastructure and a high learner-teacher ratio have reduced the amount of time spent on practical and participatory approaches to learning, emphasizing the importance of teacher training and support to ensure the success of the curriculum reform. The reforms in Zimbabwe started in 2013 aiming to meet the required skills in the labor market (Gory et al., 2020). For more than two decades, curriculum reforms have been ongoing in Namibia but facing difficulties in implementation issues (Lipinge & Kasanda, 2013). In South Africa, the curriculum aims to promote common values. In Zambia, the educational system aims to promote mathematics education and the need for inclusivity (Kadonsi et al., 2023). Despite the efforts in these regions to improve the educational system in the regions, various challenges to equitable educational systems remain at the focal point.

Various studies on competency-based curricula (CBC) have been carried out in various countries, such as Kenya and Rwanda, with different observations noted by various authors. In Rwanda, it was noted that around 82% of the teachers struggled with the CBC because of its inadequacy in training and content (Kizito et al., 2019). This suggests that the challenges faced were not inherent in the curriculum design but rather in the level of professional development and preparation for teaching. Lack of training reduced the confidence level of the teachers in effectively executing learner-centered strategies, while

unclear curriculum content reduced the effectiveness of the teaching strategies. These limitations have the potential to compromise the effectiveness of the expected outcomes from the curriculum reforms, such as increased student engagement and performance. Therefore, teacher training and preparation for teaching are essential for the effective implementation of the CBC. These experiences from the regions provide a useful context for making sense of similar reform challenges in the context of Zimbabwe. The implementation of the competency-based curriculum in Zimbabwe has been challenged by the limitations in the allocation of resources. However, the government, with support from various cooperating organizations like UNICEF, has made significant efforts to improve the implementation of the curriculum (Nyikadzino, 2023). For instance, there is the provision of learning and teaching resources, teacher training, and support for the use of continuous assessment. Despite the challenges, the collaborative efforts have played a crucial role in bridging the gap to some extent.

Evidence from scholarly literature shows that teacher education programs based on the competency-based curriculum (CBC) are currently in use in Kenya, though with inconsistencies in coverage and quality, which still pose a challenge to full-scale implementation (Mutai, 2025). Mpisili (2022) further observes that, despite concerted efforts by various countries in the region to improve implementation of the CBC, infrastructural challenges still pose a significant barrier to implementation. Despite such challenges, various countries in this region continue to make efforts to improve their education standards and inclusiveness. The analysis of the CBC in Mashonaland East, Zimbabwe, is vital since it guides the nation on the overall performances of learners in all the provinces (Chimbunde, 2023). Although the curriculum will in some way improve the education system, some researchers like Rugedhla et al. (2023), have identified problems in inclusion, namely in the way learners with special needs are accommodated. In addition, Muwaniki et al. (2022), identified problems such as limited engagement time in the implementation of the CBC and this can be a result of poor teacher remuneration and student absenteeism (Muwaniki et al., 2022). Various factors within the education system affect the academic performance of students and these include teacher quality, student engagement, student attitude and learning resources. Sibanda (2023) demonstrated that both parental support and socioeconomic status have a major influence on academic achievement.

The inclusion of factors such as information and communication technology (ICT) management skills in school environments can boost operational efficiency and lead to improvement in the academic performance of the students (Mataruka et al., 2023). Factors such as curriculum development, learning resources like ICT and instructional material contribute immensely to the academic performance of learners (Cristina et al., 2018; Wambua et al., 2018). Hence, understanding these factors is important as it positively impacts student achievement.

Analyzing the interaction of factors that affect the academic performance of Zimbabwe's post-2015 curriculum in Mashonaland East can be done through Structural equation modeling (SEM), which is a powerful tool that investigates the complex relationships between the components. The use of SEM facilitates the analysis of teacher quality, curriculum development, student engagement, and learning resources on the performance of students (Wijaya et al., 2023). Given the nature of the learning environment where factors such as the learning resources and student engagement interact, it is vital to develop an SEM where proper conclusions can be drawn because of the interdependence of these variables. Various researchers have employed SEM in analyzing student performance and many different fields. Mataruka et al. (2023), effectively used SEM in assessing student performance using factors such as student engagement, self-control and emotion and analyzing the influence of entry requirements on postgraduate academic performance (Rudhumbu & Mudau, 2022). Through the use of SEM, complex linkages between variables can be examined making it easy to observe the variables with the greatest effect and hence we can use the SEM within the framework of Zimbabwe's post-2015 curriculum in Mashonaland East which can reveal the relationships between the learning resources, quality of the teacher, and student attitude and consequently can lead to assess their performance. The SEM approach allows for the evaluation of intangible elements such as teacher quality. However, the true potential of SEM is to reveal how pedagogical competence impacts students' engagement, attitudes, and eventually academic performance. Previous research, such as that done by Saliya (2022), has shown that SEM allows for the determination of structural relationships through which learning outcomes are influenced by effective teaching. In this study, teacher quality is not only evaluated as a statistical construct but as a

tool to boost the effectiveness of curriculum implementation. Therefore, this study adds to existing literature by showing how intangible elements influence the reform-oriented curriculum in Zimbabwe. This adds to the overall analytical consistency between methodology, theory, and findings.

While numerous studies have examined the evaluation of Zimbabwe's post-2015 curriculum's academic performance, there remains a significant amount of unfinished work, particularly in understanding how factors like as learning resources and curriculum development impact student attitudes regarding their academic achievement. More needs to be done, especially in the Zimbabwe setting where the updated curriculum was introduced in 2015. The unique contribution of this paper stems from the application of SEM which extracts the complex relationship between learning resources, development, student engagement, teacher quality, and student attitudes in molding academic performance in the Zimbabwe educational reforms (Mazuruse et al. 2026). Previous studies only focus on the use of simpler regression models that cannot expose hidden relationships of variables. The findings of the study will likely help the Zimbabwe educational system, especially in improving the curriculum. This paper is organized as follows: Section 2 gives the theoretical model and hypothesis whilst section 3 deals with research methodology. Section 4 offers a thorough explanation of the findings and section 5 gives the discussion of the results. Section 6 outlines the conclusion, implications, limitations and the study recommendations.

2. Theoretical model and hypotheses

Zimbabwe's post-2015 curriculum has been important in solving the challenges that the country is facing.

The competency-based curriculum allows the students to maximize their potential. Since the theoretical model in this article incorporates many variables that are interlinked, structural equation modeling will be applied to understand their relationships. Our theoretical framework proposes that student involvement, teacher quality, learning resources, and curriculum development are underlying factors that affect the academic environment. Teacher quality, student engagement, learning resources, and curriculum development as latent variables that affect academic achievement. Based on a review of existing studies and real-world data, we propose that these underlying factors have a significant impact on the connection between student attitude and academic achievement. Our theoretical model is based on the notion that students' attitude plays a major role in mediating the relationship between latent variables and academic achievement. To improve the results in schools, we need to understand the complex interplay between these variables. Based on the theory outlined above, our objective is to understand and examine the complex interaction between the latent variables and academic achievement in Zimbabwe's post-2015 curriculum in Mashonaland East through SEM. Figure 1 is the conceptual model for which provides a visual representation of the hypotheses to be examined.

