

DOI Link: <https://doi.org/10.61586/IQd7t>

Vol.409, Issue.8, Part.1, August 2025, PP.113-134

DEVELOPING A SCALE TO MEASURE SCHOOL EFFECTIVENESS IN RURAL PRIMARY SCHOOLS IN NORTHERN CHINA

Xue Wenhui¹

Sultan Idris Education University, Perak, Malaysia

Xuewen_hui@126.com

Corresponding author: Mahaliza Mansor

Sultan Idris Education University, Perak, Malaysia

mahaliza@fpe.upsi.edu.my

Received Feb 2025 Accepted July 2025 Published August 2025

Abstract

This study developed a valid and reliable instrument to assess school effectiveness (SE) based on Sammons, P. (1995) characteristics of effective schools. The sample of the study consists of 500 teachers who are chosen using multistage cluster sampling technique from primary schools in China. The Exploratory Factor Analysis (EFA) has been carried out by using data of 100 teachers. Exploratory Factor Analysis (EFA) validated the constructs, while Cronbach's Alpha confirmed item reliability. Kaiser-Meyer-Olkin (KMO) values (0.6–1) demonstrated sampling adequacy. For the second phase of the study. The Confirmatory Factor Analysis (CFA) has been carried out toward data of 500 teachers. The analysis revealed that the eleven constructs explained over 50% of the total variance, with individual constructs contributing variances ranging from 54.897% to 86.345%. The final instrument retained 58 items, achieving good model fit indices (RMSEA = .061, CFI = .909, GFI = .902, χ^2/df = 2.794). Convergent validity was supported by factor loadings ranging from .76 to .94, while subscale correlations (.66 to .77) confirmed discriminant validity. The instrument also demonstrated strong internal consistency, with an overall reliability value of .94 and construct-specific values between .72 and .93. These results indicate that the instrument is a reliable and effective tool for measuring school effectiveness, particularly in educational research and practice in rural primary schools.

Keywords: school effectiveness, factor analysis, scales development

Introduction

To follow the global trend of education reform, China's education also has embarked on a path of large-scale development, through implementing quality education, reforming school curricula, and promulgating a series of education policies to enhance school effectiveness. School effectiveness has been a topic of considerable interest, intense debates within academic research since the 1960s. Initial studies suggested that a child's academic success was more influenced by family background and socioeconomic status than by school-related factors (Coleman et al., 1966). Studies on school effectiveness reveal that some schools are more successful than others, encouraging researchers to uncover the factors which contribute to school effectiveness (Ismail et al, 2022). An essential part of school effectiveness research is the development of evaluation indicators (Sun, 2022).

As a result, educational reform initiatives have been directed towards identifying influential factors in school effectiveness. The researchers found that the unique characteristics like professional leadership, shared vision and goals, a learning environment, concentration on teaching and learning, purposeful teaching, high expectations, positive reinforcement, monitoring progress, pupil rights and responsibilities, home-school partnership and a learning organization will contribute to school effectiveness (Sammons, Hillman & Mortimore, 1995).

Currently, there are still not many suitable instruments to measure primary school teachers' perception toward school effectiveness in China. Most of the previous studies have been carried in Western countries and some Southeast Asian countries. The researcher will adopt Sammons' eleven key factors to develop a scale to test whether it is suitable in Chinese educational setting. In addition, the use of suitable statistical procedure in developing and validating items is also a must in developing a good scale.

Literature review

As with the definition of school effectiveness, researchers have suggested multiple variables and school outcomes as measures of school effectiveness. The Coleman Report (Coleman et al., 1966; Durlak, 2011) uncovered that socioeconomic status, race, and other family background factors had a more prominent effect on student achievement compared to the impacts of school factors. In Britain, Reynolds and Rutter (1976) and his colleagues (1979) revealed that schools with similar enrollments serving similar catchment areas had different outcomes. Mortimore (1991) claims that an effective school is "one in which pupils progress further than might be expected from consideration of its intake" (p.9). Wyatt (1995) suggested that effective schools should consider

socioeconomic status, prior learning, and family background to enhance student progress.

However, other studies have highlighted that school effectiveness should not solely focus on academic achievement, but also take into account factors like differences in attitudes towards learning, classroom behaviors, and student participation rates (Krik & Jones, 2004; Rutter, 1983; McGaw et al., 1992; Sammons, 1995; Sammons et al., 1995; Akyurek et al., 2024). Lezotte (1997) defined an effective school as one where all students receive an education regardless of their socioeconomic status or family background. Cobanoglu and Yurek (2018) define school effectiveness as the capability of achieving the aims and goals planned by the school. Several researchers have defined school effectiveness based on just academic achievements, however, school effectiveness does not depend only on academic outputs (Talebloo et al., 2017). Policy makers rely on the claim that schools do make a difference in student outcomes as a guide in their educational reforms (Ismail et. al, 2021).

