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The Influence of Principal Leadership on School Innovativeness

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Abstract

The purpose of this study was to show how principal leadership style affects school innovativeness. We intended to evaluate: 1) As department heads are the direct instructional leaders in schools, innovativeness is more probable with their indirect contribution. 2) Direct instructional leadership can improve with indirect approaches. This study is based on the principal questionnaires from The Teaching and Learning International Survey (TALIS 2018). Dataset: TCGINTT3 is used to answer the research question. The dataset is further trimmed to have the only data from Norway and only the variables needed for this study.

A scheme via SEM (Structural Equations Modelling) is elaborated to examine the leadership process that is hypothesized to be related to a school's innovation. Structural equation modelling is a detailed statistical approach to test hypotheses about the relationship between latent and observed variables. The correlation among the latent variables is also measured to detect any dependency and to avoid autocorrelation errors. In addition to the variables, school weightage (SCHWGT) is used for the analysis to eliminate biased estimates for the population.

Finally, to measure the model's fitness as a validation step, some empirical tests have been performed. The model was built using the software M-Plus (version 7.3). Findings of the relationship between school leadership and organization innovativeness outcomes provide a confused and inconsistent picture. However, this study's findings highlight that the ability to "quickly do things in a new way" was strongly associated with schools' innovativeness. Thus, the link between indirect instructional leadership and innovation becomes necessarily more evident.

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Introduction

As per the OECD (The Organization for Economic Co-operation and Development) guidelines, innovation is defined as "the implementation of a new or significantly improved products (good or services) or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations" (OECD, 2005, p. 46). In other words, an organization is considered innovative if it can improve its product, processes, or practices by implementing new techniques compared to the traditional methods used in the organization.

When it comes to school innovation, innovation can refer to the usage of new pedagogic practices for better learning outcomes for students. As a consequence, an innovative school can have higher performance compared to non-innovative schools. Furthermore, school innovation is highly linked to the school resources such as teachers, classrooms, books, syllabus, assessment forms, training programs, etc. The principal, who is the leader of the school, controls these resources.

In the literature, there are several studies that have been conducted to understand the impact of principal's leadership styles on school innovation. Daniëls et al.(2019) present the overview of four main leadership theories in education settings: instructional, situational, transformational, and distributed.

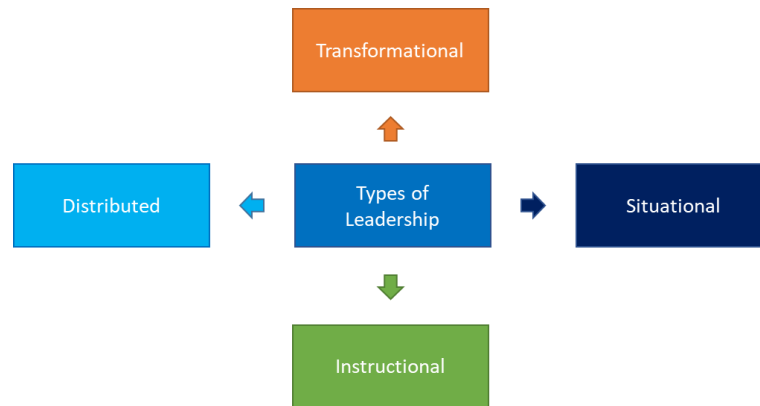


Figure 1. Types of Leadership

Instructional leadership is considered a top-down approach where principals act as hands-on leaders working with teachers to improve teaching and learning. In contrast with instructional leadership, the transformational style is perceived as a shared leadership model which focuses on collaborative practices to improve student achievement (Sun and Leithwold, 2012). Distributed leadership style focuses on task distribution and distributed influence processes to improve innovation in teaching and learning. In situational leadership, an employee should be treated as per the dynamics of the situation. The relationship between the school context and leadership is discussed in Hallinger (2011).

The report, *Rektor - en forskningsöversikt 2000–2010* [Overview of research on school principals] indicates that research on instructional leadership style is limited in the volume and received little attention in Norway and Sweden (Johansson & Bredeson, 2011). In this thesis, I contribute to filling this gap in the literature by investigating the impact of the principal's instructional leadership style on the school innovativeness with the help of Teaching and Learning International Survey (TALIS) data.

TALIS (Teaching and Learning International Survey) data from the OECD (The Organization for Economic Co-operation and Development) helps answer how the principal

leadership style impacts innovativeness by asking teachers and school principals about their learning and working atmospheres and offers a barometer of the profession every five years.

Principal leadership

Leadership in education is very important; a person with leadership qualities strives to create a transformation in the educational system. In a school, it is the principal, who strives to build a progressive transformation in the educational system. Principal as a leader is considered as an important factor responsible for the school's innovativeness and creativity (Yılmaz, E, 2010). Principal work does not only involve working with management but also involves improving the school performances. The principal demonstrates different types of leadership style to improve the educational system.