2.1. Student engagement

Student engagement positively influences academic performance (Hamu et al., 2023; Moesarofah et al., 2023). Student engagement, as Rudhumbu and Mudau (2022) have described it, means the degree of involvement, motivation, and passion that students show in the educational experience. Student engagement is an important factor in academic performance as it includes emotional and behavioral dimensions (Mazuruse et al., 2021; Reyes et al. 2012). Behavioral engagement includes aspects such as contributing to class discussions, attending classes and completing assigned tasks. Emotional engagement includes a feeling of belonging and showing interest in learning. Research conducted by Duncan (2020), shows that an engaged student shows high levels of motivation and critical thinking. A positive teacher-student relationship is believed to improve student engagement (Magwa & Mohangi, 2022). Active student engagement has a positive correlation with involvement and increased levels of focus resulting in improvement in understanding. Consistent with the prior studies, the following hypotheses are formulated:

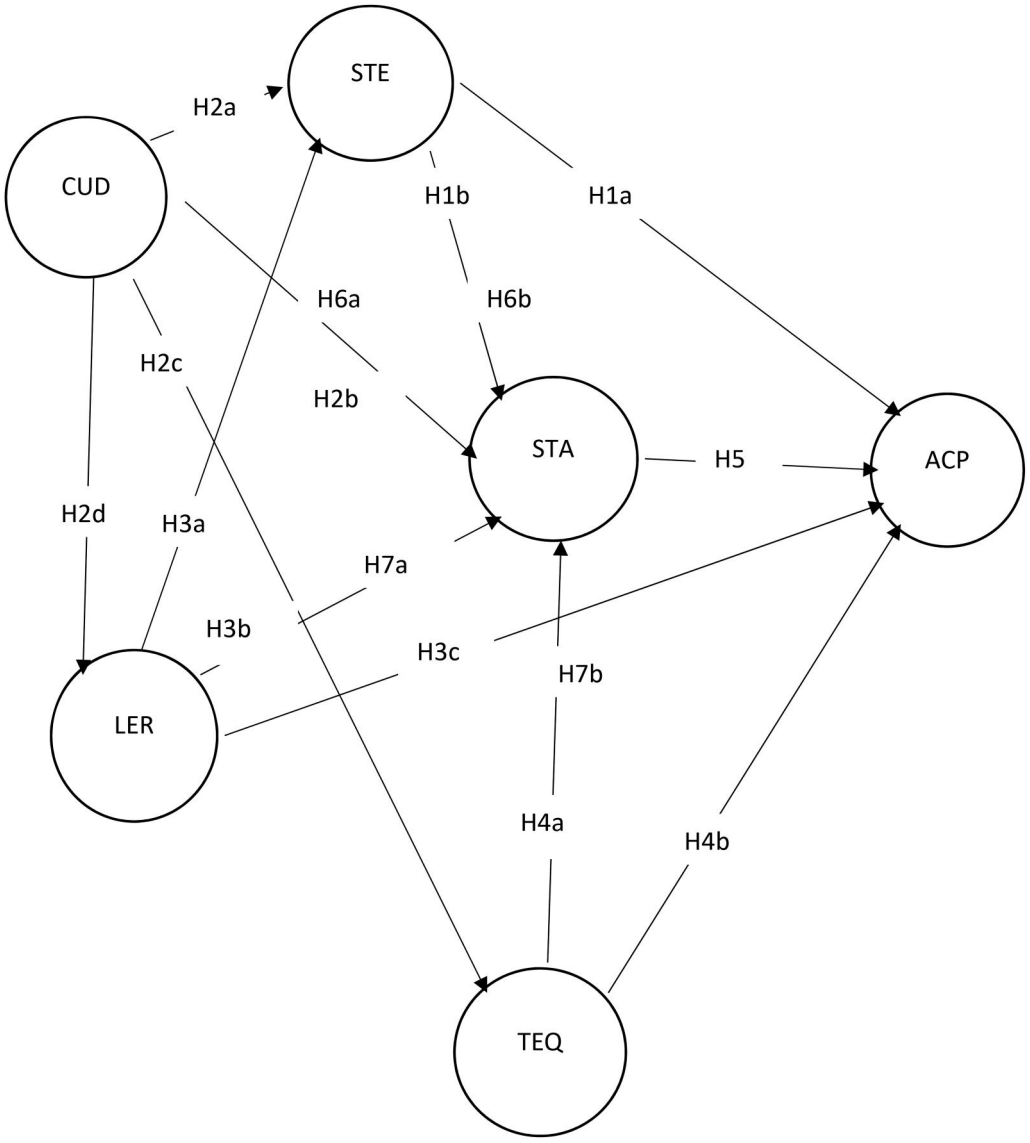

Figure 1. Conceptual research study model.
Key: TEQ = Teacher quality, LER = Learning resources, CUD = Curriculum development,.
STE = Student engagement, STA = Student attitude, ACP = Academic performance.

Hypothesis 1b: *Student engagement positively influences student attitude.*

Hypothesis 1a: *Increased student engagement has a direct impact on academic performance.*

2.2. Curriculum development

Curriculum development involves the creation and implementation of education programs (Alharahsheh et al., 2022). The content of a good curriculum aligns its mandate with the needs of the students and the skills of the country. Regularly updating the curriculum promotes the competitiveness of students with the international labor demands (Maziriri et al., 2025; Stewart, 2012). Moreover, a flexible curriculum incorporates many methods of learning which include practical and theoretical styles that will improve the academic performance of the learners (Chikazhe et al., 2023; Wanner and Palmer, 2015). Curriculum development in Zimbabwe has emerged as a strong pillar in assessing student performance and the success of the country. The country has understood the importance of changing education from knowledge-focused curricula to competency-based ones, in line with the current skills and labor requirements (Rudhumbu & Mudau, 2022). Phuthi (2022) has indicated the importance of universities changing their

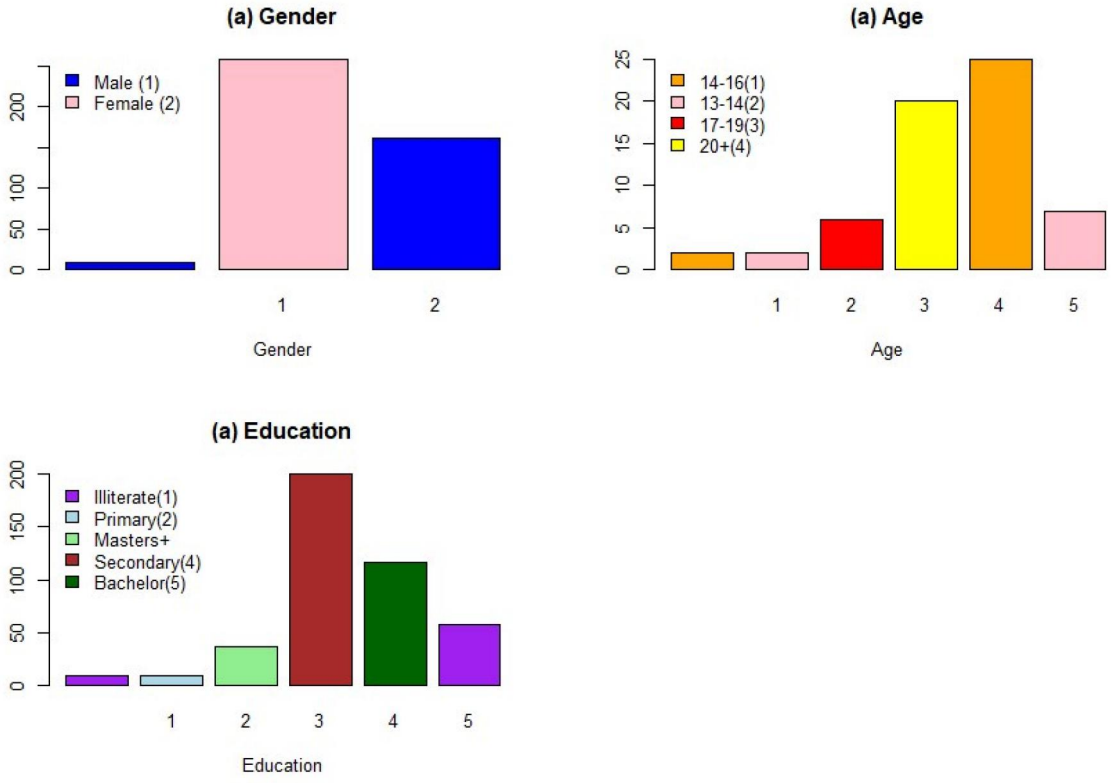

Figure 2. Demographic characteristics.