Although there are no universally accepted measures of school effectiveness, there are several common characteristics used to describe an effective school. Ronald Edmonds (1979), one of the founding researchers of school effectiveness, suggested the characteristics of effective schools as strong administrative leadership, focus on basic skills, high expectations for student success, frequent monitoring of student performance and safe and orderly schools. These characteristics were known as the “Effective Schools Model”. Building on the characteristics of this model, Lezotte (1991) formally proposed the “Correlates of effective schools”. Lezotte (1991) stated that the attributes of an effective school are: a safe and orderly environment, a climate of high expectations for success, instructional leadership, clear and focused mission, opportunity to learn and student time on task, frequent monitoring of student progress and home-school relations. Sammons, P. (1995) provided a description of some of the key factors (or correlates) of effectiveness: professional leadership, shared vision and goals, a learning environment, concentration on teaching and learning, purposeful teaching, high expectations, positive reinforcement, monitoring progress, pupil rights and responsibilities, home-school partnership and a learning organization.

The correlates of effective schools are a set of components that depend on each other, working together to achieve school effectiveness (Talebloo et al., 2018). The unique correlates of effective schools are considered as a means for achieving student success (Magulod, 2017, Ismail et. al, 2021). An effective school is one where teachers, through a strong culture of collaboration, can positively influence and improve students’ academic achievement (Akyürek & Aypay, 2023). In this study, the research will adopt the eleven key factors to develop a scale for school effectiveness in primary schools in Chinese setting.

The Elements of School Effectiveness

Professional leadership

The professional leadership include three characteristics: strength of purpose, involving other staff in decision-making, and professional authority in the processes of teaching and learning (Sammons, 1995).

Shared vision and goals

Shared vision and goals refers that the staff collectively establish agreement on the objectives and principles of the school, and when they consistently implement these principles through collaborative and unified approaches to work and decision-making (Sammons, 1995).

A learning environment

A learning environment refers to a well-organized atmosphere and an appealing workspace. Together, these elements shape the ethos of a school, reflecting the collaborative efforts and working dynamics of the staff as well as the conducive climate within which students operate (Sammons, 1995).

Concentration on teaching and learning

Concentration on teaching and learning refers that the main objectives of schools revolve around the core activities of teaching and learning. Cohen (1983) observed that the effectiveness of a school is undeniably reliant on the quality of classroom teaching. Similar conclusions stressing the importance of teaching and learning at the classroom level can be found in reviews conducted by Scheerens (1992), Mortimore (1993), and Creemers (1994).

Purposeful teaching

Purposeful teaching include the elements: efficient organisation, clarity of purpose, structured lessons and adaptive practice (Sammons, 1995).

High expectations

Having positive expectations regarding student achievement, especially among teachers but also shared by students and parents, is recognized as a crucial characteristic of effective schools (Sammons, 1995).

Positive reinforcement

Reinforcement plays a significant role in effective schooling, encompassing both disciplinary patterns and feedback provided to students (Brookover et al., 1979; Rutter et al., 1979).

Monitoring progress

Having well-established mechanisms to monitor the performance and progress of students, classes, the entire school, and improvement initiatives is a critical characteristic of many effective schools (Sammons, 1995).

Pupil rights and responsibilities

Pupil rights and responsibilities include enhancing the self-esteem of students, involving them actively in the school community, and empowering them with shared responsibility for their own learning (Sammons, 1995).

Home-school partnership

Home-school partnership refers supportive relationships and cooperation between schools and families (Sammons, 1995).

A learning organisation

The term “learning organization” also refers to the idea that this learning process is most impactful when it occurs within the school itself or extends throughout the entire school community, rather than being limited to individual teachers (Hopkins, Ainscow & West, 1994).

Research Objectives

The main objective of this study is to develop school effectiveness scale in Chinese education setting. In order to achieve the main objective, the researcher have developed four objectives as follows: (1) to develop an initial pool of items for scale to measure the elements of school effectiveness, (2) to assess the factor structure of the scale items by performing EFA, 3) to test the factor structure of the scores obtained from the items determined in EFA, through the use of CFA, 4) to analyze the reliability and construct validity indices of the school effectiveness scores.

Methodology

For sampling procedures, multiple-staged stratified random sampling was employed in this study due to its highly recommended efficiency (Lohr, 2021). 100 teachers from seven primary schools in Linfen, China are chosen as the first phase of the data collection, which was used in preliminary study as to perform content validity, criterion validity and EFA. The questionnaires online were distributed to each of these schools. The CFA is carried out on 600 teachers from 13 primary schools in Linfen, China for the second phase of data collection. Eventually, for analysis, 500 questionnaires were collected.

The Development of Scale

The scale originally consist of eleven factors: professional leadership with 8 items, shared vision and goals with 5 items, a learning environment with 6 items, concentration on teaching and learning with 6 items, purposeful teaching with 5 itmes, high expectations with 8 itmes, positive reinforcement with 4 items, monitoring progress with 5 items, pupil rights and responsibilities with 5 items, home-school partnership with 8 items and a learning organization with 5 items, total with 65 items. All these items were acquired through analysis of the paper by Sammons, P. (1995)

The questions in one questionnaire, are multiple choice questionnaire formats with a 5-point Likert scale from strongly disagree to strongly agree in this study.

Face Validity, Content Validity and Criterion Validity

To ensure the face, content, criterion validity, a panel of three experts were invited to review the questionnaire and give their recommendations on improving the questionnaire. Among the three experts, two of them are associate professors in Malaysia, the other expert is the associate professor at universities in China. all the three experts are specialized in the area of management. Moreover, to make sure the items to be understood easily and used in the appropriate language and terminology, it was important to get feedback on quality of each item.

