The Relationship Between Principals' Leadership Practices and Students' Learning Outcomes From a Distributed Perspective

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Abstract: There is little empirical evidence that convinces the effectiveness of distributed leadership in contemporary educational research. Thus, many distinguished scholars suggest its' statistical examination. Considering this need, the primary purpose of this study was to investigate the effects of principals' distributed leadership practices on students' learning outcomes at Technical and Vocational Education Training schools in Eritrea. The study was conducted based on quantitative design and applied structural equation modelling. A sample of six hundred and three students was employed. The researcher developed the structural equation model to test a model that hypothesized the relationship between the major variables using path analysis. The study results demonstrate that the principals' distributed leadership practice has a direct and significant (.883, p<.001) effect on students' learning outcomes keeping other things constant. The strongest predictor of students' learning outcomes was capacity building, given it has the largest path coefficient (β=.346). Moreover, findings show gender disparity among the respondents and in terms of turnout rate; nevertheless, it was not statistically significant (p<.001). One of the study's contributions is that it developed and assessed the validity of the principals' distributed leadership practice scale for Eritrea's TVET schools through CFA model. The study offered basic evidence that distributed type of leadership is a significant predictor of learning outcomes by exploring six factors of leadership practices, which shows a promising area for practice and future studies.

Keywords: *Distributed leadership, learning outcomes, principal practice.*

Introduction

In this new era of accountability, distributed leadership (D.L) has emerged to address the complexity and challenges of school principals regarding their predilection and leadership practices that significantly affect students' learning outcomes (Harris, 2008; Tian, 2016). Meanwhile, D.L has become a popular topic among members of a discourse community and outshines other types of educational leadership (Lumby, 2016). D.L as a new phenomenon of educational leadership and students' learning outcomes as the foremost objective of educational reforms thrilled the intention of many scholars, reformers, and experts (Harris, 2008; Leithwood et al., 2009; Pont et al., 2008; Spillane, 2006). D.L has been theorized since 2000, and several related studies have made significant contributions to its progress. From the year 2003 up to 2017, a sizeable quantity of literature has been published on D.L concepts. For example, a search result from Google.com May 2017 showed around 280,000 keywords of D.L, at the same time, on the website book.google.com.sg, results show around 34,600 books interconnected to D.L (Tsu, 2019). Moreover, a meta-analysis by Tian et al. (2016) shows more than 720,000 studies published on D.L.

Though the concept of D.L has been proliferating within the past two decades, there are very few empirical studies conducted. Among the enormous available literature, only 21 empirical studies were found by Tian et al. (2016), and of these, only seven manuscripts applied quantitative methods in this newly emerged field of leadership. Yet, neither universally accepted framework of its best practice nor empirical consensus reached on its effectiveness (Diamond & Spillane, 2016). Compatible, in this era of accountability, scholars agree that principals are accountable and responsible for students' learning outcomes (Ross & Gray, 2006; Spillane, 2006; Torrance, 2013). A work by Pont et al. (2008) asserts that an effective principal has a crucial and significant role in cultivating school achievement and students' learning outcomes.

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As a consequence, pieces of literature strongly recommend not to underestimate and snub the principal's role in D.L practices because D.L practice is facilitated and limited by a principal (Harris, 2013; Jambo & Hongde, 2020; Spillane et al., 2007; Tian, 2016). A study by Torrance (2013), Harris (2013), and Ghirmai and Hongde (2023) claim that D.L is still in the 'gift' of the school principal with the central role of motivating followers, enabling others, and facilitating leadership activities in school. There is confirmation substantiating the view of D.L effectiveness through a school principal (Bush & Glover, 2012; Klar et al., 2016). However, many researchers suggest that D.L have not been fully treated and needs to be further scrutinized in particular with regards to its' best application and effectiveness through practical approaches of investigation (Diamond & Spillane, 2016; Harris, 2011, 2013; Leithwood et al., 2009; Tian et al., 2016; Timperley, 2008). This denote that there is lack of quantitative empirical studies, hence there is a need for a statistical examination.

D.L practice is highly reliant on context. How it could have practiced itself in various multicultural perspectives is a thought-provoking question (Ghirmai & Hongde, 2023; Tian, 2016). In fact, the literature on D.L shows the dominance of Western contexts, and most D.L studies were completely embodied investigations conducted in the native English speakers' realm (Jambo & Hongde, 2020; Tian et al., 2016). As a result, literature recommend further investigation of D.L effectiveness on students' learning outcomes in the third world countries. Besides, most existing studies are focused on the context of general education (Jambo & Hongde, 2020). There is, therefore, a need to gather further empirical evidence on the effectiveness of D.L in TVET schools or higher education contexts.

In addition to the above methodological and contextual problems, D.L lacks of best route for its application (Diamond & Spillane, 2016; Harris, 2013; Jambo & Hongde, 2020), and there is debate around the direct relationship between principal's leadership practices and students' learning outcomes (Harris, 2008; Jambo & Hongde, 2020; Ross & Gray, 2006; Timperley, 2008). A study by Ross and Gray (2006) argue that the direct effect of a principals' leadership practices on students' learning outcomes is near zero. Therefore, the lack of quantitative empirical studies, the dominance of Western contexts, and the debate around the direct impacts of principal leadership practice on student outcomes are the research gaps that the researcher want to address. From this premise, the present study was conducted at Eritrea's technical and vocational education training (TVET) schools to examine the effect of principals' distributed leadership practices (PDLP) on students' learning outcomes (SLO) using path analysis of structural equation modelling (SEM).