curricula so that they can address the problems the country is facing and concentrate on socio-economic development. In essence, the main objective is to come up with a system that encourages students to critically think in solving problems and consequently lead to socio-economic growth. Consistent with the prior studies, the following are hypotheses are proposed:

Hypothesis 2b: *Curriculum development has a direct influence on student attitude.*

Hypothesis 2a: *Curriculum development is positively associated with student engagement.*

Hypothesis 2d: *Curriculum development positively influences the availability and quality of learning resources.*

Hypothesis 2c: *Curriculum development positively influences teacher quality.*

2.3. Learning resources

Learning resources acts as a backbone for the smooth running of all school activities. Learning resources encompass the materials and instruments that educators use to help students accomplish their goals of learning (Yan-Hong, 2011). The resources include charts, multimedia, playgrounds, classrooms and textbooks (Mwania & Murithi, 2017; Akungu, 2015). Moreover, the learning resources which include textbooks, access to the internet, libraries and equipment in the laboratory are essential for learning purpose (Nikolic, 2015). The availability of proper learning resources improves the quality of the students produced as they can remember what they have learned through additional study. The use of modern technologies like interactive whiteboards and online platforms can help the individual need of students and thereby improve their academic performances (Memon et al., 2022). The use of educational materials is important for improving the quality of education in schools. Research has shown that the use of information and communication technology (ICT) learning resources can improve the academic performance of students through the interactive process (Mataruka et al., 2023). So, there is need for schools to

invest more in learning resources to improve the performance of the learners. The following hypotheses were formulated:

Hypothesis 3b: *The learning resources positively influence student attitude.*

Hypothesis 3c: *Academic performance is positively influenced by the learning resources.*

Hypothesis 3a: *Student engagement is positively influenced by the availability of learning resources.*

2.4. Teacher quality

The quality of the teacher plays a significant role in affecting student performance.

High-quality teachers exhibit high levels of pedagogical skills including the ability to meet the needs of students with different needs. Effective teachers engage students through proper communication channels and constructive feedback as said by Lorencová et al. (2019). Students who are taught by quality teachers often perform better in examinations. A positive teacher attitude can encourage students to participate and can result in shaping the overall performance (Roorda et al., 2011). The capacity of the teachers to effectively interact well with students and make positive relationships is a skill that is required for them to achieve their academic goals (Hamu et al., 2023). Their quality can be assessed through the level of education and experience, so any instructor needs to acquire the necessary skills to effectively influence the student positively. The administration needs to motivate teachers to improve their quality.

Based on the discussion above, we set the following null and alternative hypotheses:

Hypothesis 4b: *Higher teacher quality is positively associated with academic performance.*

Hypothesis 4a: *Teacher has a direct positive impact on student attitude.*

2.5. Student attitude

Student attitude is another factor that can affect academic performance. Musa and Garba (2019) have shown that the attitude of teachers to disciplines like Mathematics has a positive correlation with academic performance. This observation entails that the quality of the teacher should be considered as one of the strong pillars that affect the education outcome. Addressing student attitudes is very important for administrators and policymakers to create a conducive environment that will improve their academic performance (Hamu et al., 2023; Moesarofah et al., 2023). Research conducted by Schunk and Zimmerman (2012), shows that a positive attitude toward learning is associated with high levels of persistence and high levels of engagement. Moreover, students with a positive mindset can be able to overcome challenges they may face during learning. Students' attitudes can be influenced by several factors such as peer influence and family support (Mata et al., 2012).

Consistent with the prior studies, the following are the hypotheses formulated:

Hypothesis 5: *Student attitude is positively associated with academic performance.*

2.6. Mediation of student attitude

Student attitude plays as a mediator variable in this study between the endogenous variables and academic performance demonstrating its efficacy in determining the performance of students. Studies have shown that student engagement positively impacts academic performance whilst student attitude act as a mediator variable (Didar, 2023, Baños et al., 2023). In another separate study, student attitude mediates the influence of learning resources on academic performance (Akgun & Ciarrochi, 2003), demonstrating the efficacy of student attitude. Moreover, the study conducted by Wu et al. (2024) demonstrates the significant impact of teacher-student quality on academic engagement. Therefore, student attitude plays

a significant role in connecting endogenous variables with the academic performance of students. The following hypotheses are called based on previous literature:

Hypothesis 6a: Student attitude mediates the influence of curriculum development on academic performance.

Hypothesis 6b: Student attitude mediates the influence of student engagement development on academic performance.

Hypothesis 7a: Student attitude mediates the influence of learning resources on academic performance.

Hypothesis 7b: Student attitude mediates the influence of teacher quality on academic performance.

2.7. Academic performance

The academic performance of learners is one of the ways affected by several variables in the education settings. It can be measured by observing the grading system at the end of each cycle say after 4 months. Evaluating the effectiveness of Zimbabwe's post-2015 curriculum in Mashonaland East on academic achievement requires an examination of several elements, including the availability of learning resources, the process of curriculum development, the quality of teachers, student attitudes, and levels of student participation. Factors such as student engagement, teacher quality and learning resources have influenced the academic performance of students (Marongedza et al., 2022; Sithole et al., 2022). Since academic performance is influenced by several factors, the structural equation model can reveal the interaction of several factors that will allow policymakers to address crucial elements (Rudhumbu & Mudau, 2022).

2.8. Justification of chosen constructs

Despite the positive roles of parental support and socioeconomic in the academic performance of learners, they were not integrated into the model due to contextual and methodological considerations relevant to the present study. More specifically, the study focused on the importance of school-level factors affecting academic performance after the curriculum reforms rather than those at the family level. Moreover, the consistent and valid measurement of parental support and socioeconomic factors across diverse and varied rural, urban, and peri-urban communities in Mashonaland East Province was a limitation that may result in a measurement error and compromise the validity of the model. Preliminary conceptual mapping also indicated that socioeconomic factors may overlap with learning resource access, which may result in multicollinearity and complicate the interpretation of the structural relationships. On the contrary, learning resource access was retained in the model due to its direct association with the provision of textbooks and educational materials for the effective implementation of the curriculum. Similarly, teacher quality was integrated into the model as a proxy for pedagogical competency, subject expertise, and teaching management skills that are essential for effective student learning outcomes. Student engagement was also integrated into the model to reflect student behavior and emotional participation in academic activities that may result in effective learning outcomes. Moreover, student attitude was integrated into the model as a mediator that may influence the effectiveness of the curriculum and student academic performance. Curriculum development was conceptualized as a latent variable that may influence academic performance by reflecting the importance and flexibility of the curriculum for effective implementation and student learning outcomes.

3. Research methodology

This section provides step-by-step processes on how the research was done. Closed-ended questionnaires were used to gather data on the views of respondents on the academic performance of students due to multiple factors. The study used a quantitative approach to analyze the data.

3.1. Questionnaire design and measures

The factors measured in this study were assessed through a 5-point Likert scale from strongly disagree to strongly agree. For example, the curriculum development with 3 items was assessed using item scales as shown in Appendix. The main aim of the study was to assess the efficacy of Zimbabwe's Post-2015 Curriculum in Mashonaland East on academic performance. The designed questionnaire focused on factors like student engagement, curriculum development, teacher quality and learning resources to thoroughly understand how these factors affect the academic performance of the students (Yamashita, 2022 It was very important to ensure that the questionnaire is properly crafted with clear and concise questions to maximize response rate and minimize response biases (Arundel, 2023). Moreover, a well-designed questionnaire saved time and allowed participants to contribute positively. It is very important to ensure that the questionnaire is properly crafted with clear and concise questions. Further to this, the process of questionnaire design should involve pre-testing the questionnaire and identifying the necessary information to reduce impartial results (Taherdoost, 2022).