Thus, different styles of leadership have an effect on the innovativeness of an organization. Recently, there are three types of leadership style used in education research on instructional leadership, transformational leadership and distributed leadership (Bush & Glover, 2014; Gumus et. al., 2018).

Transformational leadership is defined as a leadership that motivates people and organizations to achieve long term goals (Burns, 1979).

Distributed leadership is extended leadership inside and throughout the organization and there is a high level of involvement in the exercise of leadership (Spillane et al., 2001).

Instructional leadership is defined as a leadership style performed by the principal in order to encourage student learning. Instructional leadership is more involved in the administration side; it is the actions taken by the principal to instructional characteristics to bring successful organizational achievements (Hallinger and Heck, 1998).

The leader must take accountability for the achievements and non-achievements of the school. The principal as a leader is continuously looking to develop the school and makes developments irrespective of how challenging it might be. Leadership describes how effective any school is, a school with no good leader will possibly not succeed.

The achievement of any organization is very much valued upon the leader of an organization. Efficient leadership style provided by the principal will lead to the success of an organization. Principal leadership is necessary in a school to endorse success. However, also the readiness of the people to accept and follow a person, contributes to make a person a leader. They see the person as a support in achieving their own wishes and aspirations. Leadership style can be described as the type of link that is used by an individual in order to prepare people to work collectively to achieve a common aim or goal (Harris et al.,2007).

The principal is respected as the instructional leader of the school. Principals as instructional leaders are instruments used in an organization for the success of the organization. It determines the objectives of an organization and ways of accomplishing them. Therefore, Principal instructional leadership in an organization has been viewed as inspiration, and the principal is the leader encouraging others in the direction of achievement of the organization goals.

In the initial period of 1980s, the Instructional leadership model became apparent in the investigation on the effectual schools (Hallinger, P., 2005). Compared to the primitive models, this model concentrated on the behaviour on how the leadership style enhanced learning consequences (Stewart, 2006). The Instructional leadership style should include leadership qualities and also involve organization tasks. In many cases, the instructional leadership is a major element of efficient schools (Teddlie and Reynolds, 2000). There are not enough evidence

in recent times to show that a growth in leadership quality is connected to school performance. (Bush and Glover, 2004). Therefore, evidence based on the instructional leadership is very limited. In this analysis, I describe that principal instructional leadership influences school innovativeness.

Direct instructional leadership

The styles of instructional leadership should include both leadership qualities and organizational tasks that could possibly be done by one person or with the help of another person. When seen from one side, leadership is very essential in setting a path, which mainly focuses on student learning and through creating goals from the organization side and create an environment, which helps to achieve the goals. (Robinson et al., 2009). Proper organization and encouragement are two typical strategies that are associated with the leadership behaviour. (Cardno, 2012). The other side, the important purposes of instructional leadership involves management tasks that includes collaborating, active planning, supervising, progressing and evaluating (Drucker, 1955; Hallinger, 2005). The direct instructional leadership is done by the heads of department. The particulars of the prospectus in the subject are attended by the direct instructional leaders and so they are the direct instructional leaders for their department. (Siskin, 1991).

Recently there has been a lot of importance placed on the necessity for principals to be direct instructional leaders. The Principal instructional leadership remains direct when focusing on the improvement of teaching and working on the development plan of the school. Direct instructional leadership is concentrated on the quality of the teaching teacher learning, teacher practice, as well as the professional development plan of the school curriculum (Bendikson, Robinson, & Hattie 2012).

In this study, based on the questionnaires selected from TALIS, the direct instructional leadership activities are categorized as four components, all together linking the relationship of direct instructional leadership activities to organizational development. The first dimension, cooperating, is about collaborating with the teachers in resolving the classroom problems, and involves direct finding of the needs for learning and development. The second dimension, curriculum, is the beginning keyword for the word instruction, have been familiar with the school's strategy, departmental planning and establishing educational goals. The third dimension, teacher evaluation, includes directly monitoring the performance of the teacher, and is based on the observation giving constructive feedback involving professional discussions with teachers, and understanding the importance of direct instructional leader's capability in the teaching area. The fourth dimension, evaluation of learning, happens through direct monitoring of the class and observing the instruction in the classroom.

There is a diverse view about principals in schools regarding their direct involvement in instructional development. Not many experts support this point of view, but few support this view. The view on the direct involvement of principals in instructional development and student achievement was supported by Gillat and Sulzer-Azaroff (1994). They believed that when the principal behaves more like a teacher by setting goals, observing classrooms and providing feedback, student achievement is expected to improve. As of this point of view, the principal is a great instructional leader who must actively and directly participate in classrooms and work with students and teachers.

Another study (Bendikson, Robinson, & Hattie 2012) found that in successful schools, where direct instructional leadership was implemented, promising quality teaching was more common than in the other schools. But in schools where student outcomes is in need of

improvement, a similar extent of leadership will perhaps not be found. In that case, the principal should take a direct instructional leadership role. These results propose that the kind of effective principal instructional leadership is reliant on the developing phase of the school. School's progress and different style of leadership is necessary at several phases of improvement (Hallinger & Murphy, 1987).