Furthermore, the empirical findings of the study offer valuable acumen to all stakeholders as the outcome is to understand the correlation between principals' distributed form of leadership and students learning achievement in Eritrea's TVET schools. As such the study is vital to TVET schools' principals to avoid heroic behaviour and lead the school through interaction, inspiration and a winning attitude, for teachers to teach and lead successfully, students to engage and to pursue their learning happily, parents to meet their aspirations and finally, the government to produce competitive and well-trained citizen for nation-building.

Research Objectives and Questions

The foremost objectives of this article are (a) to empirically establish the effect of the PDLP on SLO in TVET schools of Eritrea, (b) to identify the most effective attribute of the PDLP on SLO, and (c) to determine group variation on PDLP. To investigate the above objectives, the researcher attempted to answer the following questions: (a) Do the PDLP have a direct and significant effect on SLO? (b) Which factor of the PDLP has the larger effect on SLO? and (c) What is the group variation of the respondents on the PDLP?

Research Hypothesis and Framework

In this study, seven hypotheses were derived, and formulated to examine the above objectives. These are as follows:

Hypothesis (a) H_1: PDLP has no significant and direct effect on SLO. Prior studies showed that school principal leadership has no significant and direct effect on SLO (Clifford et al., 2012; Leithwood et al., 2004; Pont et al., 2008; Ross & Gray, 2006). Meanwhile, this study incorporated alternative hypothesis 1 and related to research question 1.

Hypothesis (b) H_0: there is a positive relationship between inspiring shared vision (ISV) and SLO. Inspiring shared vision is a meaningful predictor of students' learning outcomes. A work by Day and Sammons (2016) declared that the inspiration of a clear vision is one of the vital roles of the effective principal in England. Hence, this study included null hypothesis 1.

Hypothesis (c) H_0: There is a positive relationship between motivating followers (MF) and SLO. Prior studies confirmed that a principal who motivates followers has a positive relationship with students' learning outcomes. For example, Mulford and Silins (2003) concluded that students' learning achievement is improved when followers are motivated and encouraged by their leaders. So, this study comprised null hypothesis 2.

Hypothesis (d) H_1: There is no positive relationship between power-sharing (PS) and SLO. Various literature claimed that D.L in a school could bring conflict in prioritizing school-specific goals and deeds (Chrispeels, 2004; Donaldson, 2006; Timperley, 2008). This refers to encounters of leadership boundary issues (crossing hierarchical, cultural boundaries, and rivalry) in the followers can negatively affect learning achievement. Thus, the present study incorporated alternative hypothesis 2.

Hypothesis (e) H$_o$: There is a positive relationship between capacity building (CB) and SLO. Many researchers agree that capacity building is an essential factor for schools to be effective and effective leadership facilitates a situation that supports professional learning by building the capacity of followers that have a positive impact on students' learning outcome (Leithwood et al., 2004; Leithwood & Jantzi, 2006; Mulford & Silins, 2003). Adding to this, D.L is a significant factor that encourages school development and students' outcomes through capacity building (Miller, 2015). Hence, this study incorporated null hypothesis 3.

Hypothesis (f) H$_o$: There is a positive correlation between participatory decision-making (PDM) and SLO. Lambert (2003) noted that D.L practice could enhance decision-making processes and that this, in turn, increases achievement. This can be facilitated when the principal deliberately involves followers in the decision-making process, and followers experience on leadership activities in school like: selection and preparation of instructional materials, school budget, discipline, capacity building, and policy practices. In light of these points, followers are motivated to share their points of view and ideas and ask challenging questions that can enhance sound decisions and improvement (Lambert, 2003). In addition, a claim is made within the reviewed literature that involving followers in decision making is an approach of D.L exercise that positively impacts better outcomes (Dampson et al., 2018; Harris, 2013; Sibanda, 2018). Hence, this study encompassed null hypothesis 4.

Hypothesis (g) H$_1$: there is no positive relationship between enabling others to act (EOT) and SLO. Previous studies showed that enabling and involving followers in leadership could enhance incompetency distribution that could not ensure students' outcomes (Mayrowetz, 2008). In fact, an individual's incompetent leadership could be destructive to development and effectiveness (Timperley, 2008). Hence, this study involved alternative hypothesis 3.

Although there is no most desirable and globally accepted framework of D.L, this study was conducted based on a hybridized model of D.L (Ghirmai & Hongde, 2023). This framework is a combination of Spillane's (2006) framework, which incorporates the leaders – plus piece and the practice centred piece, planned alignment framework (Leithwood et al., 2007) and Tian (2016) modified the duality framework tied with the customary hierarchy mindset of educational leadership of developing countries (Lumby, 2016). Eritrea's TVET school leadership is more related to the concept of the above-hybridized framework. In this study, the researcher developed and conceptualized the link between the six constructs of the independent variable used as the principal's key behavioural practices to analyse the effect of PDLP on SLO based on the theoretical perspectives discussed aforementioned. These are ISV, MF, PS, CB, PDM, and EOT. In one way or the other, Eritrea's TVET schools had taken a pragmatic attitude to the adoption of D.L and flourished as a result. Hargraves and Fink (2012) considered traditional and progressive delegation as procedures of D.L in which the organizational organogram of a school shared a limited range of power and decision making functions with followers. Meanwhile, in Eritrea's TVET schools, the decision-making process takes place through committee (followers) full of empowerment and accountability, coordination, and alignment of leadership activities towards shared goals ensured by school leaders.