3.2. Sampling and data collection

This study used a stratified random sampling approach in its attempt to create a representative sample of stakeholders affected by curriculum reform in Mashonaland East Province, Zimbabwe. The strata were determined by community characteristics, school characteristics, and geographical distribution at the district level. A total of 400 participants were targeted using the Krejcie and Morgan (1970) formula, which gave a confidence level of 95%, a margin of error of 5%, and a random sampling approach. A structured close-ended questionnaire was used as a means of collecting information on the perceptions of teacher quality, learning resources, curriculum development, student engagement, student attitude, and academic performance. A pilot study on the reliability and validity of the questionnaire was undertaken before the main study. The responses obtained in the study were then entered a SEM approach, which can be used in analyzing both mediated and direct relationships between the study variables.

The stratified sampling technique was utilized to guarantee that the key contextual variations that impacted curriculum implementation and student performance were adequately represented in the study. The term 'community' refers to the socio-spatial environment in which the school is located and can be regarded as a rural, peri-urban, or urban environment that varies in terms of access to educational resources and facilities (Sahana et al. 2023). The term 'school type' refers to the administrative and funding structure of the school and includes government, mission, and private schools that have different management structures and learning environments (Sahito et al. 2025). The term 'location' refers to the geographical distribution of the school at the district level in the Mashonaland East Province and allows for the spatial comparison of the outcomes of the curriculum reform process. The stratification variables impacted the presentation of the data by facilitating the descriptive comparison of the characteristics of the population. The stratification variables impacted the analysis of the data by enhancing the representativeness and reducing the bias of the sample for the structural equation modeling (SEM) results. Thus, the stratified sampling technique enhanced the rigor of the study.

3.3. Ethical considerations

Examining the academic performance in Zimbabwe's post-2015 curriculum in Mashonaland East, ethical considerations were observed to ensure that the respondent's freedom, professionalism, integrity, and privacy were maintained. Since the study focused on schools, the climate in educational institutions was observed, as shown by a study conducted by Gwamanda et al. (2023). Participants were told about the importance and purpose of the research and the potential risk involved and should be permitted to quit participating. The respondents were not forced to participate, ensuring voluntary participation. Finally, the outcome of the research was conveyed to the respondents to ensure transparency and honesty.

4. Data analysis and results

To build a strong structural equation modeling, an assessment of the variables was done through convergent and discriminant validity.

4.1. Demographic characteristics

The demographic characteristics used in this study included gender, age and education. The results indicated in Figure 1 show more females than males who participated in the survey. Gender differences can influence the outcome of the research. Furthermore, analyzing gender distribution enables us to observe gender composition. Most participants were in the age range of 14–16 years, which indicates that most of them were in secondary schools and were the implementers of the updated curriculum. Moreover, the age range 20+ years was the second with the most respondents. Many respondents in this category have experience that might bring desirable answers. The age group of 13–14 years had the lowest number of participants; most of whom are at lower levels of education and the outcome might reflect the truth on the ground. Demographic control variables such as gender, age, and educational status were included into the study since they have a role to play. From a socialization and gender roles perspective, male and female students may have differing levels of motivation and interests in the curriculum. Theoretical links with differing educational experiences and academic outcomes were also based on past educational research that suggested that gender may influence student engagement levels and confidence with academic tasks and responding to curriculum changes. Thus, the gender distribution of the student population was integrated into the study to provide context for differing student attitudes and academic outcomes rather than implying curriculum bias toward a particular gender group. Similarly, the inclusion of the variable of student age was based on the theoretical links with developmental learning theory that suggested that cognitive maturity and readiness may influence student learning and adaptation to differing curriculum approaches. The inclusion of educational status was based on the differing levels of human capital that may influence the ability of the student population to interpret the results of the survey and evaluate the schooling environment. The inclusion of the demographic variables has thus been theoretically justified and more coherently integrated into the analysis and discussion.

On the other hand, the few numbers of participants in this age range might raise suspicion in the selection process. The educational status of the participants is an important key parameter under the demographic characteristics. A greater proportion of the participants were from secondary education, followed by those who had bachelor's degrees. Educational status has been included as a key demographic variable in this study in consideration of its theoretical implications in relation to individuals' cognitive ability, perceptions, and understanding of educational reform. Based on human capital theory and educational sociology literature, it has been theorized that educational status would have a significant impact in relation to individuals' understanding and perceptions of educational reform. In this study, educational status has been included to contextualize perceptions of student engagement, resources, and performance. Based on the results, the majority of the sample included in this study have a secondary level of educational attainment, followed by bachelor's degree holders. This has provided credibility to this study, as it may be assumed that the sample has sufficient educational grounding to provide perceptions of schooling processes. Moreover, this variable has also provided the opportunity to control potential response biases in terms of literacy and understanding levels. In this study, educational status has been grounded in theory, providing support to the methodology and facilitating a discussion of the results

4.2. Steps of the structural equation modeling

During the construction of the structural equation modeling, the assessment of the measurement model was done through convergent validity to check the adequacy of latent variables in explaining the variance in its indicators. The process was done by checking composite reliability (CR), average variance extracted (AVE), factor loadings and Cronbach's Alpha. Moreover, to ensure that constructs are distinct,

Table 1. Measurement model assessment.

Latent constructs	Indicators	Factor loading	Comp. reliability	AVE	Cronbach's alpha	Result
Academic performance	ACP1	0.837	0.835	0.814	0.902	Supported
	ACP2	0.829				
	ACP3	0.964				
Students attitudes	STA1	0.901	0.856	0.803	0.923	Supported
	STA2	0.864				
	STA3	0.868				
	STA4	0.915				
Curriculum development	CUD1	0.748	0.817	0.752	0.738	Supported
	CUD2	0.817				
	CUD3	0.725				
Teacher quality	TEQ1	0.862	0.824	0.878	0.875	Supported
	TEQ2	0793				
	TEQ3	0.837				
Student engagement	STE1	0.745	0.848	O.797	0.796	Supported
	STE2	0.803				
	STE3	0.825				
	STE4	0784				
Learning resources	LER1	0.764	0.806	0.768	0.842	Supported
	LER2	0.801				
	LER3	0.775				

Source: Field Data (2024).

the Heterotrait-Monotrait ratio (HTMT) was used. After the measurement model was examined, the structural relationship of variables was assessed for both the direct and indirect effects, evaluating the significant and non-significant. Since our concept included the mediator variable, the mediation process was done through Sobel's Test. To examine the model's fit and stability, diagnostic measures like effect size, coefficient determination and multicollinearity were used. Furthermore, standardized root mean square residual (SRMR) was used to examine the goodness of fit. Finally, the goodness of fit (GoF), validates the model's adequacy in representing the relationships among the constructs.

4.3. Convergent validity

The extent of correlation in structural equation modeling (SEM) between various measures of the same construct is assessed through convergent validity. Cheung et al. (2024) and Rubia, (2019) are some of the researchers who emphasized the significance of convergent validity in structural equation modeling. The main aspect used to measure convergent validity is through average extracted (AVE). The AVE value above 0.5 is considered satisfactory according to Cheah et al. (2018). Moreover, Henseler et al. (2015) suggest using standardized measurement weights and reliability coefficients like omega and H as criteria for evaluating convergent validity. To ensure the reliability and precision of structural equation modeling, convergent validity was performed. From the results displayed in Table 1, the average variance extracted from all the variables ranges from 0.752 to 0.878 which is in agreement with what Cheah et al. (2018) said and hence convergent validity was met. Moreover, the composite reliability for academic performance, student attitude, curriculum development and teacher attitude were 0.835, 0.856, 0.817 and 0.824 respectively. Furthermore, the composite reliability for student engagement and learning resources is 0.848 and 0.806 respectively. From the results displayed, we can conclude that the outcomes support the validity of the measurement. (See Table 1).

