

## Exploratory Factor Analysis (EFA) on Principals' Instructional Leadership Practices, Teacher Commitment, and Student Engagement

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### Abstract

The principal who implements instructional leadership practices has been shown to enhance teachers' commitment to their careers, which subsequently serves as a catalyst for student achievement, providing key indicators of excellence in education. This article aims to validate the instruments measuring Instructional Leadership, Teacher Commitment, and Student Achievement using Exploratory Factor Analysis (EFA). The instructional leadership instrument comprises 20 items, the teacher commitment instrument consists of 18 items, and the student achievement instrument contains 22 items. The study employs a quantitative analysis, with data collected through questionnaires. The sampling method utilized includes stratified random sampling and simple random sampling. A total of 374 respondents, all teachers from daily secondary schools in the state of Kedah, Darul Aman, Malaysia, participated in the study. Data were analyzed using the Statistical Package for the Social Sciences (SPSS). The results of the EFA analysis revealed that the instructional leadership variable is represented by 20 items (no items were excluded), teacher commitment is represented by 18 items (no items were excluded), and student achievement is represented by 22 items (no items were excluded). Overall, the EFA results demonstrate that these instruments are appropriate for the primary research within the context of daily secondary school teachers in Kedah, Darul Aman. Additionally, the article provides evidence-based statistical guidelines for conducting EFA to ensure the validity of research instruments, ensuring their relevance to the specific context of the study.

**Keywords:** Exploratory Factor Analysis (EFA), Instructional Leadership, Teacher Commitment, Student Achievement.

### Abstrak

Kepala sekolah yang mempraktikkan praktik kepemimpinan instruksional terbukti mampu membantu meningkatkan komitmen guru terhadap karier mereka, yang pada gilirannya menjadi katalisator bagi siswa untuk menjadi indikator keunggulan dalam pendidikan. Artikel ini bertujuan untuk memvalidasi instrumen Kepemimpinan Instruksional, Komitmen Guru, dan Keterlibatan Siswa menggunakan *Exploratory Factor Analysis* (EFA). Instrumen kepemimpinan instruksional terdiri dari 20 item, instrumen komitmen guru terdiri dari 18 item, dan instrumen pengembangan siswa terdiri dari 22 item. Penelitian ini menggunakan analisis kuantitatif yang dikumpulkan melalui kuesioner. Pemilihan sampel dilakukan dengan menggunakan metode stratified random sampling dan simple random sampling. Penelitian ini melibatkan 374 responden yang terdiri dari guru dari sekolah menengah harian di negara bagian Kedah, Darul Aman Malaysia. Data dianalisis menggunakan *Statistical Package for*

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*the Social Sciences* (SPSS). Hasil analisis EFA menunjukkan bahwa variabel kepemimpinan instruksional diwakili oleh 20 item (tidak ada item yang dibuang), komitmen guru diwakili oleh 18 item (tidak ada item yang dibuang) dan prestasi siswa diwakili oleh 22 item (tidak ada item yang dibuang). Secara keseluruhan, EFA menunjukkan bahwa instrumen ini cocok untuk penelitian nyata di kalangan guru SMK harian di negara bagian Kedah Darul Aman. Pedoman berbasis bukti statistik untuk melakukan prosedur EFA untuk validitas instrumen penelitian sehingga relevan dengan konteks studi juga dijelaskan.

**Kata Kunci:** *Exploratory Factor Analysis* (EFA), Kepemimpinan Instruksional, Komitmen Guru, Keterlibatan Siswa.

## **Introduction**

Education is one of the main areas that contribute to the economic growth and development of a country. Therefore, the role of education is crucial in Malaysia's efforts to become a developed country. Every planning and implementation carried out to develop the education system in Malaysia must be based on a vision to bring about change and a paradigm shift in terms of thinking, orientation, and action. In this case, school leadership is considered playing an important role as a catalyst to increase teacher commitment in carrying out daily tasks towards efforts to improve the quality of Malaysian education so that it is equal to world education to produce perfect Malaysian citizens in the future.