In this article, students have been taken as followers (Copland, 2003; Leithwood & Jantzi, 2006). Moreover, this article was based on SEM to show that PDLP exists from students' perspectives of TVET schools in Eritrea. These PDLP characterized the questionnaire by 24 question items and eight SLO questions with three factors designed to measure the relationship between PDLP and SLO. These factors are students' attained traits, positive attitude towards school (Hulpia & Devos, 2009; Pascarella et al., 2005), and students' cumulative grade point average (CGPA).

Methodology

Participant and Instruments

Stratified random sampling was applied to identify a sample of 650 second year students of TVET schools from a total population of 1525 in Eritrea. From the record office of each school, students' I.D number was obtained and coded in each stratum. With the help of the research randomizer application software, the random numbers were identified. Then questionnaire papers in printed form were issued to the students in their respective schools. Completed questionnaires were returned and used for analysis. The return rate was 92.7% (603 students).

Based on the formulated research questions, the researcher came-up with a questionnaire that helped to collect primary data. The questionnaire had 41 statements developed to inquire about the principal's D.L practice by students. These question statements were organized into three parts. These are demographic information (9 items), factors of PDLP (24 items), and SLO (8 items)). This empirical study measured SLO through self-reported measures of learners acquired traits (α =.791) and attitudes (α =.811) in addition to the students' cumulative grade point average (CGPA) scores, which were acquired from the record offices of the respective schools. An example of the questions asked about acquired traits is: "I do have better skills to challenge my future occupation" (M = 4.09, SD = .877, loading = .845) and for acquired attitude "I will recommend this school to others" (M = 3.97, SD = .845, loading = .802). All the statements of the questionnaire were identified from literature reviews of different studies and modified based on the research site's context. The question's weaknesses and strengths are identified through a discussion with the research professionals and colleagues. Through pilot study the questionnaire was validated. The pilot test was conducted at School 3 to ensure the relevance and clarity of items. Then some items were adjusted and improved based on the feedback provided.

Moreover, the sample test was used to remove and improve the insignificant items related to the variables through a reliability test, and confirmatory factor analyse. The Cronbach Alpha value of the seven constructs was compared with the threshold value of .70 to demonstrate that the scales are consistent and reliable. The test result shows that all constructs have a value above 0.8 except PDM (.767). ISV accounts for the highest value, followed by SLO (.913 & .903, respectively). In this study, a Five Likert scale (strongly disagree with the value of 1 up to strongly agree with 5) was applied.

Of equal importance, composite reliability as the gauge for estimating the internal consistency of variables was estimated using SmartPLS. Besides, convergent validity as the extent of a positive relationship between significant variables' items was estimated (Hair et al., 2018). The result shows that all reliability values were above the threshold value .7. Convergent validity of the construct was measured through AVE (average variance extracted) for items of each construct variable (Hair et al., 2016, 2019), and there was no AVE value less than .5. In light of these points, the fact that all relevant requirements had been fulfilled in this study.

Discriminatory validity is described as how a construct differs from other constructs through statistical standards. Based on this concept (Hair et al., 2019), the discriminant validity of the survey was examined using the Hetero-trait (HTMT) criterion (Henseler et al., 2015). The result shows that HTMT values do not exceed 0.9, and the upper level of the confidence intervals for all HTMT was significantly different from 1 (Henseler et al., 2015). These findings imply that discriminant validity had been established based on the $HTMT_{0.9}$ and $HTMT_{inference}$ criterion.

Procedure

This study was conducted at eight TVET schools in Eritrea. Eritrea is a new country that got its independence in 1991, located the East Horn of Africa. Bordered by the East with Red Sea, by the South with Ethiopia and Djibouti, and by the West with Sudan. Formal TVET in Eritrea has five Technical schools, a Commercial school, an Agro-technical school and a Music school. The study was conducted once approval was granted by the examination committee of the School of Education at the Huazhong University of Science and Technology, Wuhan, P.R.C. Written permission was obtained from the Ministry of Education (MOE), the department of TVET. Then formal contact was made with the cooperation of the principals of the eight TVET schools, and an appointment was set to conduct the study at their site. Moreover, participants were informed of the study's purpose, and procedures of data collection, and assured their confidentiality in the questionnaire. Participants were 18 years and above, thus, all gave written consent for participation. At the scheduled time, the researcher visited each school to distribute and collectively administer a questionnaire to students in their classrooms during regular school day. To make the students' questions easily understood, the researcher employed a simple and local language (Tigrigna) in the survey.