Indirect instructional leadership

Principal instructional leadership becomes indirect when concentrating on creating a situation for best possible teaching and learning.

The indirect instructional leadership creates an atmosphere to enhance learning. Indirect instructional leadership could be the most excellent predictor of school performance (Bendikson, Robinson, & Hattie 2012). When supporting school plans, procedures, resources, and administration as well as high quality education and staff learning, indirect instructional leadership promotes an environment for quality education and staff learning (Kleine-Kracht, 1993).

In this study, based on the questionnaires selected from TALIS, the indirect instructional leadership is categorized as two components all together linking the relationship of Indirect instructional leadership activities to organizational development, promoting trust and collaboration, and supporting good instructional practices.

When principals concentrate on activities that are only related to teaching and avoid the administration performances, they follow a low-level instructional leadership that is very "narrow" (Murphy 1988). There is a misperception that the responsibilities of the principal is smaller when there is a narrow understanding about the instructional leadership (Zhao 2018).

Then this could also lead to an assumption that responsibilities really do not need to have an important influence on student accomplishment (Wiseman and Goesling 2000).

Nevertheless, much of the literature about instructional leadership place emphasis on the role of principals in indirectly encouraging a learning climate favourable to student learning and supporting teachers. My evaluation of instructional leadership describes this indirect role as setting a goal for school mission, promoting, and collaborating, and maintaining good instructional practices.

Principals can indirectly have an effect on teaching-learning practice. Bellibas (2015) considers that principals can provide a favorable environment, provide chances for professional growth, and inspire development even without directly involving the instructional method.

The majority of the demonstration specifies that school principals play an important role in the school efficiency and student accomplishment indirectly by means of actions they take on to control school and classroom environments (Kleine-Kracht, 1993).

Innovation in school practices

Innovation in general means something new. Innovation is used to signify any shift, no matter how little. Innovation is not only characterized by introducing or executing new ideas or practices. The description or meaning of innovation can be described as a process that includes several activities to discover innovative ways to do things. It must not be mistaken for inventing, because this can be described as the act of making, creating, or delivering something.

Nevertheless, new innovations can be associated with inventiveness. There is little research on what innovation will bring about to the organization.

Researches promoted the earlier findings, which emphasize that school principals who concentrate on teacher involvement and certified teaching are the main actors for school development (Çoban & Atasoy, 2020).

Previous research considered that the acceptance of innovation stimulates an organization and directs to better organizational performance. The advancement of new technology has created innovative practices in education, business and in government. To maintain the speed with the globalization, the educational leaders have adopted innovative practices developing from the beginning of new skills in the school management (Akpan, 2016).

The significance of innovation to success is accepted (Fernandes Rodrigues Alves et al., 2018). But on the other side, knowing the significance of innovation is a bit more confrontational, particularly in the academic sector (Birkinshaw et al., 2008).

In schooling, organizational innovativeness generally concentrates on creating a learning organization in order to accept the innovative practices and methods and adapt to the environmental changes rapidly. In the educational area, this term is believed as adaptation of schools to innovative practices and methods. In order to do this, school principals must act as instructional leaders and they must build an image for their schools. Furthermore, Gumuş, et al. stated that the principals in the school build an encouraging, cooperative atmosphere for the teachers. Therefore, to find a clear knowledge of the meaning of innovation, it becomes essential to know it ahead of transforming technology. In the modern period, educational organizations are encountering the task of doing extra with a small amount of resources as they attempt to meet up the difficult and ever-changing needs of the people (Akpan, 2016). Modern and innovative methods are now being applied in educational management and in teaching. Innovation in school management and teaching, motivate innovative practices in schools (Akpan, 2016). In order for

the school administrator to be successful in the delivering of his/her administrative roles, the person requires to be familiarized with the use of innovations in school management (Akpan, 2016). According to (Uchendu, 2015) innovation is a practice in which brand-new procedures or methods are placed or introduced into the process of an organization to substitute older or ineffectual ones.

Relations between leadership and innovativeness

A helpful school leader and accessibility of technical equipment were the appropriate antecedents of innovativeness (Nilsen, Trude; Scherer, Ronny & Blömeke, Sigrid (2021)). There is a number of aspects, frequently connected to political deviations to the education system. Similarly, the development of school-based administration in several countries over the recent decades, which has added more impact to the school and so a larger role for the school administrator, as controls and responsibilities have been transferred from national level or local towards the school. Unavoidably this has led to an evolution in the significance of the principal and in his/her specific responsibility, and consequently to a larger attention in leadership as a important aspect in development and school effectiveness, a report that performed to be validated by study in school effectiveness (Teddlie and Reynolds, 2000). According to McGregor (1978) leadership is one of the most important determining factors of achievement of every organization project or society. Leadership according to Ukeje and Okorie (1990), creates the variation amongst accomplishment and disappointment, amongst success and failure, amongst improvement and non-improvement of every organization project or society.