Teacher leadership and commitment are important factors that contribute to the success of a school because quality leadership that is trusted by teachers can be a catalyst for increasing teacher commitment to their duties and responsibilities. Prior studies have shown that leadership styles greatly affect followers' commitment.<sup>1</sup> One leadership style that is said to be able to influence teacher commitment is instructional leadership, which in turn is able to produce superior students.<sup>2</sup>

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<sup>1</sup> Bernard M. Bass and Ronald E. Riggio, *Transformational Leadership*, 2nd ed. (New York: Psychology Press, 2006), <https://doi.org/10.4324/9781410617095>; Lokman Mohd. Tahir, "Orientasi Kepemimpinan Pengetua Dan Perkaitannya Dengan Komitmen Guru : Kajian Di Sekolah - Sekolah Menengah Di Johor" (PhD Thesis, Johor, Universiti Teknologi Malaysia, 2007), <https://eprints.utm.my/18691/>; David M. Herold et al., "The Effects of Transformational and Change Leadership on Employees' Commitment to a Change: A Multilevel Study," *Journal of Applied Psychology* 93, no. 2 (2008): 346–57, <https://doi.org/10.1037/0021-9010.93.2.346>; Muhammad Ismail Ahmad Aslamiah, "Interaksi Kepimpinan Dan Persekitaran Pembelajaran Dengan Kepuasan Dan Komitmen Guru Di Banjarmasin, Kalimantan" (PhD Thesis, Changlun, Univeriti Utara Malaysia, 2014), <https://etd.uum.edu.my/4439/>; Waheed Hammad, Mahmut Polatcan, and Hosam Morad, "Investigating Links between Teacher Leadership, Collective Efficacy and Teacher Commitment in Egyptian Schools: A Mediated-Effects Analysis," *International Journal of Educational Management* 38, no. 3 (March 20, 2024): 750–68, <https://doi.org/10.1108/IJEM-03-2023-0124>; Mohammed Alzoraiki et al., "Impact of Teachers' Commitment to the Relationship between Transformational Leadership and Sustainable Teaching Performance," *Sustainability* 15, no. 5 (January 2023): 4620, <https://doi.org/10.3390/su15054620>; Ramazan Cansoy, Parlar ,Hanifi, and Mahmut and Polatcan, "Collective Teacher Efficacy as a Mediator in the Relationship between Instructional Leadership and Teacher Commitment," *International Journal of Leadership in Education* 25, no. 6 (November 2, 2022): 900–918, <https://doi.org/10.1080/13603124.2019.1708470>; Melni Gusva Fitri and Nellitawati Nellitawati, "Analisis Keterkaitan Kepemimpinan Kepala Sekolah Dengan Komitmen Kerja Guru Di Sekolah Menengah Kejuruan Negeri," *Journal of Educational Administration and Leadership* 4, no. 4 (August 16, 2024): 156–62, <https://doi.org/10.24036/jeal.v4i4.484>; Usfandi Haryaka, "Strategi Kepemimpinan Kepala Sekolah Dalam Meningkatkan Kinerja Guru Di SMA Budi Luhur Kota Samarinda," *Jurnal Ilmu Manajemen Dan Pendidikan* 4, no. 1 (June 13, 2024): 61–72, <https://doi.org/10.30872/jimpian.v4i1.3350>.

<sup>2</sup> Bambang Sumintono et al., "The Role of Districts in Supporting School Leaders' Instructional Leadership: A View and Experience from a Developing Country," *Journal of Educational Administration* 57, no. 5 (September 3, 2019): 591–600, <https://doi.org/10.1108/JEA-09-2019-227>; Haim Shaked, "Instructional

Previous research has shown that principals who practice instructional leadership can influence teacher commitment and student achievement. Therefore, many studies, such as those conducted by King et al.,<sup>3</sup> Yusof and Wahab,<sup>4</sup> Nureddin and Dzulkifli,<sup>5</sup> Bhaskaran and Hamid,<sup>6</sup> and Duman et al.,<sup>7</sup> emphasize the importance of the role of principals and elementary school teachers as instructional leaders in schools because instructional leadership significantly contributes to student academic achievement and teacher commitment, which are essential for creating effective schools. Teachers have high commitment and are believed to contribute to student excellence.