Analysing of Data

The collected data of this study was checked and analysed using statistical packages of SPSS 21, Amos 21, and SmartPLS 3. Using these statistical packages, the study applied cross-validation procedures as a methodological contribution to enrich the existing empirical evidence of the principals' distributed form of leadership practice in educational studies. Multiple analyses were conducted, such as descriptive statistics, confirmatory factor analyses, the goodness of fit, correlation analysis, regression and path analysis of the structural equation model (SEM). Model fit of the study measured through the absolute model fit index (AMFI) and Comparative fitting index (CFI). AMFI implies that the p-value attached to the chi-square (x^2) to be non-significant and this represents that there is no significant difference between the observed variance and covariance of the study. Nevertheless, chi-square increase when the sample size increase and the probability level tends to be significant as well as it increases when the observed variables increase (Khine, 2013). Hence, literature suggest to analyze model fit using GFI or Adjusted goodness of fit index (AGFI) which calculates and adjusts the GFI by the ratio the degree of freedom applied in a model to the total degree of freedom. The recommended value of this GFI and AGFI should be greater than .95. Similarly, the standard root means square residual (SRMR) calculates how residual accurate in the model, and the value should be less than .05. Besides, the root mean square error of approximation (RMSEA) which adjusted the tendency of chi-square with large sample size and more variables, the value should be less than .05 or .08 to show a good fit with a confidence level at 95% of sampling errors (Khine, 2013). Meanwhile, the comparative fit index (CFI) assesses the hypothesized model of the study with the assumption that all observed variables are uncorrelated. CFI is a regularly and widely used test of model fit with the endorsed value of greater than .95. On the other hand, the Tucker-Lewis Index (TLI) is used to assess the conceptual model developed from literature with the hypothesized model of the study through the value greater than .95.

Results

Demographic Information and Descriptive Statistics

In this section the researcher examines the main characteristics of the sample and descriptive statistics of the study presented. The respondents of this research study were determined through stratified random sampling. Using the proportion allocation method, the sample size of each school was identified. Thus, most of the respondents were from School 3 (33.5%), followed by School 2 (13.3%). Students classification based on the field specialization shows that technical schools' participants account for the highest percentage (54.9%), and followed by the commercial school (33.5%). An independent sample t-test was conducted to test gender disparity. This study's empirical result indicated gender disparity in terms of participation (47.1% Female and 52.9% Male), and female respondents were more highly satisfied than male respondents on PDLP. However, the mean difference was not statistically significant at a 95% level of confidence. One-way ANOVA test was conducted on respondents' age and field of specialization compared to PDLP. The mean difference of both age and field of specialization was statistically significant (p<.001), and the postulation of homogeneity of variance is unsatisfactory. Therefore, they were considered as determinant factors of PDLP.

The study's descriptive statistics show that the construct variables have a homogenous mean score, and their mean was far above average (3). The highest and lowest factor loading of items in both independent and dependent variables was .875 and .625, respectively. The mean score, standard deviation, and factor loading for PDLP and SLO latent variables are present in Table 1.

Table 1 - Descriptive Statistics of Ungrouped Data of Variables

Questionnaire Items of Independent Variables	Variable	Mean	Std. Dev.	Loading
Our principal: has a clear vision and goals towards our school,	ISV1	3.97	.822	.847
Direct us towards school goals,	ISV2	4.07	.778	.832
Inspired us to have a vision about our academics, and	ISV3	4.09	.760	.822
Able me to do have vision and interest to pursue my education	ISV4	4.05	.794	.810
Our principal motivates us by: providing continuous support,	MF1	4.04	.813	.835
Showing good approach	MF2	4.04	.820	.804
Giving respect and trust	MF3	3.91	.963	.779
Providing recognition and reward	MF4	4.03	.809	.625
Our principal share and delegate power, and authority to student's representatives and committees	PS1	3.90	.837	.771
Students' representatives have the power to control students and teacher's daily attendance	PS3	3.99	.813	.760
Encourage students' representatives not to abuse or misuse power	PS4	3.84	.935	.747
Our principal organizes and provide us orientation & field trips,	CB1	4.07	.821	.875
Fosters & conduct meetings & seminars regarding school grading system & promotion policy,	CB2	3.99	.807	.847
Facilitate clinical supervision to assure the quality of our learning performance	CB3	4.06	.789	.826
Supports socialization program to build cooperation & unity.	CB4	4.08	.786	.792
Our principal encourages us to participate in ad hoc committees of our department & classroom	PDM1	3.78	.804	.763
Support us to select committees & classroom representatives	PDM2	3.62	.979	.737
Gives us opportunities to express our ideas freely	PDM3	3.70	.824	.720
Involve students' representatives in his/her decision making	PDM4	3.77	.898	.685
Our principal leads our school by being exemplary	EOT2	4.08	.831	.841
Enable students' representatives to facilitate co-curricular activities & peer education in classrooms	EOT3	4.11	.887	.800
Our principal encourages us to evaluate our teachers	EOT4	4.05	.915	.752
Questionnaire items of Dependent variable (SLO)				
I do have better skill to challenge my future occupation	SLO1	4.09	.877	.845
When I joined this school, my performance improved	SLO2	3.85	.884	.814
School leadership is playing a great role on my course's completion & graduation	SLO3	3.95	.875	.805
I do have the expectation to pursue my higher level of schooling	SLO4	4.00	.865	.803
I will recommend this school to others	SLO5	3.97	.845	.802
My academic performance	SLO6	3.87	.767	.790
My overall experience in this school	SLO7	4.02	.829	.742
Cumulative grade point average	SLO8	3.81	.632	---

Confirmatory Factor Analysis (CFA)