Exploratory Factor Analysis (EFA)

The statistical objective of EFA is to identify a set of latent constructs from a large number of individual variables (items), with the result being reliable and valid measurement scales (Hair et al., 2020). In this research, the EFA has been performed by using SPSS version 26.00, to ensure the instrument has reasonable construct validity. The EFA has been used on 65 items of school effectiveness. The EFA was applied based on the rules in the table 3.3 (Hair et al., 2020).

Table 1. Indicators of EFA

Indicators	Cut-off Value
Appropriateness of data for factor analysis	
Kaiser-Meyer-Olkin (KMO)	Recommended value of 0.6 or above
Meritorious: ≥ 0.80 , Middling: ≥ 0.70 , Mediocre: ≥ 0.60 , Miserable: ≥ 0.50 , Unacceptable: < 0.50	
Bartlett's Test of Sphericity	Significant at $\alpha < 0.05$
Anti-Image Correlation: individual measure of sampling adequacy (MSA)	> 0.5
Items with the factor loading	> 0.5 were retained

Confirmatory Factor Analysis (CFA)

To test the stability of the eleven-factor model, the CFA has been applied in this research through AMOS Version 23. This hypothesized eleven-factor model with all sixty-five items as indicators of the variable individually. Maximum likelihood was used to estimated the parameters. A comprehensive evaluation of model fit was provided though multiple indices (Hu & Bentler, 1999). To evaluate the goodness-of-fit of the model, the chi-square per degree of freedom ratio (χ^2/df), Comparative Fit Index (CFI), Goodness of Fit Index (GFI) and Root Mean Square Error of Approximation (RMSEA) have been used. The convergent indices

should be greater than 0.3 and less than 0.90, while the discriminant indices fall between 0.60 and 0.90. These values were used to assess the unidimensionality of the factors (Hair et al., 2020).

Reality

Reliability denotes the degree of consistency with which the instrument measures whatever it is measuring (Ary et al., 2018). Instrument's reliability shows whether it is free from bias or otherwise (Hair et al., 2020). In this study, constructs with Cronbach's Alpha values greater than 0.60 were retained for further analysis (Hair et al., 2020).

Results

(1) Results related to research objective 1: to develop an initial pool of items for scale to measure the school effectiveness.

From the panels view, no item has been dropped from each factor. But some items need revising. The results of the re-evaluation show no improvement should be made on the questions used in questionnaire. Then, table 3.2 shows the revision of the questionnaire based on the experts' feedback.

Table 2. Revision of the questionnaire based on the experts' feedback

Experts 1:	
Recommendations	Revisions
PL8: Consistently make changes from the feedback. - Rephrase the sentences. Make sure consistent with the above.	Revised the item PL8 : Headmaster makes changes from the feedback consistently.
HE8: Teachers believe that they can ensure that all students master the intended curriculum.- Rephrase the sentences.	Rephrase the item HE8: Teachers can ensure that all students master the intended curriculum.
PRAR4: Pupils are given greater control over what happens to them at school.-Rephrase the sentences.	Rephrase the item PRAR4: Pupils are provided with more control over their experiences at school.
AOTC4: If a child doesn't want to learn teachers here give up.	Rephrase the item AOTC4: If a child is reluctant to learn, teachers at this school tend to give up.
Expert 2:	
Recommendations	Revisions
PL2: Chinese version:校长始终认同学校社区愿景、使命- In Chinese translation is slightly different. 始终认同 is agreed with. 分享 = share?	Changed the Chinese version, PL2 : 校长始终分享学校社区愿景、使命
PL4: Headmaster gives the opportunity to teachers in term of decision making.-need improvement. Suggestion: The headmaster provides	Improved the item PL4: The headmaster provides teachers with opportunities to participate in decision-making.

teachers with opportunities to participate in decision-making.

PL6: Headmaster support for teachers priority needs.-revise, Suggestion: Headmaster supports the priority needs of teachers.

PL7: Headmaster encourages teachers to accomplish a task that directed.-revise, Suggestion: Headmaster encourages teachers to accomplish the tasks as directed.

SVAG2: An agreed-upon written statement of purpose guides the instructional program. Revise, Suggestion: The instructional program is guided by an agreed-upon written statement of purpose.

SVAG4: Mission is based on time-to-time student learning.-Specify School's mission? or Teacher's mission?

COTAL5: School heads have observation sessions during my T&L session in time to time.-revise, Suggestions: School heads conduct observation sessions during my T&L sessions from time to time.

PT1: Teachers well organise the teaching and are absolutely clear about their objectives. -revise, Suggestion: Teachers are clear about the teaching objective when preparing lessons.

ALO5: My school library is efficiently facilities to students and teachers.-revise, Suggestion: My school library provides resources and services to enhance teaching and learning to the students. and teachers

Revise the item PL6: Headmaster supports the priority needs of teachers.

Revise the item PL7: Headmaster encourages teachers to accomplish the tasks as directed.

Revise the item SVAG2: The instructional program is guided by an agreed-upon written statement of purpose.