However, these studies have used various instruments that measure principal instructional leadership, teacher commitment, and student achievement in the educational context of various national, racial, and cultural groups. Therefore, we cannot generalize the findings to all educational contexts. The use of appropriate instruments for a particular population and research context is essential to ensure that research findings are relevant and impactful to society. Thus, research tools must be validated to ensure they are high quality and can measure what needs to be measured.<sup>8</sup>

The instruments used to measure the three variables in this study have been tested and used several times with various research objectives and contexts. Among them, the instructional leadership instrument was used by Bhaskaran and Hamid to identify the instructional leadership practices practiced by principals in five secondary schools in Bandar Banting.<sup>9</sup> Duman and his team sought to determine the connection between the instructional leadership of principals and the attitudes of teachers.<sup>10</sup> Gavifekr et al. studied instructional leadership practices among principals in vocational and technical schools around Kuala

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Leadership in Higher Education: The Case of Israel,” *Higher Education Quarterly* 75, no. 2 (2021): 212–26, <https://doi.org/10.1111/hequ.12274>; Jennifer Lambrecht et al., “The Effect of School Leadership on Implementing Inclusive Education: How Transformational and Instructional Leadership Practices Affect Individualised Education Planning,” *International Journal of Inclusive Education* 26, no. 9 (July 29, 2022): 943–57, <https://doi.org/10.1080/13603116.2020.1752825>.

<sup>3</sup> Yong King King, Mohamed Yusoff Mohd Nor, and Bity Salwana Binti Alias, “Kepimpinan Instruksional Pengetua Dan Hubungannya Dengan Kompetensi Guru,” *Malaysian Journal of Social Sciences and Humanities (MJSSH)* 8, no. 2 (February 28, 2023): e002141–e002141, <https://doi.org/10.47405/mjssh.v8i2.2141>.

<sup>4</sup> Rozila Md Yusof and Jamalul Lail Abdul Wahab, “Kepimpinan Instruksional Pengetua Dan Hubungannya Dengan Komitmen Guru Di Sekolah Berprestasi Tinggi (SBT) Di Daerah Seremban,” *International Journal of Education, Psychology and Counselling (IJEPC)* 4, no. 33 (2019), <https://gaexcellence.com/ijepe/article/view/3122>.

<sup>5</sup> Shamsir Nureddin and Dg Norizah Ag Kiflee@Dzulkifli, “Pengaruh Kepemimpinan Instruksional, Kompetensi Pedagogi Dan Iklim Organisasi Terhadap Prestasi Kerja Guru Sekolah Menengah Di Tenggara Sabah,” *International Journal of Modern Trends in Social Sciences (IJMTSS)* 7, no. 28 (September 27, 2024): 65–79.

<sup>6</sup> Kalaichelvi Bhaskaran and Aida Hanim A. Hamid, “Amalan Kepimpinan Instruksional Pengetua Di Sekolah Menengah Di Bandar Banting,” *International Journal of Education and Pedagogy* 2, no. 1 (March 31, 2020): 264–84.

<sup>7</sup> Mejran Duman, Muhamad Suhaimi Taat, and Mohd Khai Abdullah, “Hubungan Kepemimpinan Instruksional Pengetua Dengan Sikap Guru Terhadap Perubahan Dalam Pendidikan Abad Ke-21,” *Malaysian Journal of Social Sciences and Humanities (MJSSH)* 6, no. 3 (March 8, 2021): 241–51, <https://doi.org/10.47405/mjssh.v6i3.722>.

<sup>8</sup> Paul Cozby, *Methods in Behavioral Research*, 10th ed. (McGraw-Hill Companies, Incorporated, 2009).

<sup>9</sup> Bhaskaran and Hamid, “Amalan Kepimpinan Instruksional Pengetua Di Sekolah Menengah Di Bandar Banting.”

<sup>10</sup> Duman, Taat, and Abdullah, “Hubungan Kepemimpinan Instruksional Pengetua Dengan Sikap Guru Terhadap Perubahan Dalam Pendidikan Abad Ke-21.”