CFA was applied to examine the permanency of the exploratory factor structure and to approve the fundamental component structure of PDLP and the structural model fit of the study. CFA of exogenous variables of PDLP, all factors with coefficients below 0.45 were eliminated and reduced the parameters to be estimated at 24 to 22 items. Each construct of exogenous variables has four items each (except PS & EOT that which have three items each), whereas the endogenous variable has eight items.
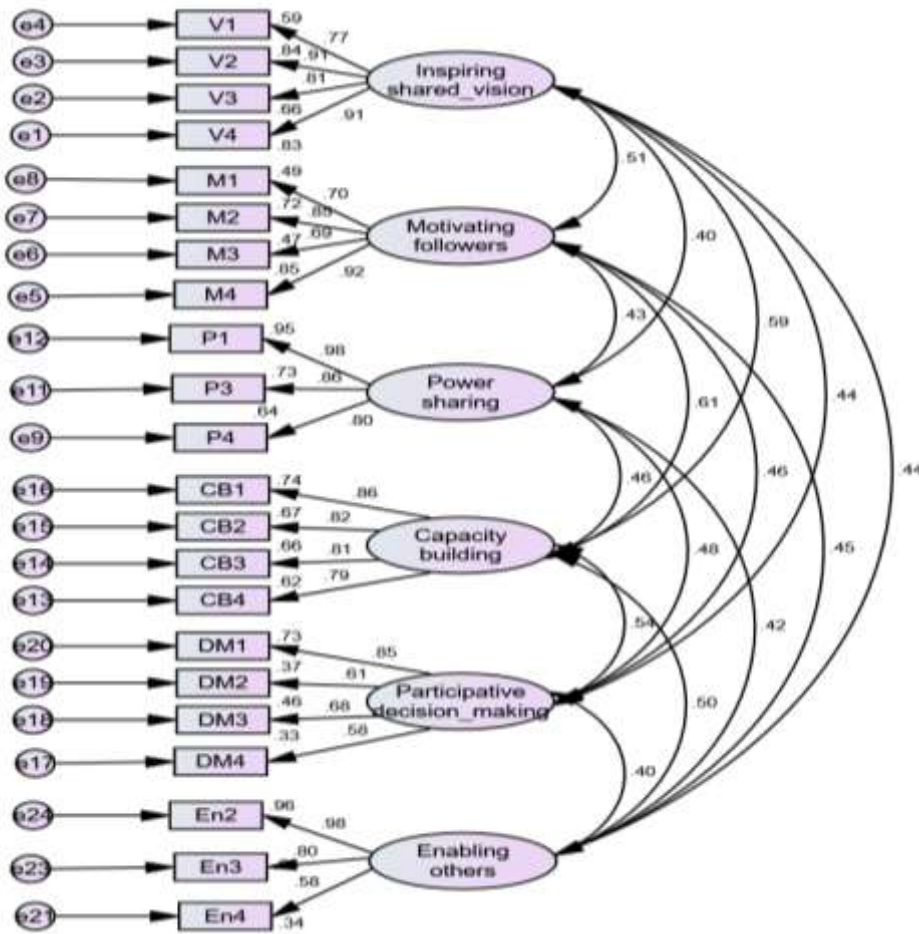

Figure 1 - Confirmatory Factor Analysis Model of PDLP

Measurement model fit statistics for the study variables were assessed through AMFI (absolute model fit index) and CFI (comparative fitting index). The present study's model fit with the x2(603) test that produced the value of 442 was evaluated with the 194 degrees of freedom yielded a P-value of 0.067. GFI value was found to be 0.940. This indicates that the GFI goodness-of-fit value for the theoretical model is appropriate for the obtained data. On the other hand, the RMSEA value was detected as 0.046. This shows that the structured theoretical model did not explain only a few variances and covariance. Besides, the standardized mean square residual (RMR) report .024 shows that the residual value was accurate to the model, and the model was well fitted. In this study, the χ2/df ratio (CMIN/DF) was found to be 2.283. This ratio is closer to 2, indicating a good fit between observed and multiplied covariance matrixes (Kline, 2011). Moreover, the standardized parameter estimates had a range from .577 to .913. The correlation between the latent factors of the exogenous variables of PDLP was statistically significant. The squared multiple correlation estimate had a range of .332 to .957. Therefore, these values indicate that data and residuals were normally distributed. Also, the regression weights were positive and significant, showing a correlation between the constructs.

Hypothesis Test Using Path Analysis

Figure 3 of the current study shows the path analysis of SEM without mediating effect. It indicates the direct effect of PDLP on SLO and the strength of the correlation among the constructs. The standardized direct effect of the constructs reported ISV= .179, MF= .172, PS= .195, CB= .346, PDM= .132, and EOT= .171. Based on the report observed, the interrelationship between the major constructs and the study's proposed hypotheses was tested, and three alternative hypotheses were rejected, whereas four null hypotheses were retained (refer to the discussion part of the present study below).
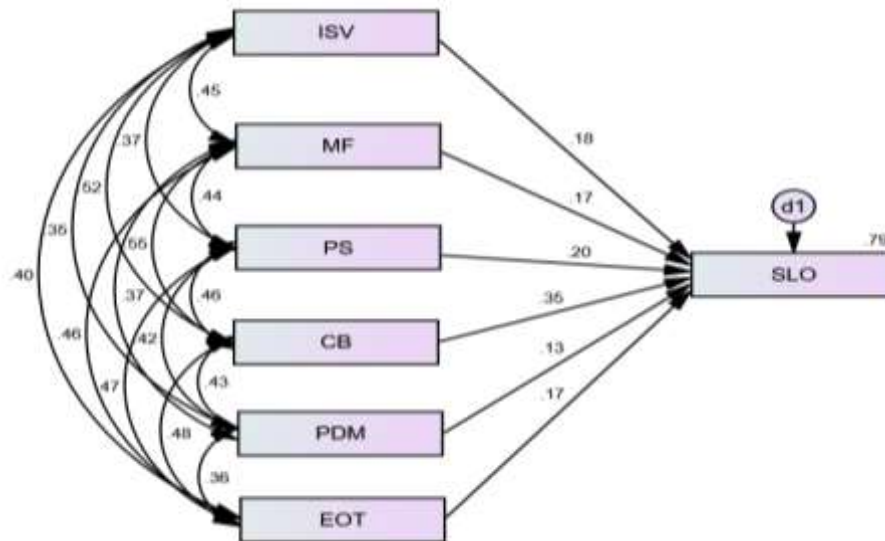
Figure 2. Path Analysis Model 2 of SEM