Revise the item SVAG4: Mission of the teacher is based on time-to-time student learning.

Revise the item COTAL5: School heads conduct observation sessions during my T&L sessions from time to time.

Revise PT1: Teachers are clear about the teaching objective when preparing lessons.

Revise ALO5: My school library provides resources and services to enhance teaching and learning to the students.

Expert 3:

Recommendations

Revisions

Overall, the questionnaire is suitable and effective for achieving the required data. Both the English and Chinese versions are concise and understandable.

(2) Results related to research objective 2: to assess the factor structure of the scale items by performing EFA.

EFA result for Professional leadership

The Exploratory Factor Analysis (EFA) was conducted on eight items measuring Professional Leadership (PL1–PL8). The Kaiser-Meyer-Olkin (KMO) value was 0.860, exceeding the acceptable threshold of 0.6, and Bartlett's Test of Sphericity

was significant, indicating the data's suitability for factor analysis. Additionally, the anti-image correlation showed that the Measure of Sampling Adequacy (MSA) for each item surpassed the minimum threshold of 0.5. The communalities of all items exceeded 0.3, except for PL8 (0.207). The analysis revealed an eigenvalue greater than 1, explaining 65.060% of the total variance. However, PL8 had a factor loading of 0.454, below the acceptable threshold of 0.5, indicating a problematic factor structure. Consequently, PL8 was removed, and a revised factor structure was re-specified.

Table 3 .Exploratory Analysis for Professional Leadership

Item	KMO (Bartlett's Test)	Cumulative % of variance	Factor loading	Communalities	Anti-image correlation
PL1	0.860	65.060	.821	.675	0.917
PL2	(significant		.847	.717	0.876
PL3	at p<0.05)		.843	.711	0.823
PL4			.844	.712	0.868
PL5			.843	.711	0.848
PL6			.864	.747	0.832
PL7			.851	.725	0.865
PL8			.454	.207	0.871

The revised EFA with the remaining seven items of Professional Leadership (PL1–PL7) yielded eigenvalues greater than 1, explaining 71.874% of the total variance. All factor loadings exceeded the threshold of 0.5, confirming the validity of these items for measuring Professional Leadership.

Table 4 .Exploratory Analysis for Professional Leadership (Re-specification)

Item	KMO (Bartlett's Test)	Cumulative % of variance	Factor loading	Communalities	Anti-image correlation
PL1	0.860	71.874	.831	.690	0.924
PL2	(significant		.851	.724	0.869
PL3	at p<0.05)		.842	.708	0.819
PL4			.849	.721	0.867
PL5			.843	.711	0.839
PL6			.871	.758	0.833
PL7			.847	.718	0.881

EFA result for Shared vision and goals

Kaiser-Meyer-Olkin (KMO) value for the EFA conducted for the five items measuring Shared Vision and Mission is 0.877 and a significant Bartlett's Test of Sphericity, confirming the adequacy of the data for factor analysis. The anti-image correlation showed that the Measure of Sampling Adequacy (MSA) for all items exceeded the acceptable threshold of 0.5, supporting the factorability of the items. Communalities for all items were above 0.3, indicating that they were well-defined by the factor solution. The EFA results revealed eigenvalues greater than 1, explaining 74.960% of the total variance, with factor loadings exceeding 0.5 (Hair et al., 2019). Thus, all five items (SVAG1 to SCAG5) were validated as measures of Shared Vision and Mission.

Table 5. Exploratory Factor Analysis for shared vision and goals

Item	KMO (Bartlett's Test)	Cumulative % of variance	Factor loading	Communalities	Anti-image correlation
SVAG1	0.877 (significant at p<0.05)	74.960	.902	.813	0.888
SVAG2			.901	.812	0.855
SVAG3			.920	.846	0.838
SAVG4			.855	.731	0.909
SVAG5			.739	.546	0.929

EFA result for A learning environment

The EFA conducted for the six items measuring A Learning Environment produced a Kaiser-Meyer-Olkin (KMO) value of 0.678 and a significant Bartlett's Test of Sphericity, confirming the suitability of the data for factor analysis. The anti-image correlation indicated that the Measure of Sampling Adequacy (MSA) for all items exceeded the acceptable threshold of 0.5, supporting item factorability. All items had communalities above 0.3, suggesting they were well-defined by the factor solution. The analysis revealed eigenvalues greater than 1, explaining 55.224% of the total variance, with factor loadings above 0.5. Consequently, all six items (ALE1–ALE6) were validated as measures of A Learning Environment.

Table 6. Exploratory Factor Analysis for A learning environment

Item	KMO (Bartlett's Test)	Cumulative % of variance	Factor loading	Communalities	Anti-image correlation
ALE1	0.678 (significant at $p < 0.05$)	55.224	.672	.883	0.629
ALE2			.685	.789	0.666
ALE3			.727	.861	0.610
ALE4			.818	.778	0.727
ALE5			.826	.788	0.751
ALE6			.716	.545	0.678

EFA result for Concentration on teaching and learning

The EFA conducted for the six items measuring Concentration on Teaching and Learning produced a Kaiser-Meyer-Olkin (KMO) value of 0.670 and a significant Bartlett's Test of Sphericity, indicating the data's adequacy for factor analysis. The anti-image correlation showed that the Measure of Sampling Adequacy (MSA) for all items exceeded the acceptable threshold of 0.5, supporting item factorability. All items had communalities above 0.3, confirming they were well-defined by the factor solution. The analysis revealed eigenvalues greater than 1, explaining 64.406% of the total variance, with factor loadings above 0.5. Consequently, all six items (COTAL1–COTAL6) were validated as measures of Concentration on Teaching and Learning.