Lumpur.<sup>11</sup> Abdullah et al. investigated the impact of principals' instructional leadership on the collective efficacy of teachers and the moderating role of professional learning communities.<sup>12</sup> And King et al., which was conducted to identify the type of relationship between principals' instructional leadership and teachers' competence.<sup>13</sup>

Research related to teacher commitment was conducted by Hassan and Ghani, which aimed to determine the relationship between principal supervision and teacher commitment in classroom management.<sup>14</sup> Meanwhile, Billy and Taat studied the level of teacher commitment and the relationship between school culture and teacher commitment.<sup>15</sup> Ambotang and Anuar conducted research to examine the influence of pedagogical knowledge, content knowledge, and teacher commitment.<sup>16</sup>

Further research related to student engagement has also been conducted, including by Jette and Hamzah, who examined the relationship between student development in the learning process and teacher facilitation from the perspective of assessment by school administrators.<sup>17</sup> Zakaria et al. conducted a study to assess the strategic leadership practices of school principals, student achievement, and their correlation.<sup>18</sup>

However, because sample groups differ in each study, researchers must ensure the validity and reliability of the instrument every time they conduct a study. According to Chik and Abdullah,<sup>19</sup> if a researcher adapts an instrument that has been built by a previous researcher and changes the statements to suit the current study, then they need to re-run the EFA procedure. This is because the current study area may be different from previous studies, or the current study population may be significantly distinct from previous studies in terms of socio-economic status, race, and culture. Therefore, this research instrument still needs to be tested in the context of teachers in the state of Kedah Darul Aman.

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<sup>11</sup> Simin Ghavifekr et al., "Instructional Leadership Practices Of Principal In Vocational And Technical College: Teachers' Perception," *MOJEM: Malaysian Online Journal of Educational Management* 3, no. 1 (September 6, 2017): 48–67.

<sup>12</sup> Abdul Ghani Kanesan Abdullah, Ekerim A/P Din Chen, and Ying-Leh Ling, "Pengaruh Moderator Bagi Komuniti Pembelajaran Profesional Terhadap Kepimpinan Instruksional Pengetua Dan Efikasi Kolektif Guru," *JuPiDi: Jurnal Kepimpinan Pendidikan* 6, no. 3 (July 9, 2019): 1–16.

<sup>13</sup> King, Nor, and Alias, "Kepimpinan Instruksional Pengetua Dan Hubungannya Dengan Kompetensi Guru."

<sup>14</sup> Hasifah Hassan and Muhammad Faizal A. Ghani, "Pengaruh Komitmen Guru Dan Penyeliaan Guru Besar Terhadap Pengurusan Bilik Darjah Di Sekolah Rendah Daerah Tenom, Sabah," *JuPiDi: Jurnal Kepimpinan Pendidikan* 9, no. 1 (February 10, 2022): 56–76.

<sup>15</sup> Lily James Billy and Muhamad Suhaimi Taat, "Budaya Sekolah: Hubungannya Dengan Komitmen Guru," *Malaysian Journal of Social Sciences and Humanities (MJSSH)* 5, no. 10 (October 2, 2020): 207–16, <https://doi.org/10.47405/mjssh.v5i10.511>.

<sup>16</sup> Abdul Said Ambotang and Lena Anuar, "Pengaruh Pengetahuan Pedagogi, Pengetahuan Kandungan Dan Komitmen Guru Terhadap Kualiti Pengajaran," *Jurnal Pemikir Pendidikan* 11, no. 1 (February 27, 2023): 50–60, <https://doi.org/10.51200/jpp.v11i1.4279>.

<sup>17</sup> Julian@Juliana George Jette and Mohd Izham Mohd Hamzah, "Hubungan Kemenjadian Murid Dalam Proses Pembelajaran Dan Pemudahcaraan (PdPe) Guru: Penilaian Pentadbir Sekolah," *Jurnal Dunia Pendidikan* 2, no. 1 (April 15, 2020): 171–79.

<sup>18</sup> Ilminza Zakaria et al., "Pengaruh Amalan Kepimpinan Strategik Pengetua Terhadap Kemenjadian Murid," *ASEAN Comparative Education Research Journal on Islam and Civilization (ACER-J)* 4, no. 2 (September 9, 2021): 96–111.

<sup>19</sup> Zamri Chik and Abdul Hakim Abdullah, "Developing and Validating Instruments for Measurement of Motivation, Learning Styles and Learning Disciplines for Academic Achievement," *International Journal of Academic Research in Business and Social Sciences* 8, no. 4 (May 3, 2018): Pages 594-605, <https://doi.org/10.6007/IJARBS/v8-i4/4035>.