Table 2. Maximum Likelihood Estimates

Regression Weights : (Group number 1 - Default model)			Estimate	S.E.	C.R.	P
SLO	<---	ISV	.159	.020	7.841	***
SLO	<---	MF	.151	.021	7.202	***
SLO	<---	PS	.166	.020	8.473	***
SLO	<---	CB	.311	.023	13.719	***
SLO	<---	PDM	.122	.020	6.070	***
SLO	<---	EOT	.155	.021	7.419	***
SLO			.793			

Square Multiple Correlation (Group number 1 - Default model)
Note: *** is p<0.01, SLO refers to students learning achievement, ISV= inspiring shared vision, MF= motivating followers, PS= power-sharing, CB=capacity building, PDM= participatory decision making, EOT=enabling others to act

Moreover, the researcher measured collinearity using the variance inflation factor (VIF). This helped to ensure the correlation between the independent variable constructs and ensure that the regression result does not have any bias (Hair et al., 2016, 2019) before evaluating the structural model coefficients. According to Mason and Perreault (1991), collinearity occurred both in high and low values of VIF. Meanwhile, a study by Hair et al. (2019) suggests that VIF values should be closer to 3 or less. In light of this suggestion, all the survey constructs were below 3, which confirmed no collinearity issues in the model (see Table 3).

Table 3 Collinearity Assessment Result of PLS-SEM

Construct	Student Survey VIF
Inspiring shared vision (ISV)	1.511
Motivating followers (MF)	1.663
Power-sharing (PS)	1.545
Capacity building (CB)	1.851
Participative decision-making (PDM)	1.371
Enabling others to act (EOT)	1.547
Trait	3.435
Attitude	3.335
Cumulative grade point average (CGPA)	1.438

Note: VIF refers to the variance inflation factor

In order to measure the significance of the PLS-path coefficient, the researcher runs a bootstrapping routine with 5000 samples. Based on these procedures, PDLP was identified as a significant predictor to determine SLO (.883, p<.001) in the socio-cultural context of TVET schools in Eritrea. The value of R^2 of the survey was 0.775; thus, PLS-SEM has substantial explanatory power in the survey. Similarly, the Q^2 value is a measure of out of sample prediction and in-sample explanatory power (Hair et al., 2016). As the guidelines suggested by Hair et al. (2019), the Q^2 value should be

greater than zero, which indicates the predictive relevance of the PLS-path model. Equally, the overall latent variable (SLO) prediction accuracy (Q^2= 0.765) indicates that the survey model has high prediction power.
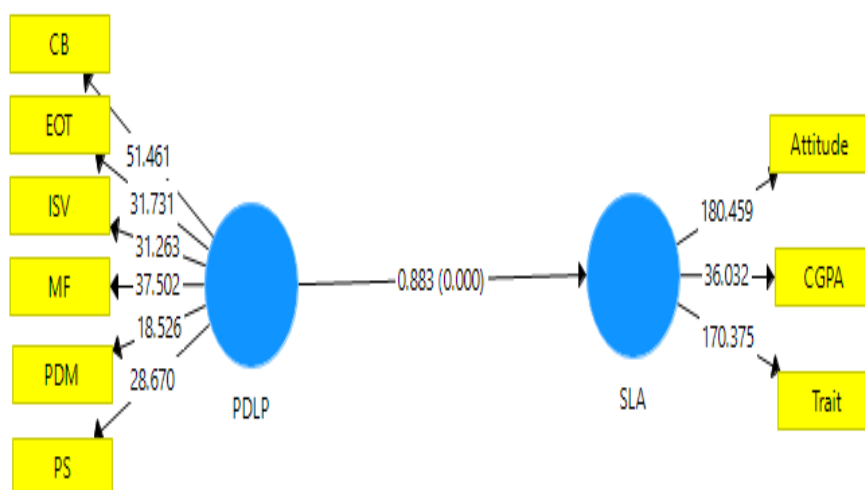

Figure 3. PLS-Path Analysis With Bootstrapping

Note: SLA stands for students' learning outcomes

Furthermore, the Pearson correlation matrix showed inter-correlation among the variables' constructs and revealed that PDLP was positively correlated and statistically significant with SLO (.883, p<.001) while other things kept constant.