In broad, instructional leaders come up with an active contributing part in the student's achievement and school leadership. Findings of "turn around" institutes and involvements into

learning and teaching consistently trust school and leadership with significant concern for institutes and teaching efficacy (Edmonds, 1979).

Instructional leaders are the ones who in several circumstances start the course of school development by executing a specific plan which promotes a teaching tactic (Muijs et al., 2004). The model that occurred was that, whilst direct instructional leadership may perhaps be the better analyst of improvement, indirect instructional leadership may possibly be the best analyst of performance. In general, it is important to discover if principals' instructional leadership can describe the variance across schools and its diverse dimensions influence organizational innovativeness and how principals' instructional leadership.

Research Questions

The objective of this study is to show, how principal leadership style affects school innovativeness. A principal leadership style might affect school innovativeness. Innovation in school practices reflects school innovativeness. The research evidently states the question "To what extent are the leadership styles of principals' and innovation of school practices related?". In order to answer this question, it is hypothesised that:

1) As department heads are the direct instructional leaders in schools, innovativeness is more probable with their indirect contribution.

2) Direct Instructional leadership can be improved with indirect approaches, For example: providing feedback to teachers based on indirect observations.

I highlighted the fact that Direct leadership wasn't as efficient as Indirect instructional leadership. In Norwegian education, very little study has been done on the restructuring of leadership teams, on one side from being an instructional leader, it is expected that the principal will turn out to be someone who attempts and discovers innovative ideas for the organization

(Abrahamsen, Aas, and Hellekjær 2015). Innovativeness is assumed to be more associated with the ability to change quickly ways to do things.

The specified model aims to answer the following question: "How does Principal's leadership affect school innovativeness?".

Methodology

Sample and data

The Teaching and Learning International Survey (TALIS 2018) is conducted internationally, that provides a prospect for principals and teachers to deliver input into the policy development and education analysis. The Organization for Economic Co-operation and Development (OECD) conducts TALIS survey. Norway, along with more than 40 other countries, is taking part in the survey. A Cross-country evaluation of the data may allow countries to recognize, whether other countries encounter the same kind of problems, and learn from the other policy methods. Teachers and school principals will deliver information about the problems like the professional growth they have established; their beliefs and teaching practices; the evaluation of teachers' work and the response and appreciation they obtain for their work; and numerous other management, school leadership and workplace related problems. Principals from 161 schools from Norway responded to the survey conducted by the TALIS during 2018. Table 1 shows the distribution of responses with type of school, gender and total experience as principal (range). This analysis makes use of anonymized data, which is accessible from the International large-scale assessment gathered by OECD, hence data protection obligations and authorization from the research committee is not essential.

Table 1

Responses by Category

School Type	Gender	Total Experience as Principal	Number of Response
Public	Female	0 to 9	52
		10 to 14	14
		15 to 19	7
		20 +	4
	Female Total		77
	Male	0 to 9	47
		10 to 14	13
		15 to 19	4
		20 +	6
	Male Total		70
Public Total		147	
Private	Female	0 to 9	7
		10 to 14	1
	Female Total		8
	Male	0 to 9	5
		15 to 19	1
	Male Total		6
Private Total		14	
Grand Total		161	

To identify this model, the following latent variables have been defined:

DILA: This variable stands for Direct Instructional Leadership Activities, and was built from 2 observed variables: TC3G22C, TC3G22B.

IILA: This variable stands for Indirect Instructional Leadership Activities, and was built from 3 observed variables: TC3G22F, TC3G22E, TC3G22D.

To measure the school's innovativeness, the latent variable INNOV, defined as the "Innovation in school practice" and built with 4 observed variables (TC3G28A, TC3G28B, TC3G28C, TC3G28D), was used, as the dependent variable.

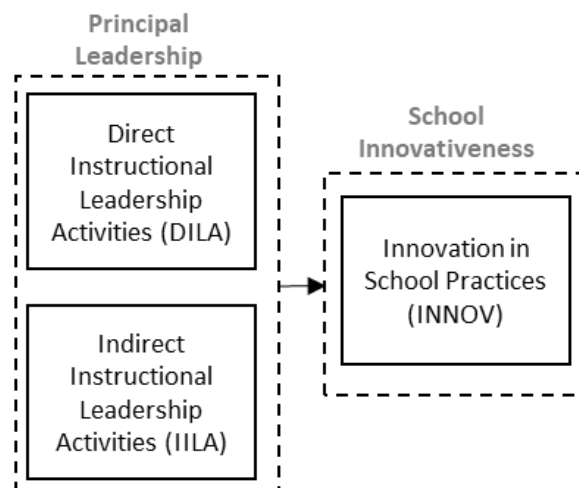


Figure 2. The model structure for the SEM specification.