## Method

This study was conducted using a quantitative design involving 374 teachers of Sekolah Menengah Kebangsaan (SMK) in the state of Kedah Darul Aman as respondents. Sampling was conducted using a stratified random method to create a representative sample distribution across the state, while simple random sampling ensures that each population unit has an equal chance of being selected. Considering the recommended sample size for exploratory factor analysis (EFA), which is a minimum of five times the number of items, the researcher set a total sample size larger than 300 to minimize the problem of low questionnaire returns. The selection criteria for teachers included a minimum of one year of service and status as a permanent teacher.

The research instrument consisted of a questionnaire using a 10-point Likert scale to measure the three variables studied. The instructional leadership questionnaire developed by Hallinger consists of 20 items divided into three dimensions.<sup>20</sup> The questionnaire has been translated by Shafinaz.<sup>21</sup> Teacher commitment was measured using an instrument developed by Meyer and Allen containing 18 items,<sup>22</sup> while student development was tested with 22 items from six dimensions developed by Rayung et al.<sup>23</sup> All instruments have gone through a validation and reliability process.

The data collection process was carried out through a questionnaire in the form of a Google Form, where respondents were provided access to fill out the questionnaire. After obtaining permission from the authorities and the principal, the link and QR code for the questionnaire were distributed to selected teachers. Data processing and analysis using EFA were carried out by referring to the procedure proposed by Hair et al.<sup>24</sup> The goodness-of-fit index, communality value, KMO, and Bartlett's strength test were all tested to ensure the validity of the instrument. In addition, factor rotation analysis was carried out with the aim of achieving excellent internal consistency through the Cronbach's alpha coefficient, which is expected to be above 0.70.

## Results and Discussion

### EFA for Instructional Leadership Instrument

Items that examine educational leadership consist of 20 items labeled LMM1 to LMM6, LMP1 to LMP8, and LMI1 to LMI6. The interval scale used to measure the items is 1 to 10, where one (1) is never and ten (10) is very often. The EFA procedure using the Principal Component Analysis (PCA) method with varimax rotation was carried out on 20

<sup>20</sup> Philip Hallinger, "Instructional Leadership and the School Principal: A Passing Fancy That Refuses to Fade Away," *Leadership and Policy in Schools* 4, no. 3 (September 1, 2005): 221–39, <https://doi.org/10.1080/15700760500244793>.

<sup>21</sup> A. Maulod Shafinaz, "Hubungan Antara Kecerdasan Emosi Dan Kepimpinan Instruksional Pengetua Dengan Efikasi Kendiri Guru Sekolah Menengah Kebangsaan Di Negeri Sembilan" (PhD Thesis, Kuala Lumpur, Universiti Malaya, 2017).

<sup>22</sup> John P Meyer and Natalie J Allen, "TCM Employee Commitment Survey Academic Users Guide 2004" (The University of Western Ontario, 2004).

<sup>23</sup> Mohd Nasir Rayung, Mohd Husin Musa, and Mansur Tanra, "Analisis Faktor Pengesanan Instrumen Kemenjadian Pelajar," *Malaysian Journal of Social Sciences and Humanities (MJSSH)* 4, no. 6 (October 22, 2019): 1–10, <https://doi.org/10.47405/mjssh.v4i6.275>.

<sup>24</sup> Joseph F. Hair et al., *Multivariate Data Analysis*, 8th ed. (North Way: Cengage Learning EMEA, 2019).

items measuring instructional leadership based on 3 identified construct components as (1) defining vision and goals, (2) managing instructional programs, and (3) fostering a climate of teaching and learning. Table 1 below shows the value of the sample adequacy measurement obtained based on Kaiser-Meyer-Olkin (KMO) of 0.972, which indicates that the data obtained is worthy of further research. Factor analysis also found that the Bartlett Sphericity Test value for this construct was significant with a p-value = 0.000. This value indicates that there is a suitable correlation between the items used to form factors.<sup>25</sup>

**Table 1. KMO Values and Bartlett's Test for Instructional Leadership**

Kaiser-Meyer-Olkin Sampling Adequacy Measurement		.972
Bartlett's Test of Sphericity	Approx. Chi-Square	18451.823
	df	190
	Sig.	.000

Table 2 shows the results of the total variance explained for the construct of instructional leadership. The study's results show that factors with one or more eigenvalues will be extracted as factors against the study's dependent variable.<sup>26</sup> Through the factor extraction steps in Table 2, three factors are arranged according to their eigenvalues in descending order. The findings of the analysis also show that in terms of the total rotation of the squared loadings, factor 1 accounts for 34.71 percent of the variance, factor 2 accounts for 29.84 percent of the variance, and the third factor accounts for 28.34 percent of the variance.