Table 7. Exploratory Factor Analysis for Concentration on teaching and learning

Item	KMO (Bartlett's Test)	Cumulative % of variance	Factor loading	Communalities	Anti-image correlation
COTAL1	0.670 (significant at $p < 0.05$)	64.406	.725	.744	0.784
COTAL2			.870	.879	0.805
COTAL3			.891	.817	0.707
COTAL4			.838	.705	0.661
COTAL5			.776	.823	0.574
COTAL6			.694	.915	0.524

EFA result for Purposeful teaching

The EFA conducted for the five items measuring Purposeful Teaching produced a Kaiser-Meyer-Olkin (KMO) value of 0.763 and a significant Bartlett's Test of

Sphericity, confirming the adequacy of the data for factor analysis. The anti-image correlation showed that the Measure of Sampling Adequacy (MSA) for all items exceeded the threshold of 0.5, supporting item factorability. Communalities for all items were above 0.3, indicating they were well-defined by the factor solution. The analysis yielded eigenvalues greater than 1, explaining 59.233% of the total variance, with factor loadings above 0.5. Consequently, all five items (PT1–PT5) were validated as measures of Purposeful Teaching.

Table 8. Exploratory Factor Analysis for Purposeful teaching

Item	KMO (Bartlett's Test)	Cumulative % variance	Factor of loading	Communalities	Anti-image correlation
PT1	0.763 (significant at $p < 0.05$)	59.233	.863	.745	0.822
PT2			.851	.834	0.737
PT3			.845	.774	0.767
PT4			.814	.737	0.797
PT5			.901	.927	0.523

EFA result for High expectations

The EFA conducted for the eight items measuring High Expectations produced a Kaiser-Meyer-Olkin (KMO) value of 0.766 and a significant Bartlett's Test of Sphericity, indicating the data's adequacy for factor analysis. The anti-image correlation showed that the Measure of Sampling Adequacy (MSA) for all items exceeded the threshold of 0.5, confirming item factorability. Communalities for all items were above 0.3, and the analysis revealed an eigenvalue greater than 1, explaining 54.897% of the total variance. However, HE1 had a factor loading of -0.27, and HE8 had a factor loading of 0.482, both below the acceptable threshold of 0.5, indicating issues with the factor structure. Consequently, HE and HE8 were removed, and the factor structure was re-specified.

Table 9. Exploratory Factor Analysis for High expectations

Item	KMO (Bartlett's Test)	Cumulative % of variance	Factor loading	Communalities	Anti-image correlation
HE1	0.766 (significant at $p < 0.05$)	54.897	-.027	.800	0.211
HE2			.810	.658	0.845
HE3			.802	.645	0.701
HE4			.878	.777	0.913
HE5			.767	.660	0.777
HE6			.866	.757	0.691
HE7			.865	.754	0.727
HE8			.482	.457	0.880

The revised EFA with the remaining six items of High Expectations produced a Kaiser-Meyer-Olkin (KMO) value of 0.773 and a significant Bartlett's Test of Sphericity, confirming the data's suitability for factor analysis. The eigenvalues is greater than 1, explaining 70.017% of the total variance, with all factor loadings exceeding the threshold of 0.5. Thus, the six items (HE2, HE3, HE4, HE5, HE6, and HE7) were validated as measures of High Expectations.

Table 10. Exploratory Factor Analysis for High expectations (Re-specification)

Item	KMO (Bartlett's Test)	Cumulative % of variance	Factor loading	Communalities	Anti-image correlation
HE2	0.773 (significant at $p < 0.05$)	70.017	.810	.656	0.843
HE3			.810	.655	0.714
HE4			.872	.760	0.916
HE5			.783	.614	0.808
HE6			.873	.761	0.689
HE7			.869	.755	0.728

EFA result for Positive reinforcement

Four items measure Positive Reinforcement. Kaiser-Meyer-Olkin (KMO) value is 0.860 and a significant Bartlett's Test of Sphericity, confirming the data's adequacy for factor analysis. The anti-image correlation showed that the Measure

of Sampling Adequacy (MSA) for all items exceeded the acceptable threshold of 0.5, supporting item factorability. Communalities for all items were above 0.3, indicating they were well-defined by the factor solution. The analysis revealed eigenvalues greater than 1, explaining 86.345% of the total variance, with factor loadings above 0.5. Consequently, all four items (PR1–PR4) were validated as measures of Positive Reinforcement.