Measures

Three latent were constructed using three sets of observed variables: Direct Instructional Leadership Activities (DILA) constructed using 2 items of the principal's questionnaire; Indirect Instructional Leadership Activities (IILA), based on 3 items; and Innovation in school practices (INNOV) based on 4 items. The Table 2 provides more details about each construct. The responses were in 4-points likert scale corresponding to the values «Strongly disagree», «Disagree», «Agree», «Strongly agree».

Table 2

Items/questions selected from TALIS 2018 for this research

Item Id	Item Description
<i>Direct Instructional Leadership Activities (DILA):</i>	
TC3G22C	Providing feedback to teachers based on principal's observations
TC3G22B	Observing instruction in the classroom
<i>Indirect Instructional Leadership Activities (IILA):</i>	
TC3G22F	Taking actions to ensure that teachers feel responsible for their students' learning outcomes
TC3G22E	Taking actions to ensure that teachers take responsibility for improving their teaching skills
TC3G22D	Taking actions to support cooperation among teachers to develop new teaching practices

Item Id	Item Description
<i>Innovation in School Practices (INNOV):</i>	
TC3G28A	The school quickly identifies the need to do things differently
TC3G28B	This school quickly responds to changes when needed
TC3G28C	This school readily accepts new ideas
TC3G28D	This school makes assistance readily available for the development of new ideas

Note: Principal questionnaire, TALIS 2018.

Method of analyses

This study used principal questionnaires from TALIS 2018 (Dataset: TCGINTT3) to answer the research question. The dataset is further trimmed to have the only data from Norway and only the variables needed for this study. In addition to the variables from Table 2, school weightage (SCHWGT) is used for the analysis. The school weight is used in this model in accordance Rutkowski et. al's (2013), to eliminate biased estimates to the population. The sample, which is attained here might not replicate the population, however, the school weight will allow the analysis to replicate the population characteristics more accurately.

To examine the leadership process, that is hypothesized to be related to school's innovation, a scheme via SEM (Structural Equations Modelling) was elaborated. As represented by linear structural relations (LISREL), in structural equation modelling we differentiate between variance-based techniques and covariance-based techniques, (Jöreskog, 1970), out of which the partial least squares (PLS) path modelling (Wold, 1975) is the utmost outstanding representative. Structural equation modelling is a detailed statistical approach to testing hypothesis among the relationship between a latent and observed variables (Hoyle, 1995).

The SEM framework in this study focus most on the structural model rather than the measurement model. The hypotheses about the relationships between the latent and the observed variables are assessed using the directions of the structural paths. The correlation among the latent variables are also measured in order to detect any dependency, and to avoid autocorrelation

errors. Jarvis et al. (2003) projected four theoretical decision rules, which has been used to identify the model specification. The primary rule is that the researcher should study the theoretical path of causality between each latent variable and corresponding observed variables. In the second rule the researcher should analyse the interchangeability of the observed variables, when there is a removal of an item, the nature of the underlying contracts should or should not change. Finally, the third and fourth evaluation rules refer to the presence of covariation among the observed variables and the construct indicators. Finally, to measure the fitness of the model as a validation step, some experimental analysis have been performed.

The model was built using the software M-Plus (version 7.3). The standardized parameter estimates were used. The squares represent the observed variables and the arrow pointing the observed variable are for the error terms. Ovals are used to indicate the latent variables.

Results

Item Response Distribution

The answers' rates by item also show a normal repartition among the distributions. For items TC3G22F (67%), TC3G22E (49%), TC3G22D (54%), TC3G28A (79.5%), TC3G28B (79.5%), TC3G28C (62.7%) and TC3G28D (72%), the rate of "Agree" was higher than for the other items (Figure 3). As a reminder, these items are related to IILA and INNOV.