**Table 2. Total Variance Explained for Instructional Leadership**

Component	Initial Eigenvalues			Total Square Load Rotation		
	Total	%variance	Cumulative%	Total	%variance	Cumulative
1	16.206	81.030	81.030	6.941	34.707	34.707
	1.368	6.839	87.869	5.967	29.837	64.544
3	1.003	5.013	92.882	5.668	28.338	92.882

The next procedure in factor analysis is to rotate the extracted factors.<sup>27</sup> Table 3 below shows the distribution of items received to measure instructional leadership. The varimax rotation operation shows that Factor 1 contains eight items from the dimension of managing teaching programs; Factor 2 contains six items from the dimension of defining school vision and goals; and Factor 3 contains six items from the dimension of developing teaching climate. All items have factor loading values that exceed the minimum limit of 0.6, and items with values less than 0.6 should be discarded because they do not contribute to the

<sup>25</sup> Hair et al.

<sup>26</sup> Chua Yan Piaw, *Kaedah Penyelidikan* (Kuala Lumpur: Mc Graw Hill, 2006), <https://scholar.google.com/scholar?cluster=533211156831901582&hl=en&oi=scholar>.

<sup>27</sup> Chua Yan Piaw, *Kaedah Dan Statistik Penyelidikan Buku 4: Ujian Univariate Dan Multivariate* (Selangor: Mc Graw Hill, 2014), <https://scholar.google.com/scholar?cluster=13201969441040539163&hl=en&oi=scholar>.

measurement of the construct.<sup>28</sup> The Cronbach's alpha value for each factor is 0.840 to 0.926, exceeding the required 0.70.<sup>29</sup>

**Table 3. Factor Loadings for the Three (3) Components of Learning Leadership**

Item	Components		
	1	2	3
LMP4	.826		
LMP5	.800		
LMP7	.798		
LMP3	.790		
LMP6	.784		
LMP8	.780		
LMP2	.775		
LMP1	.757		
LMM4		.832	
LMM2		.829	
LMM3		.827	
LMM6		.814	
LMM5		.807	
LMM1		.790	
LMI4			.801
LMI2			.801
LMI5			.801
LMI6			.798
LMI3			.797
LMI1			.791

Based on Table 3, the EFA analysis of instructional leadership shows that 20 items in the instructional leadership instrument, translated by Shafinaz,<sup>30</sup> are declared suitable for use.

#### **EFA for Teacher Commitment Instrument**

Items that test teacher commitment consist of 18 items labeled KA1 to KA6, KB1 to KB6, and KN1 to KN6. The interval scale used to measure the items is 1 to 10, where one (1) is Strongly Disagree and ten (10) is Strongly Agree. The EFA procedure using the Principal Component Analysis (PCA) method with varimax rotation was carried out on 18 items that measure teacher commitment based on 3 construct components identified as (1) affective commitment, (2) normative commitment, and (3) continuance commitment. Table 4 below shows the value of the sample adequacy measurement obtained based on Kaiser-Meyer-Olkin (KMO) of 0.973, which indicates that the data obtained is worthy of further research. Factor analysis also found that the Bartlett Sphericity Test value for this construct

<sup>28</sup> Chik and Abdullah, "Developing and Validating Instruments for Measurement of Motivation, Learning Styles and Learning Disciplines for Academic Achievement."

<sup>29</sup> Hair et al., *Multivariate Data Analysis*.