Table 11. Exploratory Factor Analysis for Positive reinforcement

Item	KMO (Bartlett's Test)	Cumulative % of variance	Factor loading	Communalities	Anti-image correlation
PR1	0.860 (significant at $p < 0.05$)	86.345	.925	.855	0.862
PR2			.930	.865	0.863
PR3			.921	.848	0.880
PR4			.886	.886	0.836

EFA result for Monitoring progress

Five items was used to measure Monitoring Progress. Kaiser-Meyer-Olkin (KMO) value is 0.775 and a significant Bartlett's Test of Sphericity confirms the data's suitability for factor analysis. The anti-image correlation showed that the Measure of Sampling Adequacy (MSA) for all items exceeded the acceptable threshold of 0.5, supporting item factorability. Communalities for all items were above 0.3, indicating they were well-defined by the factor solution. The analysis revealed eigenvalues greater than 1, explaining 67.141% of the total variance, with factor loadings above 0.5. Consequently, all five items (MP1–MP5) were validated as measures of Monitoring Progress.

Table 12. Exploratory Factor Analysis for Monitoring progress

Item	KMO (Bartlett's Test)	Cumulative % of variance	Factor loading	Communalities	Anti-image correlation
MP1	0.775 (significant at $p < 0.05$)	67.141	.837	.700	0.858
MP2			.814	.663	0.740
MP3			.864	.747	0.761
MP4			.819	.671	0.837
MP5			.759	.576	0.689

EFA result for Pupil rights and responsibilities

The EFA conducted for the five items measuring Pupil Rights and Responsibilities produced a Kaiser-Meyer-Olkin (KMO) value of 0.811 and a significant Bartlett's Test of Sphericity, confirming the data's suitability for factor analysis. The anti-image correlation showed that the Measure of Sampling Adequacy (MSA) for all items exceeded the acceptable threshold of 0.5, supporting item factorability. Communalities for all items were above 0.3, indicating they were well-defined by the factor solution. The analysis revealed eigenvalues greater than 1, explaining 67.141% of the total variance, with factor loadings above 0.5. Consequently, all five items (PRAR1–PRAR5) were validated as measures of Pupil Rights and Responsibilities.

Table 13. Exploratory Factor Analysis for Pupil rights and responsibilities

Item	KMO (Bartlett's Test)	Cumulative % of variance	Factor loading	Communalities	Anti-image correlation
PRAR1	0.811 (significant at $p < 0.05$)	69.276	.778	.605	0.848
PRAR2			.913	.834	0.765
PRAR3			.916	.838	0.758
PRAR4			.826	.682	0.915
PRAR5			.710	.505	0.834

EFA result for Pupil Home-school partnership

The EFA conducted for the eight items measuring Home-School Partnership (HSP) produced a Kaiser-Meyer-Olkin (KMO) value of 0.697 and a significant Bartlett's Test of Sphericity, indicating the data's suitability for factor analysis. The anti-image correlation revealed that the Measure of Sampling Adequacy (MSA) for each item exceeded the acceptable threshold of 0.5, supporting item factorability. Communalities for all items were above 0.3. The analysis yielded an eigenvalue greater than 1, explaining 46.163% of the total variance. However, two items, HSP7 (-0.101) and HSP8 (-0.045), had factor loadings below 0.5, indicating issues with the factor structure. As a result, HSP7 and HSP8 were removed, and the factor structure was re-specified.

Table 14. Exploratory Factor Analysis for Home-school partnership

Item	KMO (Bartlett's Test)	Cumulative % of variance	Factor loading	Communalities	Anti-image correlation
HSP1	0.697 (significant at $p < 0.05$)	56.163	.730	.746	0.827
HSP2			.757	.752	0.842
HSP3			.737	.759	0.724
HSP4			.842	.919	0.660
HSP5			.777	.742	0.774
HSP6			.849	.860	0.731
HSP7			-.101	.894	0.466
HSP8			-.045	.895	0.466

The revised EFA for the remaining six items of Home-School Partnership (HSP) produced eigenvalues greater than 1, explaining 61.434% of the total variance. All factor loadings exceeded the threshold of 0.5, confirming the validity of the six measurement items: HSP1, HSP2, HSP3, HSP4, HSP5, and HSP6

Table 14. Exploratory Factor Analysis for Home-school partnership
(Re-specification)

Item	KMO (Bartlett's Test)	Cumulative % of variance	Factor loading	Communalities	Anti-image correlation
HSP1	0.761 (significant at $p < 0.05$)	61.434	.746	.746	0.826
HSP2			.750	.752	0.847
HSP3			.756	.759	0.728
HSP4			.919	.919	0.684
HSP5			.742	.742	0.777
HSP6			.860	.860	0.760

EFA result for Pupil A learning organisation

The EFA conducted for the five items measuring A Learning Organisation (ALO) yielded a Kaiser-Meyer-Olkin (KMO) value of 0.890 and a significant Bartlett's Test of Sphericity, confirming the data's suitability for factor analysis. The

anti-image correlation revealed that the Measure of Sampling Adequacy (MSA) for each item exceeded the acceptable threshold of 0.5, supporting the factorability of the items. All items had communalities greater than 0.3. The analysis produced an eigenvalue greater than 1, explaining 62.567% of the total variance, with factor loadings above the 0.5 threshold. Thus, the five items (ALO1, ALO2, ALO3, ALO4, and ALO5) were confirmed as valid measures of A Learning Organisation.