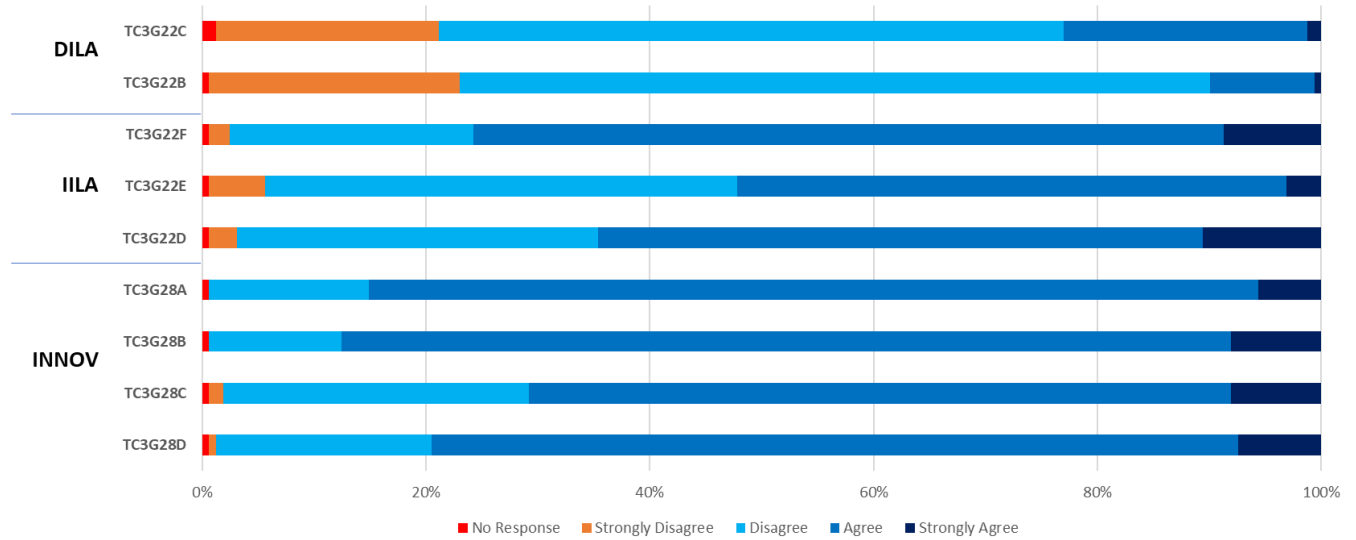


Figure 3. Answers' rate by item

Item-Item Correlations, and Measurement Models

In the initial model, the item-item correlation was computed without residual correlation, even though the covariance coefficients were high, the model fit was not so good. Hence the modification indices were used to identify the item that can be correlated. Modification indices gives information on how to improve the model based on the data.

Covariance between TC3G22C and TC3G22D was allowed, based on MPlus suggestion, items TC3G22C and TC3G22D theoretically resembles each other, and it is proved that they measure more of the same construct.

In the final model item-item correlation was computed with residual correlation allowing the covariance between TC3G22C and TC3G22D, which shows good relationship between the observed variables, with covariance coefficients higher than 0.9 (Table 6 in Appendix III).

Table 3

Means, standard deviations, and correlations with confidence intervals

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8
1. TC3G22B	1.9	0.6								
2. TC3G22C	2	0.7	.67** [.57, .74]							
3. TC3G22D	2.7	0.7	.26** [.10, .39]	.46** [.33, .57]						
4. TC3G22E	2.5	0.6	.16* [.01, .31]	.23** [.08, .38]	.51** [.39, .62]					
5. TC3G22F	2.8	0.6	.27** [.12, .41]	.19* [.03, .33]	.38** [.24, .51]	.57** [.45, .66]				
6. TC3G28A	2.9	0.4	0.06 [-.10, .21]	0.05 [-.10, .21]	0.11 [-.04, .26]	.18* [.02, .33]	.18* [.03, .33]			
7. TC3G28B	3	0.5	0.11 [-.05, .26]	0.13 [-.03, .28]	0.13 [-.02, .28]	.26** [.11, .40]	.19* [.03, .33]	.49** [.37, .60]		
8. TC3G28C	2.8	0.6	0.11 [-.05, .26]	0.12 [-.04, .27]	.21** [.06, .36]	.20* [.05, .34]	.21** [.06, .36]	.31** [.16, .44]	.46** [.33, .58]	
9. TC3G28D	2.9	0.5	.16* [.00, .31]	0.16 [-.00, .30]	.31** [.16, .44]	.25** [.10, .39]	.23** [.08, .37]	.28** [.13, .41]	.41** [.27, .53]	.68** [.59, .76]

Note. *M* and *SD* are used to represent mean and standard deviation, respectively. Values in square brackets indicate the 95% confidence interval for each correlation. The confidence interval is a plausible range of population correlations that could have caused the sample correlation (Cumming, 2014). * indicates $p < .05$. ** indicates $p < .01$.

It is obvious that these items are strongly associated with each other, which would not induce a bias into our analysis. At the same time, model fit is improved, see Table 4. Hence, the successive model was used for our analysis.

The good goodness-of-fit test statistics show a good fit of the model (Table 4).

Table 4

Goodness-of-fit

	Initial model (without residual correlation)	Final model (with residual correlation)
RMSEA	0.86	0.055
CFI	0.898	0.960

In the final model, goodness-of-fit test statistics show a good fit. Root mean square error of approximation (RMSEA) is 0.055, which indicates a good fit. The Comparative Fit Index (CFI) is 0.96 which again reflects a good fit.

Instructional leadership would have an effect on school innovativeness and to check this effect we need to look at the estimates (Table 5). The estimates 0.858, 0.735, 0.716, 0.844, 0.636, 0.383, 0.772, 0.747 and 0.485 are the factor loadings. These factors show how well the questions really measure the constructs and as long as they are above 0.6. School leadership has higher factor loadings. TC3G28A of school innovativeness has very low factor loadings with the value of 0.383. The question TC3G28A does not measure school innovativeness as well as the other three questions.