4.4. Discriminant validity: Heterotrait-Monotrait ratio (HTMT) matrix

Discriminant validity can be measured through the Heterotrait:Monotrait (HTMT) ratio (Henseler et al., 2014). In structural equation modeling, the variance-based models such as partial least squares, and the HTMT ratio of correlations are suggested as another method to assess the discriminant validity (Roemer et al., 2021). In SEM, the approach is more reliable as compared to other methods such as the Fonrell and Larcker's criterion (Fornell & Larcker, 1981) approach, which has faced criticism from researchers like (Asghar et al., 2022). The Fonrell and Larcker's criterion is ineffective as compared to the HTMT Sarstedt, Dijkstra, Henseler, Ringle, Diamantopoulos, Straub, Ketchen Jr, Hair, Hult and Calantone (Henseler et al., 2014). The approach proposed by Fornell and Larcker is not as effective as the HTMT approach developed

Table 2. Heterotrait-Monotrait ratio (HTMT) matrix.

	Academic performance	Curriculum development	Learning resources	Student attitudes	Student engagement	Teacher quality
Academic performance						
Curriculum development	0.64					
Learning resources	0.871	0.749				
Student attitudes	0.765	0.694	0.933			
Student engagement	0.67	0.793	0.678	0.692		
Teacher quality	0.858	0.8	0.36	0.467	0.785	0.774

Source: Field Data (2024).

Table 3. Structural equation modelling (SEM) results.

					95%		Decision
Hypothesis	Path	Std beta	*t*-value	*P*-value	CILL	CIUL	
H6a	CUD → STA	0.91	9.462	0.000	0.745	0.958	Supported
H2a	CUD → STE	0.689	6.493	0.000	0.473	0.759	Supported
H2d	CUD → LER	0.784	7.271	0.000	0.684	0.936	Supported
H2c	CUD → TEQ	−0.250	1.024	0.207	−0.374	1.085	Not Supported
H1a	STE → ACP	0.008	2.957	0.032	0.002	0.192	Supported
H1b	STE → STA	0.099	3.398	0.000	0.019	0.236	Supported
H3b	LER → STA	0.246	5.186	0.000	0.195	0.469	Supported
H3c	LER → ACP	0.076	3.082	0.021	0.008	0.209	Supported
H3a	LER → STE	0.144	3.590	0.000	0.094	0.287	Supported
H4b	TEQ → ACP	0.213	4.817	0.000	0.104	0.433	Supported
H4a	TEQ → STA	0.760	6.958	0.000	0.437	0.846	Supported
H5	STA → ACP	0.626	6.027	0.000	0.437	0.748	Supported

Source: Field Data (2024).
Notes: Key to acronyms in Table 7: Curriculum Development (CUD), Teacher Quality (TEQ), Student Engagement (STE), Learning Resources (LER), Student Attitude (STA), Academic Performance (ACP). Specific details appear in Appendix.

by Henseler, Dijkstra, Sarstedt, Ringle, Diamantopoulos, Straub, Ketchen Jr, Hair, Hult, and Calantone (Henseler et al., 2014). Asghar et al. (2022) suggested that a score above 0.90 indicates the presence of discriminant validity issues. From the results displayed in Table 2, all the values were less than 0.90.

4.5. Structural equation modeling

Structural equation modeling (SEM) which is a bootstrapping technique (5000) was used via SmartPLS. To measure path estimates, t-values, p-values and confidence intervals, the SEM methodology was applied (Sarstedt et al., 2020). In this research both the direct and indirect relationships were included. Table 3 presents the structural equation modeling results whilst Figure 3 presents the path analysis diagram. The analytical results show that curriculum development has a positive and significant relationship with student attitude, student engagement and learning resources ($\beta = 0.911$, $p < 0.05$, $\beta = 0.689$, $p < 0.05$ and $\beta = 0.784$, $p < 0.05$), and approves H6a, H2a and H2d. respectively. Moreover, the results indicated that student engagement has a positive relationship and significant association with academic performance and student attitude ($\beta = 0.008$, $p < 0.05$ and $\beta = 0.099$, $p < 0.05$) which supports hypotheses H5 and H6 in that order. In addition, a positive and significant relationship was observed between learning resources with student attitude, academic performance and student engagement ($\beta = 0.246$, $p < 0.05$, $\beta = 0.076$, $p < 0.05$ and $\beta = 0.144$, $p < 0.05$) and hence supports hypothesis *H3b*, *H3c* and *H3a*. Furthermore, learning resources have a strong relationship with student attitude, student engagement and academic performance. This confirms that academic performance is influenced by several factors, and the administration should take into consideration these factors to implement the curriculum well. We also measured teacher quality to assess its impact on the academic performance of students. The results indicate that teacher quality has a positive and significant relationship with student attitude and academic performance ($\beta = 0.760$, $p < 0.05$ and $\beta = 0.213$, $p < 0.05$) respectively confirming hypotheses H4a and H4b. Despite a positive between the

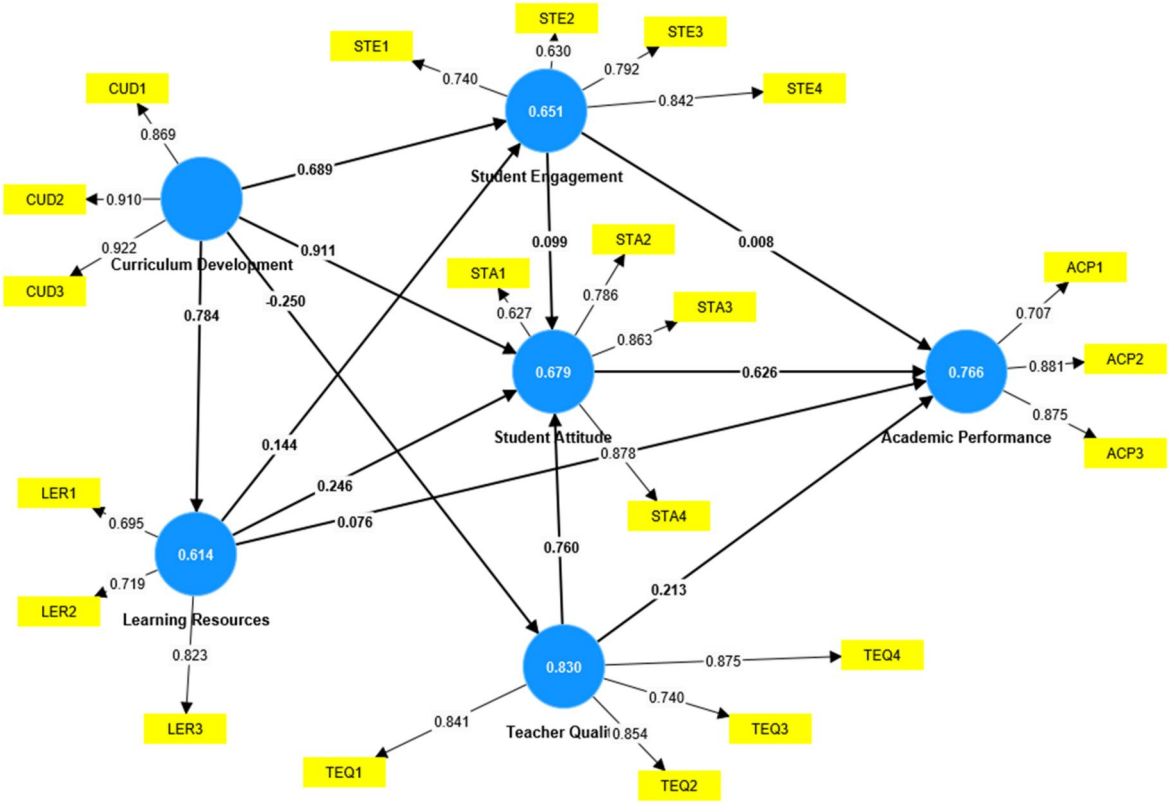

Figure 3. The structural equation model.