Once completed the validity test, all the items and constructs were checked on their reliability. The Cronbach's alpha values and corrected item-total correlation scores were used to conduct the reliability test. However, the reliability for PT5 for purposeful teaching is not acceptable. After deletion, the Cronbach's alpha values for all the constructs satisfied the recommended value for reliability coefficient of 0.7, with professional leadership (0.935); shared vision and goals (0.915); a learning environment (0.836); concentration on teaching and learning (0.877); purposeful teaching (0.866); high expectation (0.913); positive reinforcement (0.947); monitoring progress (0.877); pupil rights and responsibilities (0.886); home-school partnership (0.874); a learning organization (0.947).

(3) Results related to research objective 3: to test the factor structure of the scores obtained from the items determined in EFA, through the use of CFA. After deleting the low factor loading of HE3 for high expectations, the CFA indices are presented as below.

Table 15. Goodness-of-fit (GOF) Indices for CFA

GOF statistics	χ^2 (df, p)	χ^2/df	CFI	TLI	SRMR	RMSEA
Measurement model	4457.775 (1595, 0.000)	2.794	0.909	0.902	0.038	0.061
Acceptable value*	Significant at $\alpha = 0.05$	1-5	> 0.9	> 0.9	< 0.08	< 0.08

(4) Results related to research objective 3: to analyze the reliability and construct validity indices of the SE scores.

Table 16. The reliability and construct validity indices

Constructs	Cronbach's Alpha	AVE	CR
Professional leadership	.926	0.694	0.940
Shared vision and goals	.885	0.674	0.911
A learning environment	.822	0.688	0.929
Concentration on teaching and learning	.884	0.699	0.933
Purposeful teaching	.726	0.774	0.932
High expectations	.908	0.580	0.892
Positive reinforcement	.933	0.662	0.887
Monitoring progress	.843	0.789	0.949
Pupil rights and responsibilities	.878	0.779	0.946
Home-school partnership	.863	0.734	0.943
A learning organisation	.934	0.757	0.939

Discussion

This study aims to develop a valid and reliable instrument to measure SE, school effectiveness with the eleven constructs based on Sammons's characteristics of school effectiveness (1995). The eleven constructs are professional leadership, shared vision and goals, a learning environment, concentration on teaching and learning, purposeful teaching, high expectations, positive reinforcement, monitoring progress, pupil rights and responsibilities, home-school partnership. Exploratory Factor Analysis (EFA) is used to validate the constructs of the instrument and Cronbach's Alpha is used to determine the reliability of the items. Based on the analysis, Bartlett's Test result is highly significant ($p = .000 < .001$) for all the items in eleven constructs indicating sufficient item correlation. The Kaiser-Meyer-Olkin (KMO) is used to evaluate sampling adequacy, with KMO values for all constructs ranging from 0.6 to 1, confirming that the data is suitable and factorable for further analysis.

The analysis of components and total variance explained reveals eleven components with eigenvalues greater than 1.0. The variance explained by each construct is as follows: professional leadership (65.060%), shared vision and goals (74.960%), learning environment (55.224%), concentration on teaching and learning (64.406%), purposeful teaching (59.233%), high expectations (54.897%), positive reinforcement (86.345%), monitoring progress (67.141%), pupil rights and responsibilities (67.141%), home-school partnership (56.163%), and a

learning organization (62.567%). Hence, all eleven constructs explain more than 50% of the total variance, indicating their total variance to explained cumulatively.

In the subsequent phase of the study, only 58 were retained to form the final version of the SE instrument. The results indicate that SE and its constructs align well with the data, as demonstrated by the fit indices: RMSEA = .061, CFI = .909, GFI = .902, and $\chi^2/df = 2.794$.

To assess the convergent and discriminant validity of SE scores, the relationships among SE items within specific constructs and between the eleven major constructs were examined. Factor loadings for SE items ranged from .76 to .94, supporting evidence for convergent validity. Relationships between SE constructs or subscales ranged from .66 to .77, indicating discriminant validity. Additionally, the items demonstrated strong internal consistency in measuring teachers' perceptions of SE, with an overall internal consistency value of .94 and construct-specific values ranging from .72 to .93. These findings suggest the items are appropriate for use in exploratory research.

Conclusion

The instrument with 58 items was found to be better in collecting data to assess school effectiveness. The development and validation of school effectiveness scale for rural primary schools have significant practical value in the context of China's educational setting. The scale, including 11 dimensions, with the unique characteristics of education in China, making the practical significance more concrete and applicable to the local context.

Despite its strengths, this study has some limitations. First, the instrument was designed specifically for primary schools in China, which may limit its generalizability to other educational settings or regions. Second, the cross-sectional design of the study restricts the ability to assess the scale's longitudinal validity or its sensitivity to changes over time. Lastly, the reliance on self-reported data from teachers may introduce response bias, potentially affecting the accuracy of the findings. Perspectives from other stakeholders, such as students, parents, and school administrators, were not included, which might have limited the comprehensiveness of the evaluation. Future research should focus on testing the instrument in diverse educational contexts, including secondary school, and high schools to assess its broader applicability. Additionally, incorporating data from multiple stakeholders, such as students and parents, could further validate the instrument and provide a more comprehensive assessment of school effectiveness. The scale also can include other critical factors influencing school effectiveness, such as community support, resource allocation, and digital learning opportunities, to provide a more holistic assessment.