Table 5

Standardized model result, factor loadings

		Estimates
DILA	BY	
	TC3G22B	0.858
	TC3G22C	0.735
IILA	BY	
	TC3G22F	0.716
	TC3G22E	0.844
	TC3G22D	0.636
INNOV	BY	
	TC3G28A	0.383
	TC3G28B	0.772
	TC3G28C	0.747
	TC3G28D	0.485

Structural Model

Factorial analysis performed on the TALIS data underlines a three-factors relationship, and as shown in the matrix of covariances, the dependency between the items is high. The first factor (DILA) is significantly associated with the two items used for its construct. The second factor (IILA) is also significantly associated with the three factors used for its construct. The dependent latent (INNOV) is associated to all the items used for its construct (Table 3).

The relationships and the results of the SEM are summarized in Figure 4. Results show that Direct Instructional Leadership Activity - DILA affected negatively School Innovativeness - INNOV (-0.046), whereas Indirect Instructional Leadership Activity - IILA affected positively School Innovativeness - INNOV (0.337). DILA was more connected with questions related to “Providing feedback to teachers based on Principals’ observations” and “Observing instructions in the classroom” than with “working on a professional development plan for the school”. IILA was connected with all the items forming its construct framework. INNOV was more connected with the following items “The school quickly identifies the way to do things differently”, “This school makes assistance readily available for the development of new ideas.”. However, the path to INNOV had opposite directions with DILA and IILA. Indeed, statistically significant positive relationship between scores on IILA and INNOV was found, and there was a negative relationship between scores on DILA and INNOV.

In Table 3 the assessment of discriminant validity was acceptable. In Figure 4 are described the estimated indicator weights magnitude connecting the observed variables to the corresponding latent variables and all the results for evaluating the importance of these weights (empirically convergent validity).

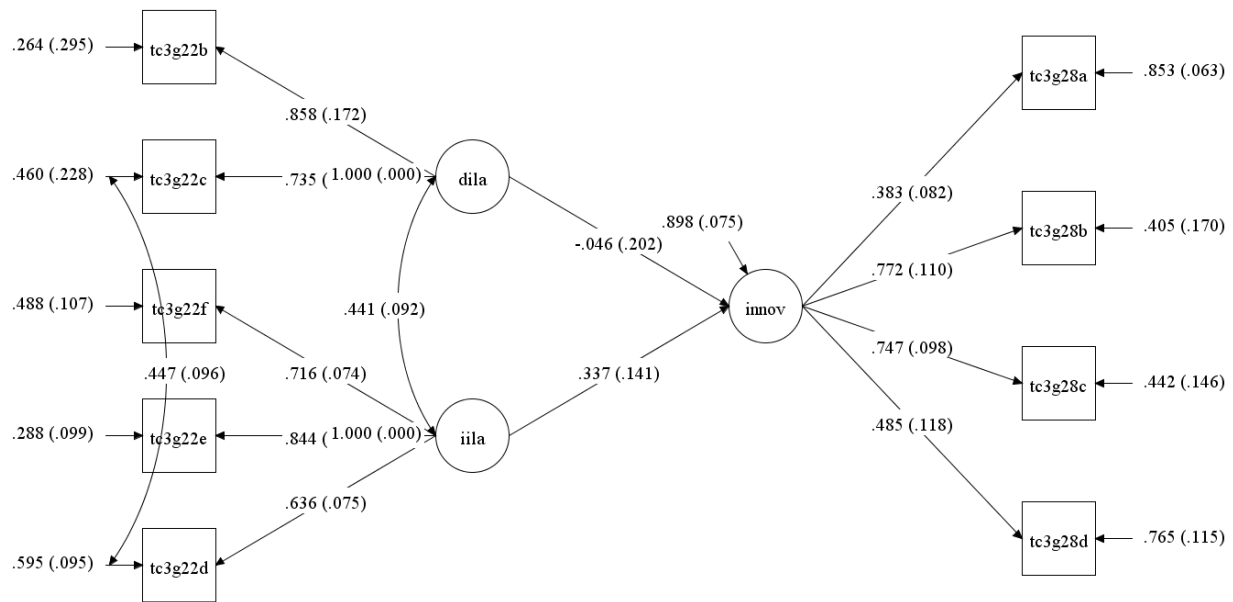


Figure 4. Structural equation model to formalize the schools' innovativeness regarding Principals' direct leadership (DILA) and Principals' indirect leadership (IILA).

Discussion

Summary

IILA was connected with all the items forming its construct framework. INNOV was more connected with item "The school quickly identifies the way to do things differently", "This school makes assistance readily available for the development of new ideas." DILA was more connected with questions related to "Providing feedback to teachers based on Principals' observations" and "Observing instructions in the classroom". However, while IILA had a positive relation to INNOV, DILA had a negative relation to INNOV in the path model.