<sup>30</sup> Shafinaz, "Hubungan Antara Kecerdasan Emosi Dan Kepimpinan Instruksional Pengetua Dengan Efikasi Kendiri Guru Sekolah Menengah Kebangsaan Di Negeri Sembilan."

was significant with a  $p\text{-value} = 0.000$ . This indicates that there is a suitable correlation between the items used to form the factors.<sup>31</sup>

**Table 4. KMO Values and Bartlett's Test for Instructional Leadership**

Kaiser-Meyer-Olkin Sampling Adequacy Measurement		.973
Bartlett's Test of Sphericity	Approx. Chi-Square	11519.304
	df	153
	Sig.	.000

Table 5 shows the results of the total variance explained for the construct of teacher commitment. The research findings indicate that factors that have the same or more than one eigenvalue will be extracted as factors for the dependent variable of the study.<sup>32</sup> Through the factor extraction steps in Table 5, three factors are arranged according to their eigenvalues in descending order. The analysis findings also show that in terms of the total rotation of the squared loadings, factor 1 accounts for 31.22 percent of the variance, factor 2 accounts for 30.53 percent of the variance, and the third factor accounts for 29.10 percent of the variance.

**Table 5. Total Variance Explained for Teacher Commitment**

Component	Initial Eigenvalues			Total Square Load Rotation		
	Total	%variance	Kumulatif%	Total	%variance	Kumulatif
1	13.997	77.763	77.763	5.620	31.220	31.220
2	1.339	7.439	85.201	5.495	30.530	61.751
3	1.017	5.653	90.854	5.239	29.103	90.854

The next procedure in factor analysis is to rotate the extracted factors.<sup>33</sup> Table 6 below shows the distribution of items received to measure teacher commitment. The varimax rotation operation shows that Factor 1 contains six items from the affective commitment dimension, Factor 2 contains six items from the continuance commitment dimension, and Factor 3 contains six items from the normative commitment dimension. All items have factor loading values that exceed the minimum limit of 0.6, and items with values less than 0.6 should be discarded because they do not contribute to the measurement of the construct.<sup>34</sup> Meanwhile, the Cronbach's alpha value for each factor ranges from 0.827 to 0.895, also exceeding the required level of 0.70.<sup>35</sup>

Based on Table 6, it can be concluded that the results of the EFA analysis for teacher commitment also found that all 18 items of the teacher commitment instrument that had been

<sup>31</sup> Hair et al., *Multivariate Data Analysis*.

<sup>32</sup> Piaw, *Kaedah Penyelidikan*.

<sup>33</sup> Piaw, *Kaedah Dan Statistik Penyelidikan Buku 4*.

<sup>34</sup> Chik and Abdullah, "Developing and Validating Instruments for Measurement of Motivation, Learning Styles and Learning Disciplines for Academic Achievement."

<sup>35</sup> Hair et al., *Multivariate Data Analysis*.



used by previous researchers, such as Hassan and Ghani,<sup>36</sup> as well as Billy and Taat,<sup>37</sup> were suitable for use in the research context.

**Table 6. Loading Factors for the Three (3) Components of Instructional Leadership**

Item	Components		
	1	2	3
KA5	.836		
KA6	.827		
KA4	.821		
KA1	.813		
KA2	.809		
KA3	.802		
KB5		.832	
KB4		.825	
KB3		.817	
KB1		.808	
KB6		.807	
KB2		.735	
KN5			.806
KN3			.798
KN6			.798
KN4			.789
KN1			.762
KN2			.762

### EFA for Student Engagement Instrument

Items that examine student development consist of 22 items labeled MP1 to MP4, MKF1 to MKF4, MKM1 to MKM3, MDB1 to MDB3, MER1 to MER4, and MIN1 to MIN4. The interval scale used to measure the items is 1 to 10, where one (1) is Strongly Disagree and ten (10) is Strongly Agree. The EFA procedure using the Principal Component Analysis (PCA) method with varimax rotation was carried out on 22 instructional leadership measurement items based on 6 construct components identified as (1) knowledge, (2) thinking skills, (3) leadership skills, (4) bilingual skills, (5) ethics and spirituality, and (6) national identity. Table 7 below shows the value of the sample adequacy measurement obtained based on Kaiser-Meyer-Olkin (KMO) of 0.970, which indicates that the data obtained is worthy of further research. Factor analysis also found that the Bartlett's Sphericity Test value for this construct was significant with a p-value of 0.000. This value indicates that there is a suitable correlation between the items used for factor formation.<sup>38</sup>

**Table 7. KMO Values and Bartlett's Test for Student Engagement**

Kaiser-Meyer-Olkin Sampling Adequacy Measurement		.970
Bartlett's Test of Sphericity	Approx. Chi-Square	13898.286
	df	231

<sup>36</sup> Hassan and Ghani, "Pengaruh Komitmen Guru Dan Penyeliaan Guru Besar Terhadap Pengurusan Bilik Darjah Di Sekolah Rendah Daerah Tenom, Sabah."