Discussion

The concept of D.L has been proliferating within the past two decades; however, there are very few quantitative empirical studies conducted on its effectiveness (Tian et al., 2016; Tsu, 2019). Hence, this study was conducted to test the effect of PDLP on SLO in TVET schools in Eritrea. This study employed a quantitative research design, and a sample of 650 students was identified through stratified random sampling and 603 students survey analysed. A structural equation model was developed to test a model that hypothesized the relationship between the major variables using path analysis. The SEM of the study sample report revealed an absolute model fit, and PDLP was identified as a significant predictor to determine SLO (.883 at p<.001) in the socio-cultural context of Eritrea's TVET schools. Thus, TVET schools that practice D.L may have an advantage to enhance students' better achievement (Ghirmai & Hongde, 2023). The value of R^2 of the survey was 0.775; thus, PLS-SEM has substantial explanatory and predictive power (Q^2= 0.765) in the survey. Moreover, this study revealed that the strongest SLO predictor was capacity building, given it has the largest path coefficient (β=.346) in the model. Besides, the findings show gender disparity among the respondents and turnout rate; nonetheless, it was not statistically significant (p<.001). The result supported the findings of Kahn and Sobani (2012), who stated that female and male students have a distinctive pattern of thinking and problem-solving attitude.

Hypothesis (a) indicates that PDLP does not have a significant and direct effect on SLO. Based on Figure 3, the direct effect of PDLP as an independent variable on SLO is statistically significant. The coefficient of regression in PDLP is .883 at p-value < 0.001. Therefore, the result supports the regression equation model, and alternative hypothesis 1 is rejected. Previous educational studies have provided ample support for the assertion that school principals do not directly affect SLO (Example: Clifford et al., 2012; Leithwood et al., 2004; Pont et al., 2008; Ross & Gray, 2006). Using SEM, Heck and Hallinger (2010) have tried to examine the link between PDLP and learning performance in 197 elementary schools in USA. Unlike to the current findings of the study, Heck and Hallinger (2010) claimed that PDLP have indirect effect on students' learning achievement. Nevertheless, this study put forward the claim that the school principal has a direct and significant effect on SLO (for instance: Rieckhoff & Larsen, 2012), so that I am not alone in my view that claim PDLP has a direct effect on SLO. Similar to the findings of the present study, in Finish vocational schools PDLP proven to have positive effect on making the learning and teaching process smooth and to reduce the trends of students' dropouts (Jäppinen & Sarja, 2012).

Hypothesis (b) shows: There is a significant and positive relationship between ISV and SLO. The empirical result of the relationship between ISV and SLO was statistically significant (β=.179). Although the correlation between the two constructs shows a small relationship, it is statistically significant; Thus, null hypothesis 1 is retained. The finding of this study supports Day and Sammons (2016) claim who stated that the inspiration of a shared vision is one of the significant roles of an effective school principal in England.

Hypothesis (c) also indicates: There is a significant relationship between MF, and SLO. The above figure 2 shows that there was a statistically significant relationship between MF and SLO. The coefficient of regression of MF value in the path is 0.172 and p<0.001. Thus, null hypothesis 2 is supported. Similar findings were reported by Mulford and Silins

(2003). Their study concluded that students' learning achievement is improved when followers are motivated and encouraged by their leaders. Yılmaz and Beycioğlu (2017) also claimed motivation as a powerful tool of D.L that encouraged followers to practice leadership activities in school and to improve learning achievement. Moreover, hypothesis (d) states: There is no significant relationship between PS and SLO. Based on the above result of path analysis, the coefficient regression of PS is 0.195 and has a significant effect on SLO (p<0.001). Therefore, alternative hypothesis 2 is rejected. This evidence supports and asserts the claims of Copland (2003), Pont et al. (2008), Harris (2013), and Tian (2016), all of whom highlight the effectiveness of distributed leadership practice on learning outcomes through a principal who is willing to unrestraint power and give a prospect to others. In addition, Cross et al. (2022) stated that a principal who shared and delegated authority to trusted members whose support they need to get the job done can produce an effective school.

Hypothesis (e) refers: There is a significant relationship between CB and SLO. Figure 2 shows that there was a statistically significant relationship between CB and SLO. The CB regression coefficient is the most considerable value in the path (0.346) and p<0.001. Thus, the null hypothesis 3 was retained. This empirical evidence confirms that effective leadership facilitates a situation that supports professional learning by building followers' capacity that positively impacts students' achievement (Beswick & Clarke, 2018; Leithwood & Jantzi, 2006; Leithwood et al., 2004; Mulford & Silins, 2003). It also supports Miller's (2015) claims, which stated that D.L is a significant factor that encourages school development and students' achievement through capacity building.

Besides, hypothesis (f) indicates: There is a significant relationship between PDM and SLO. Figure 2 shows that there was a statistically significant relationship between PDM and SLO. The regression coefficient in PDM is the smallest value in the path (0.132) at the p<0.001. Thus, the null hypothesis 4 is also accepted. The findings of the current study support the claims of Lambert (2003) who noted that D.L practice enhanced the decision-making process that could increase learning achievement. It also confirmed the claim that stated the participation of followers in the decision making process is a wisdom of D.L practice that positively influences SLO (Dampson et al., 2018; Harris, 2013; Sibanda, 2018; Timperley, 2008; Tsakeni et al., 2020).