Table 4. Mediating effect analysis via Sobel's test.

Hypothesis	Path	Std beta	*t*-value	*P*-value	Decision
H6b	STE→STA→ACP	0.062	3.507	0.000	Supported
H6a	CUD → STA→ACP	0.570	5.925	0.000	Supported
H7a	LER → STA→ACP	0.154	3.749	0.000	Supported
H7b	TEQ→STA→ACP	0.476	5.473	0.000	Supported

Source: Field Data (2024).

variables, curriculum development exhibits a negative relationship with teacher quality ($\beta = -0.250$, $p > 0.05$). The confidence intervals displayed also confirm the results of the hypothesis tests

4.6. Mediating effect analysis via Sobel test

The displayed results in Table 4 evaluate the indirect link between the latent variable with the academic performance of the students where student attitude is the mediator variable. The mediation analysis was done through the Sobel's test which multiplies the beta values of the path. However, the method sometimes tends to be criticized. From the results, the path STE→STA→ACP is the product of 0.099 and 0.626 which are the beta values of STE→STA and STA→ACP respectively. The beta value of STE→STA→ACP is 0.062 and is statistically significant. The beta value is decreasing which shows the existence of partial mediation. Furthermore, the relationship between curriculum development and academic performance is mediated by student attitude ($\beta = 0.570$, $p < 0.05$). The remaining paths TEQ→STA→ACP and LER→STA→ACP are also significant. Mediation analysis may result in some variables being insignificant whilst some will remain the same. The presence of one path that is negative may affect the outcome under Sobel's test and hence this method may be ineffective when dealing with many paths. From the results displayed, there was no change in the beta values from both the direct and the indirect paths. The t-values values displayed also confirm the results.

Even though the beta values were statistically significant, it is crucial to note the magnitude of the indirect effects, namely the variance accounted for (VAR). The VAR > 80% implies full mediation, while

Table 5. Variance accounted displayed.

Path	VAR	Ranking
STE→STA→ACP	0.364	Supported
CUD → STA→ACP	0.648	Supported
LER → STA→ACP	0.462	Supported
TEQ→STA→ACP	0.627	Supported

Source: Field Data (2024).

Table 6. Collinearity.

Exogenous variables	VIF	Tolerance
CUD → LER	2.591	0.386
CUD → STE	2.865	0.349
CUD → STA	3.115	0.321
CUD → TEQ	5.88	1.170
STE → STA	3.115	0.321
STE → ACP	4.274	0.234
TEQ → STA	3.115	0.321
TEQ → ACP	4.274	0.234
LER → STE	2.865	0.349
LER → STA	3.115	0.321
LER → ACP	4.274	0.234
STA → ACP	4.274	0.234

Source: Field Data (2024).

$20\% \leq \text{VAF} \leq 80\%$ suggests partial mediation and a value less than 20% means no mediation (Chauhan et al., 2023). The following for VAR was used:

$$\text{VAR} = \frac{\text{Indirect effects}}{\text{Total effects}}$$

The findings presented in Table 5 indicate that student attitude acted as a mediator between curriculum development, teacher quality, student engagement, learning resources and academic performance. The VAR for the path STE → STA → ACP and CUD → STA → ACP us 0.364 and 0.648 respectively. Moreover, the VAR for LER → STA→ ACP and TEQ → STA → ACP is 0.462 and 0.627 in that order. The results show partial mediation according to Chauhan et al. (2023).

4.7. Evaluation of the structural model

Model evaluation is conducted to verify hypothesized model structure is consistent with the observed data. This involved the Coefficient of determination (R^2), Variance Inflation Factor (VIF) and Effect size (f^2).

4.7.1. Collinearity of structural model

In structural equation modeling, multicollinearity is one of the assumptions. In evaluating the structural relationship between the variables, it is important to examine whether there is multicollinearity to ensure that there is no bias in the results. Specifically, the variance inflation factor (VIF) is the most commonly used index to check the presence of multicollinearity. According to Hair et al. (2011) a VIF value of 5 or above suggests significant collinearity problems among the variables. However, according to Becker et al. (2015) collinearity problems can occur when the VIF value is close to 3 or below. Collier (2020) noted that tolerance values (>0.10) are desirable. From the results displayed in Table 6, the VIF values of most of the paths were in the range propounded by Hair et al. (2011) except for CUD → TEQ which has a VIF value of 5.88 and a tolerance value of 1.117 though it is not a serious problem. From the results, we can confidently conclude that there is no multicollinearity problem.

4.7.2. Coefficient of determination (R^2)

In the study, Schumacher et al. (2016) defines R^2 as the proportion of variability in the variable that is accounted for by the relationship in the independent variable. According to Hair et al. (2011), R^2 values of 0.25, 0.5 and 0.75 can be considered weak and moderate, substantial respectively. Very high R^2 values

Table 7. Effect size.

Exogenous variables	Effect size	Total effect
CUD → LER	1.51	High
CUD → STE	1.865	High
CUD → STA	2.115	High
CUD → TEQ	4.88	High
STE → STA	2.115	High
STE → ACP	3.274	High
TEQ → STA	2.115	High
TEQ → ACP	3.273	High
LER → STE	1.865	High
LER → STA	2.115	High
LER → ACP	3.273	High
STA → ACP	3.273	High

Source: Field Data (2024).

Table 8. Goodness of fit (GoF) results.

	Estimated model
SRMR	0.072
d_ULS	12.763
d_ G	17.082
Chi-Square	3628. 21
NFI	0.827

Source: Field Data (2024).

Table 9. Goodness of fit index calculation.

Construct	AVE	R^2
CUD	0.752	
STE	0.797	0.651
STA	0.803	0.679
LER	0.768	0.614
TEQ	0.878	0.830
ACP	0.814	0.766
AVE	0.802	
AVE × R^2	0.568	
GoF	0.754	

Source: Field Data (2024).

can lead to overfitting the model and can result in a spurious relationship as long as the R^2 value is greater than the Durbin-Watson value. In the present study LER, STE and STA have an R^2 value of 0.614, 0.651 and 0.679 respectively, as shown by the path diagram. Moreover, the academic performance has an R^2 value of 0.766 meaning that the amount of variation in the academic performance is being explained by the CUD, STE, LER, STA and TEQ. Overall, the developed model exhibits a moderate level of explaining power.

4.7.3. The effect size (F^2)

An effect size is important in understanding the significance of model fit (Beribisky & Cribbie, 2024). According to Khalilzadeh and Tasci (2017) an effect size of $\leq$ 0.30 is considered poor, while $0.3 < f2 \leq 0.50$ is moderate and $f^2 > 0.50$ is considered high. The following equation is used to calculate the effect size:

$$\text{Effect size} = \frac{R^2}{1 - R^2}$$

Where R2 is the coefficient of determination. The effect size derived from Table 7 shows a high effect as illustrated by Khalilzadeh and Tasci (2017).