<sup>37</sup> Billy and Taat, "Budaya Sekolah."

<sup>38</sup> Hair et al., *Multivariate Data Analysis*.

Sig.

.000

Rotating the extracted factors shapes the item distribution in accordance with the studied dimensions.<sup>39</sup> Table 8 below shows the distribution of items received to measure students achievement. The Varimax rotation operation shows that Factor 1 contains four items from the national identity dimension; Factor 2 contains four items from the knowledge dimension; Factor 3 contains three items from the leadership skills dimension; Factor 4 contains four items from the thinking skills dimension; Factor 5 contains four items from the ethics and spirituality dimension; and Factor 6 contains three items from the bilingual skills dimension. All items have factor loading values that exceed the minimum limit of 0.6, and items with values less than 0.6 should be discarded because they do not contribute to the measurement of the construct.<sup>40</sup> The Cronbach's alpha value for each factor is 0.814 to 0.894, exceeding the required 0.70.<sup>41</sup>

**Table 8. Loading Factors for the Six (6) Components of Student Engagement**

Item	Components					
	1	2	3	4	5	6
MIN2	.780					
MIN1	.762					
MIN3	.750					
MIN4	.718					
MP3		.746				
MP4		.729				
MP1		.699				
MP2		.671				
MKM3			.804			
MKM2			.804			
MKM1			.789			
MKF4				.698		
MKF2				.697		
MKF3				.680		
MKF1				.678		
MER3					.679	
MER2					.663	
MER4					.662	
MER1					.660	
MDB2						.743
MDB3						.732
MDB1						.716

<sup>39</sup> Piaw, *Kaedah Dan Statistik Penyelidikan Buku 4*.

<sup>40</sup> Chik and Abdullah, "Developing and Validating Instruments for Measurement of Motivation, Learning Styles and Learning Disciplines for Academic Achievement."

<sup>41</sup> Hair et al., *Multivariate Data Analysis*.

Based on Table 8, the student engagement instrument, represented by six dimensions—knowledge with four items, thinking skills with four items, leadership skills with three items, bilingual skills with three items, spiritual ethics with four items, and national identity with four items—is suitable for use, as obtained by Rayung et al.<sup>42</sup>

## **Conclusion**

This study confirms the importance of instructional leadership, teacher commitment, and student engagement in improving the quality of education in Malaysia, especially in the state of Kedah Darul Aman. Through the application of Exploratory Factor Analysis (EFA), the instruments used to measure the three variables studied have been proven to be valid and reliable. The results of the analysis indicate that the instructional leadership instrument consists of three main factors: the management of learning programs, defining the school's vision and goals, and developing a teaching and learning climate. In addition, the instruments to measure teacher commitment and student engagement also successfully identified three and six factors, respectively, that are relevant and consistent with the dimensions studied. This achievement provides a strong foundation for further development and implementation in the context of education in Malaysia because the results of the study indicate that these factors contribute significantly to improving the quality of education. The validity and reliability of the instruments that have been tested make the results of this study relevant and applicable for further research and in making educational policy decisions.

Although this study makes a significant contribution to the development of instruments and to the understanding of key factors in improving educational quality, it still has several limitations that need to be considered. This research was conducted only within a specific regional context, namely the state of Kedah Darul Aman; therefore, the results and the validity of the instruments produced may not fully represent educational conditions in other regions of Malaysia with different school characteristics, organizational cultures, and educational policies. In addition, the use of a quantitative approach through Exploratory Factor Analysis (EFA) has not explored in depth the dynamics of the implementation of instructional leadership, teacher commitment, and student engagement in everyday school practices. Therefore, future research is suggested to test this instrument in broader contexts and to involve more diverse populations in order to deepen the understanding of the relationships among these variables in improving overall educational quality.

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