References

- Akyurek, M. I., Ozdogru, M., & Sarier, Y. (2024). The impact of shared instructional leadership and social capital on school effectiveness. *Journal of School Leadership*, 34(3), 234-258.
- Akyürek, M. I., & Aypay, A. (2023). An Exploration of the Relationship between School Happiness and School Effectiveness. *Journal of Educational Leadership and Policy Studies*, 7(1), n1.
- Ary, D., Jacobs, L. C., Irvine, C. K. S., & Walker, D. (2018). Introduction to research in education. *Cengage Learning*.
- Brookover, W. B., & Lezotte, L. W. (1979). Changes in School Characteristics Coincident With Changes in Student Achievement. *Occasional Paper* No. 17.
- Cohen, M (1983) Instructional, management and social conditions in effective schools, in A () Webb & L D Webt(Eds) School Finance and School Improvement: Linkages in the 1980s, Cambridge, A: Ballinger.
- Coleman, J. S. (1966). The possibility of a social welfare function. *The American Economic Review*, 56(5), 1105-1122.
- Creemers, B. P. (1994). The history, value and purpose of school effectiveness studies. In *Advances in school effectiveness research and practice* (pp. 9-23). Pergamon.
- Durlak, J. A., Weissberg, R. P., Dymnicki, A. B., Taylor, R. D., & Schellinger, K. B. (2011). The impact of enhancing students' social and emotional learning: A meta-analysis of school-based universal interventions. *Child development*, 82(1), 405-432.
- Edmonds, R. (1979). Effective schools for the urban poor. *Educational leadership*, 37(1), 15-24.
- Ghani, M. F. A. (2014). Development of effective school model for Malaysian school. *International Journal of Academic Research*, 5(5), 131-142.

- Hair, F., Black, w.C, Babin, B | , Anderson, RE, & Tatham, R.L.(2020) Multivariate data analysis. New Jersey: Pearson Prentice Hall.
- Hopkins, D, Ainscow, M & West, M (1994). School improvement in an Era of Change, London: Cassell.
- Hu,& Bentler, P,M, (1999), Cut Off Criteria for Fit Indices in Covariance Structural Analysis: Conventional Criteria Versus New Alternatives. Structural Equation Modelling, 6.1-55.
- Ismail, M., KhatiBi, A., & Azam, S. F. (2022). Impact of school culture on school effectiveness in government schools in Maldives. Participatory Educational Research, 9(2), 261-279.
- Kirk, D.J. and Jones, T.L., *Effective Schools: Assessment Report.*, New Jersey: Pearson Education, Inc., 2004
- Lezotte, L. (1991). Correlates of effective schools. The First and second generation *Effective Schools products, Ltd., Okemos, MI.*
- Lezotte, L. W. (1997). Learning for All. *Effective Schools Products, Ltd.*, 2199 Jolly Road, Suite 160, Okemos, MI 48864.
- Lezotte, L. W., & Snyder, K. M. (2011). *What Effective Schools Do: Re-envisioning the correlates.* Bloomington: Solution Tree Press.
- Lohr, S. L. (2021). Sampling: design and analysis. Chapman and Hall/CRC.
- Magulod Jr, G. C. (2017). Factors of school effectiveness and performance of selected public and private elementary schools: implications on educational planning in the Philippines. Asia Pacific Journal of Multidisciplinary Research, 5(1), 73-83.
- McGaw, B. (1992). Making Schools More Effective: Report of the Australian Effective Schools Project. *Australian Council for Educational Research*, 9 Frederick Street, PO Box 210 Hawthorn, Victoria 3122, Australia.
- Mortimore, P. (1993). School effectiveness and the management of effective learning and teaching. *School effectiveness and school improvement*, 4(4), 290-310.

- Rutter, M. (1979). *Fifteen Thousand Hours: Secondary schools and their Effects on Children*. Harvard University Press.
- Rutter, M. (1983). School effects on pupil progress: Research findings and policy implications. *Child development*, 1-29.
- Sammons, P. (1995). Gender, ethnic and socio-economic differences in attainment and progress: a longitudinal analysis of student achievement over 9 years. *British Educational Research Journal*, 21(4), 465-485.
- Sammons, P. (1995). Key characteristics of effective schools: A review of school effectiveness research. *B & MBC Distribution Services*, 9 Headlands Business Park, Ringwood, Hants BH24 3PB, England, United Kingdom.
- Scheerens, J. (1992). *Effective Schooling: Research Theory and Practice*.
- Sun P.P.(2022). *Research on the Influence of Distributed Leadership and Teacher Organizational Commitment on School Effectiveness by Principals in Primary and Secondary Schools* [Master's thesis], Huazhong Normal University.
<https://kns.cnki.net/KCMS/detail/detail.aspx?dbname=CMFDTEMP&file name=1022828161.nh>
- Talebloo, B., Basri, R., Hassan, A., & Asimiran, S. (2017). The relationship between transformational leadership and overall school effectiveness in primary schools, Selangor, Malaysia based on teachers perception. *International Journal of Academic Research in Business and Social Sciences*, 7(4), 530-649.