Finally, hypothesis (g) states: There is no significant relationship between EOT and SLO. Figure 2 shows a statistically significant relationship between EOT and SLO (Bush & Glover, 2012; Copland, 2003; Spillane et al., 2007). The coefficient of regression in EOT is 0.171 and p< 0.001. Thus, alternative hypothesis 3 is rejected. This result provides a confirmatory evidence to the claim of an effective leader who has the intended ability to mobilize, enabling others to enact and chase the school goal attainment that is SLO. Bush and Ng (2019) emphasized that delegation, empowering and enabling others, and sharing of workload is the distinctive pattern of D. L in Malaysian schools.

The findings of the present study denote that PDLP is more connected to learning achievement. The D.L practice is influenced by the principals and driven by the impact of hierarchical leadership mindset of the third world countries socio-cultural context. In this connection, this study also confirmed with other international studies about the effect of D.L on SLO through school principal (Wan et al., 2018). The researcher still need to keep in mind the specific socio-cultural contexts shaping principal leadership in each country. Compared to western context, principals differ to a large extent in setting and sharing school vision, motivating, enabling, delegating and involving followers in decision making, and to a less extent in school management. In Eritrea, students who complete grade ten (in general education) each year join a two-year intermediate level TVET program. It aims to produce semi-skilled professionals in the fields of technical, agricultural, commercial and music, ready to meet the demands of the labor market. English is the medium of instruction and the official school age in this program is 15-18 years. Students who are enrolled in TVET schools receive free training, and in the case of boarding schools, free accommodation (Ghirmai & Hongde, 2023).

Previous studies findings show that principal leadership does not necessarily predict students' learning achievement (e.g., Chen et al., 2020; Ross & Gray, 2006). In connection with these studies, the current study confirms that PDLP is positively correlated to students' learning achievement in Eritrea's TVET. Indeed, the effect of D.L is determined by school context, students' demographic characteristics, educational policy, teachers' characteristics and so on (Leithwood et al., 2004; Pont et al., 2008). However, principal role should not be underestimate in D.L practices because D.L practice is facilitated and limited by a principal which have potential influence on students learning outcomes (Harris, 2013; Jambo & Hongde, 2020; Spillane et al., 2007; Tian, 2016)

Conclusion

Based on the above empirical findings, the researcher concludes that PDLP has a direct effect on SLO keeping other things constant. This effect increases when the principal (1) leads the school by inspiring students towards a shared vision, (2) motivating students to achieve their learning goals, (3) focusing more on capacity building, (4) being the exemplary leader of a school and enabling students to be engaged and act in their schooling, (5) involving students' representatives in the decision-making process, and (6) sharing power to students' representatives to lead their classroom resources with empowerment and accountability. One of the study's contributions is that it developed and assessed the validity of the PDLP scale for TVET schools in Eritrea through CFA model. The study offered basic evidence that PDLP has a direct and significant effect on SLO. Besides, this results offered insights into how PDLP affect learning outcomes and indicate

the essential for leadership development of school leadership so that they could acquire and adopt the effective D.L qualities that are vital in changing students' attitude and improving their learning outcome.

Recommendation

The present study has some implications for practitioners. The available evidence suggests that D.L is still in hand and the gift of a school principal. Thus, school principals should have direct and daily contact with their students. They should address them through morning talk during the flag ceremony and they can give a five to ten-minute motivational speech and provide up to date information and guidance services. These measures serve to motivate and encourage students to have awareness and prolonged engagement in their schooling. The school principals should strengthen students' leadership as part of distributed leadership practices to affect SLO positively. In fact, schools that focused on students' leadership through students' class representatives shown a positive effect on SLO. The result of the study revealed that most principals shared and delegated power and responsibilities to students' representatives to lead their classrooms or workshops. These include controlling teaching materials, classrooms or workshops, teachers' and students' daily attendance, teachers' appraisal, and monitoring students' discipline. Besides, the findings shown that principals were also building harmony and cooperation among students by organizing and facilitating socialization programs such as festivals, picnics, and sports activities via students' representatives. Therefore, school principals should delegate and share authority to students' representatives and should also facilitate socialization programs to enhance learning outcomes.

Limitation

The present study addresses the existing literature gaps on the relationship between the PDLP and SLO by exploring the six factors of leadership practices, which shows a promising area for future study. Nevertheless, more research is required to understand the factors and the direct relationship between the PDLP and SLO. Compatible, this study shows one step in realizing how PDLP contributes to SLO in Eritrea's TVET schools. However, additional research is needed to assert the effectiveness of PDLP in another context. The current study employed cross-sectional data, whereas learning outcomes were well reflected in a longitudinal study; therefore, follow up data of entering cohorts of students in several types of TVET schools, which, in turn, would enable a comparative analyses of D.L effect on students' achievement is needed for future studies. This study mainly focused on the investigation of students' perception of the direct effect of their principals' leadership practices and SLO from a distributed perspective. Nevertheless, PDLP has many characteristics to contribute and to affect SLO indirectly. These are teachers' commitment, teachers' self-efficacy, and teachers job satisfaction.

PDLP can also be related to organizational success, such as job performance, academic optimism, school health, teacher retention, or burnout. Therefore, there is a space for further research to investigate the relationship between PDLP and organizational success. Furthermore, this study examined some demographic characteristics that were found to have a conditional effect on SLO. While SLO has multiple controlling variables or moderators, future studies in this area may include student engagement, educational policy, and parents' education level.

Acknowledgements

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