4.7.4. The standardized root mean square residual (SRMR)

The SRMR is a metric of the average of standardized residuals between hypothesized covariance matrices and the observed (Pavlov et al., 2021). According to Shi and Maydeu-Olivares (2020) an SRMR value

of less than 0.08, the model is considered a good fit. From the results indicated in Table 8, the SRMR value for the fitted model is 0.072, which is less than the threshold value of 0.08, indicating that the model can be accepted. Moreover, the NIF value for the model is 0.827, which is slightly above the recommended threshold value of 0.9. These results suggest that the developed model is of high quality. The Chi-Square results value of 3628.21 also suggests that the fitted model is good.

4.8. Overall assessment

Goodness of Fit (GoF) is defined as the average variances extracted (AVE) and the average R^2 of all the variables (Akter et al., 2011). The GoF is calculated using the formular derived by Akter et al. (2011). And is as follows:

$$\text{GoF} = \sqrt{AVE \times R^2}$$

The criteria provided in Table 9 to determine whether GoF values are not fit, small, medium or large to be considered as globally valid PLS model are as follows: GoF values greater than 0.36 are considered 'large', GoF values between 0.25 and 0.36 are considered 'medium', GoF values between 0.1 and 0.25 are considered 'small', and GoF values less than 0.1 are considered 'not fit'. Table 9 presents the Goodness-of-Fit (GoF) statistics obtained from the model. A Goodness-of-Fit measure of 0.754 suggests that there is a good overall model fit, and the latent constructs specified are able to account for the differences in the academic performance of the students. Therefore, the structural model has satisfactory explanatory power.

5. Discussion of the results

The study examined the complexities of multiple factors that affect the student's performance in the Zimbabwe post-2015 curriculum, specifically in Mashonaland East. Structural equation modeling was used to examine how the factors of student engagement, student attitude, learning resources, teacher quality and curriculum development affect students' academic performance. Our results confirm that these factors immensely affect the academic performance of students. The present study showed some important insights from previous research on the academic performance of students. Previous studies have repeatedly emphasized the essential roles of teacher quality, learning resources and curriculum development in influencing students' performance (Danial et al., 2024). Likewise, this study concludes that teacher quality, learning resources, and curriculum positively influence student engagement and performance of students (Heilporn et al., 2021).

We noted that curriculum development is important in influencing the availability of resources, student attitude and student engagement which aligns with Zhang et al. (2015). The results indicated a positive relationship between student attitude and curriculum development signifying that the competence-based curriculum can enhance student's performance if they develop a positive attitude toward learning and the findings are in congruent with what Lin et al. (2025) found. Moreover, the relationship between curriculum development and learning resources was found to be positive. The results further encourage school authorities to continue to support students with educational materials to improve their academic performance.

Nonetheless, the present study has distinctive aspects that differentiate it from prior research. This study uses Structural Equation Modeling to examine direct and indirect relationships, taking student attitude as the mediator variable, yet much of the available literature review focuses on the direct effects of curriculum development or teaching quality on student performance (Kunter et al., 2013). It has been observed that many studies infrequently exclude student quality as a mediator variable but rather focus on direct effects on academic performance (Fu et al., 2023) and consequently shows the uniqueness of the present study. Moreover, the present study employs structural equation modeling which facilitates an understanding of complex relationships among the interaction of variables. Despite the positive links between the variables, the present study found a negative relationship between the quality of teachers and curriculum development, contrasting with the other prior studies where a positive association is typically obtained (Wang & Neihart, 2015). The results obtained in this study may be attributed to the

problems faced by teachers in adjusting to Zimbabwe's post-2015 curriculum. The curriculum changes might have generated issues to do with teacher training, time and resources, which perhaps led to a decrease in teacher quality.

In addition, the positive impact of learning resources on academic performance aligns with other studies though a great emphasis was limitation on resources which could impede the performance of students in Zimbabwe (Kandiero, 2015). Whilst various studies indicated the importance of learning resources on academic performance (Hanaysha et al., 2023), limited resources textbooks and classroom materials are experienced in the context of Zimbabwe. Notwithstanding these challenges, the government of Zimbabwe and NGOs like UNICEF are putting a lot of effort into helping schools improve their performance (Motsi & Akşit, 2022).

Our results indicated the role played by students' engagement in academic performance of students. A positive relationship was found between student engagement and student attitude which is the mediator variable in the study. The results agree with what Erdoğdu (2019) propounded. The findings highlight the significance of schools in motivating students to work as a team so that they develop a positive attitude toward learning and hence improve their academic performance. A positive relationship was also found between student engagement and student academic performance. The findings illustrate the importance of teamwork to achieve good performance from the students. Moreover, the study demonstrates the significance of learning resources in student engagement. The availability of resources influences motivation and teamwork. A positive relationship was also found between learning resources and the mediator variable, student attitude which demonstrates how the resources impact the attitude of students. In addition, the study shows a significant impact between learning resources and academic performance. Institutions should invest in infrastructure, educational materials and technology to create a conducive environment for students.

Furthermore, the study highlights the significance of teacher quality to student attitude. Teacher quality plays an important role in shaping student attitude. Teachers with pedagogical skills are likely to influence student attitudes toward learning positively whereas those without this skill may lack knowledge to interact with students. Poor quality teachers without the knowledge of how to manage the classroom and lack professionalism may find it difficult to influence students' attitudes and hence the school administration should ensure proper recruitment of teachers and continually motivate them. Previous studies have established that teacher quality significantly impacts student attitude toward learning, which in turn affects academic performance. A good teacher creates a conducive learning environment, provides feedback, and uses a student-centered approach, which boosts motivation levels toward learning. In developing countries, studies have established that teacher-student relationships create a positive attitude toward learning, which boosts the student's self-confidence, thus reinforcing a positive attitude toward learning (Gyeltshen & Gyeltshen, 2022). In addition, a good teacher's instructional skills, as well as their mastery of the course material, have been related to increased levels of student engagement. Studies that employed expectancy-value theory and social cognitive theory have established that students who perceive their teachers as competent and supportive are more likely to develop a positive attitude toward learning. This change of attitude has been found to mediate the effects of teacher quality on learning outcomes. Empirical studies employing SEM have established that student attitude acts as a psychological mediator through which teacher quality impacts academic performance. The present study, therefore, finds common ground with literature by establishing that teacher quality indirectly impacts academic performance through the cultivation of a positive attitude toward learning.

Finally, a direct link between teacher quality and learning resources was also assessed and our study revealed a positive relationship. Teachers with pedagogical skills, professionalism and good classroom management can provide enough knowledge to students to improve their academic performance.

6. Conclusion

To conclude, the study highlights the complex interaction of the factors that influence the academic performances of Zimbabwe's post-2015 curriculum in Mashonaland East employing structural equation modeling. The results of the structural equation modeling analysis highlight the significant roles of

teacher quality, curriculum development, student engagement, student attitude and learning resources as pivotal factors in students' performance. Curriculum development was found to have a great impact on student attitude, learning resources and student engagement, affirming that a well-crafted curriculum enhances student performance. The study highlights the importance of regularly updating the curriculum to catch up with the labor market and ensuring that the learning resources are accessible and up to date. The study also highlights the significant impact of teacher quality and student attitude on the academic performance of students, signifying that effective teachers are vital for cultivating a favorable learning atmosphere and enhancing student results. Furthermore, the study highlights the importance of student engagement as a direct predictor of academic performance and as well as an indirect predictor through student attitude which acted as a mediator variable. The results indicate that efforts designed to improve student attitudes toward learning are critical as they can influence academic outcomes. The results of this study indicate that education authorities ought to prioritize improving learning resources and improving teacher quality while focusing on engaging students and their attitudes toward learning. On the other hand, tackling the obstacles in implementing curriculum reforms and providing sufficient professional development for teachers will be vital for ensuring the effective implementation of the curriculum. The study's results have great insights for policymakers and other stakeholders to enhance the academic atmosphere in Zimbabwe.

7. The study implications

The insights from this paper can be used by educational institutions and policymakers to come up with interventions to improve the academic performance of students, especially in environments where resources are scarce. For example, review of curriculum, provision of adequate learning resources and training of teachers would improve the performance of the students. Moreover, the research emphasized the importance of learning centered on students, which can direct the teaching practices and thereby lead to motivated students. In addition, the results of this study can positively affect society since enhancing the quality of education can improve social development by improving the rate of student success. Consequently, this outcome can positively influence policies in the education sector that are aimed at improving teacher quality, resource allocation and strategies for engagement. In the global context, the results of this study can be applied to environments that are like Zimbabwe's situation.

8. Study limitations

Although the study's findings were able to highlight the efficacy of structural equation modeling in academic performance, the study used a sample size of 400 respondents drawn from one province out of the ten provinces in Zimbabwe. The sample size might not be a correct representation of the interaction of factors. Different provinces might experience problems like poor teacher qualifications and poor resources which in turn have a different dimension on the questions asked. Moreover, the data collection method might fail to produce hidden information. Closed questionnaires might limit the respondents' view on the factors influencing academic performance.

9. Recommendations

It was noted that teacher quality plays a significant role in shaping the academic performance of students. To improve teacher quality, authorities should invest in programs that enhance capability. Schools should provide adequate resources, for instance, ICT, infrastructure, textbooks and other instructional materials to allow execution of the curriculum. Curriculum development is a collaborative effort of various stakeholders, so the education authorities are encouraged to take the views of people to improve the academic performance of students. In addition, the study focused on Mashonaland East Province, which is just a portion of Zimbabwe, so future studies may include other provinces to get a wider view of the challenges in curriculum delivery. The results of the study demonstrate significant insights into the educational sector on the factors affecting academic performance. The findings show the critical roles of learning resources, student attitude, teacher quality, curriculum development and student

attitude in influencing student performance. The positive link between teacher quality and student attitude and academic performance underscores the necessity of investing in teacher development programs. Practitioners should prioritize consistent teacher training to improve teaching methods, pedagogical competencies and subject knowledge. Teachers should be encouraged to continuously train in programs that can enhance the academic performance of learners so the management should commit resources for such initiatives. The positive association between learning resources and student attitudes toward academic performance underscores the need for practitioners to equip schools with adequate resources such as textbooks digital resources and instructional tools. While we appreciate the roles of organizations like UNICEF in promoting education in Zimbabwe, more effort needs to be made in this regard (Mugweni & Dakwa, 2013). To improve, schools should collaborate with the community to improve the resources available.

Moreover, a positive link between curriculum development and student engagement, student attitude and learning resources emphasizes the role of practitioners to align the curriculum in line with student needs. Though the government has revamped the curriculum, continually updating the content helps in addressing problems and consequently the curriculum will remain essential, engaging and practical. In addition, a positive association between student engagement and performance highlights the need the practitioners to continually promote interactive and participatory teaching methods that would encourage students in problem-solving and critical thinking. Student attitude was considered as a mediator variable, and it plays an essential role in shaping teacher's attitudes toward learning among students. Practitioners should create platforms that monitor and create a positive attitude in teachers. Collaboration with stakeholders would assist teachers in maintaining a good attitude toward learners. Furthermore, the negative relationship between curriculum development and teacher quality emphasizes practitioners' need to make curriculum reforms that promote professional growth. Teacher support should involve training programs and resources that would equip teachers to implement the curriculum proficiently. The recommendations provided here should guide policymakers, school administrators and educators to work as a team to effectively address factors that affect student performance

Authors' contributions

Authors contributed equally to the development of the article.

Ethics approval

The research received Ethical Approval from Ethics Committee and Research Board.

Competing interests

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Consent for publication

All authors consent to the publication of the article.

Disclaimer

The views and opinions expressed in this article are those of the authors and do not necessarily reflect the official policy or position of any affiliated agency of the authors.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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Appendix

Questionnaire

Key: TEQ = Teacher quality, LER = Learning resources, CUD = Curriculum development, STE = Student engagement, STA = Student attitude, ACP = Academic performance

Items to measure curriculum development

Indicate your agreement level with the following statements (Likert: strongly disagree = 1, strongly agree = 5)

Code	Construct	1	2	3	4	5
CUD1	To what extent do you believe that Curriculum Development positively influences student learning outcomes?					
CUD2	In your opinion, does Curriculum Development enhance students' critical thinking skills?					
CUD3	Do you perceive that Curriculum Development contributes to overall student satisfaction with their educational experience?					

Items to measure teacher quality

Indicate your agreement level with the following statements (Likert: strongly disagree = 1, strongly agree = 5)

Code	Construct	1	2	3	4	5
TEQ1	The teacher uses different learning styles during teaching					
TEQ2	Student critical skills are influenced by the quality of the teacher					
TEQ3	The teacher always explains the concepts clearly					

Items to measure student engagement

Indicate your agreement level with the following statements (Likert: strongly disagree = 1, strongly agree = 5)

Code	Construct	1	2	3	4	5
STE1	There is a strong correlation between student achievement and student engagement					
STE2	I always participate during lessons.					
STE3	Do you engage yourself with other classmates in doing group work?					
STE4	I participate in class and motivated					

Items to measure learning resources

Indicate your agreement level with the following statements (Likert: strongly disagree = 1, strongly agree = 5)

Code	Construct	1	2	3	4	5
LER1	I have access to textbooks and other materials that enhance my learning					
LER2	I have access to the internet					
LER3	Laboratory and the library are sufficient for learning					
LER1	I have access to textbooks and other materials that enhance my learning					
LER2	I have access to the internet					
LER3	Laboratory and the library are sufficient for learning					

Items to measure student attitude

Indicate your agreement level with the following statements (Likert: strongly disagree = 1, strongly agree = 5)

Code	Construct	1	2	3	4	5
STA1	I am enjoying the updated curriculum in all subjects					
STA2	I have the confidence in applying the content					
STA3	My career aspirations are determined by the updated curriculum					
STA4	Student attitude influences academic performances					

Items to measure academic performance

Indicate your agreement level with the following statements (Likert: strongly disagree = 1, strongly agree = 5)

Code	Construct	1	2	3	4	5
ACP1	I achieve good academic grades.					
ACP2	I am satisfied with my achievement.					
ACP3	I always achieve above-average marks					

Details of constructs

Curriculum development

Curriculum development is the planned process of creating, putting into action, and assessing educational programs and learning experiences. The method ensures that what is taught meets the needs of students, society's goals, and educational standards. Good curriculum creation makes the school system more relevant, consistent, and flexible.

Teacher quality

Teacher Quality includes the information, skills, attitudes, and professional abilities that instructors need to help students learn well. It entails knowing the subject matter, being good at teaching, managing a classroom, and being dedicated to helping students succeed. Studies repeatedly show that better teachers lead to improved student performance and learning outcomes.

Student engagement

Student engagement entails attention, curiosity, interest, and active participation that students show in the learning process. It shows up in behavior (participation), emotions (enthusiasm and motivation), and thinking (engagement in learning).

Learning resources

Learning resources are the tools, products, and spaces that help with teaching and learning. Textbooks, digital technology, laboratories, libraries, and instructional aids are all examples of the materials that are required for proper learning.

Student attitude

Student attitude entails the learners' mindset toward learning. A positive attitude includes motivation, curiosity, and confidence, improving academic involvement and success. On the other hand, bad attitudes might cause people to lose interest, miss class, and do poorly. Teachers and the school environment are key in promoting positive attitudes toward learning.

Academic performance

Academic Performance is the way we measure how well pupils are learning, usually through grades, test results, and teacher evaluations. It shows how well educational goals have been met.