Discussion

This study analysed the complex relationships between Principals' leadership and schools' innovativeness. School principals must act as instructional leaders and they must build

image for their schools, in order to create an innovative area of learning, must create a supportive, collaborative environment for their teachers (Mestry, Koopasammy-Moonsammy & Schmidt, 2013). However, this present study didn't find enough evidence to link positively direct instructional leadership with schools' innovativeness. If any link would exist, this study shows that it would be negative. Indeed, results showed that principals' direct instructional leadership may not be a good approach to achieve schools' innovativeness in Norwegian schools.

Relationship between IILA and INNOV was positive. Moreover, IILA was more connected with items related to "Providing feedback to teachers based on Principals' observations" and "Observing instructions in the classroom". Principal instructional leadership becomes indirect when concentrating on creating a situation for best possible teaching and learning. According to our study, the more indirect the Principal instructional leadership is, the more innovative the school will be. Robust instructional leadership has been commonly accepted as the essential factor in school development and plays an important role in improving school effectiveness (Allen et al. 2015). However, direct instructional leadership may not be the better way to achieve this goal. These findings are in line with other findings which found that, whilst direct instructional leadership may perhaps be the better analyst of improvement, indirect instructional leadership may possibly be the best analyst of performance."

In order for the school administrator to be successful in the delivering of his/her administrative roles, the person is required to be familiarized with the use of innovations in school management. There are several studies on school innovativeness (e.g. Uchendu, 2015) that defines innovation as a method where effective or new curriculums are introduced into the procedure of an organization to change ineffective or old curricula. Findings of the relationship between school leadership and organization innovativeness outcomes provide a confused and

inconsistent picture. However, this study findings highlight the fact that the ability to “quickly do things in a new way” was strongly associated with schools’ innovativeness. Thus, the link between indirect instructional leadership and innovation becomes necessarily clearer.

Limitations

The largest limitation of the study is the cross-sectional design of the data as this does not allow for causal inferences. More robust inferences could have been drawn based on a longitudinal design.

The covariance matrix shows a good relationship between the items used for the construct, which allows us to avoid multicollinearity bias in our study. However, more tests of biases detection would be better at evaluating the risk of errors. The sample representativeness is a common limitation to observational studies based on large surveys. As these surveys respond to a global need of information, random samples are often hard to select, particularly when the survey covers multiple countries, as TALIS 2018. Another limitation is related to the analysis core. We haven’t been able to define exogenous and endogenous variables. The fact is that theoretically direct instructional and indirect instructional leadership are supposed to influence schools’ innovativeness, separately. They exist independently of the measures and the indicators. Because of that specific case, linear regression was used to estimate the model, but no further analysis was performed. For example, we didn’t measure how each item is represented with respect of each latent variable. This analysis, so-called “cross loading latent/observed variables” allows to verify the appropriate classification of each item with the appropriate latent variable.

In addition, the fact that the DILA and INNOV were more connected to some items than to others may be a limitation for the study results. Theoretically, DILA is a good predictor of school’s innovativeness, even if IILA is known as a better one, based on the theoretical cadre.

Therefore, this study may have not captured all the complex associations among the observed variables and the latent variables.

Implications, contributions, future research

Muijs et al., 2004 states that in many circumstances, when instructional leaders apply a particular inventiveness encouraging teaching, they start the process of school development. This study shows that indirect instructional leadership may be the best approach to use, with a focus on “Providing feedback to teachers based on Principals’ observations” and “Observing instructions in the classroom”. This strategy may improve the quality and the effectiveness of the school. It may boost the ability of the school to quickly do things differently, particularly by integrating the new technology tools and techniques in the learning process. Such findings bring more evidence that schools benefit more from a strategy where the instructional leadership is not only done by the heads of the schools’ departments (direct), but by the teachers, through the indirect instructional leadership of the principals. Future researches need to do further investigations on the impact of direct instructional leadership on schools’ innovativeness, compared with indirect instructional leadership.

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Appendix I: GDPR documents & Ethical approval**NOTIFICATION FORM (ENGLISH TRANSLATION) - NSD****Which personal data will be processed?****Name**

No

National ID number or other personal identification number

No

Date of birth

No

Address or telephone number

No

Email address, IP address or other online identifier

No

Photographs or video recordings of person

No

Audio recordings of persons

No

GPS data or other geolocation data

No

Demographic data that can identify a natural person

No

Genetic data

No

Biometric data

No

Other data that can identify a natural person

No

Will special categories of personal data or personal data relating to criminal convictions and offences be processed?**Racial or ethnic origin**

No

Political opinions

No

Religious beliefs

No

Philosophical beliefs

No

Trade Union Membership

No

Health data

No

Sex life or sexual orientation

No

Criminal convictions and offences

No

Project Information

Register new project

Title

The influence of principal leadership on school innovativeness

Project description

The aim of this study is to investigate the influence of principal leadership style on school innovativeness. A principal leadership style might affect school innovativeness. Innovation in school practices reflects school innovativeness.

Subject area

Other subject areas

Will the collected personal data be used for other purposes, in addition to the purpose of this project?

No personal data collected.

External funding

No

Type of project

- Student project, Master's thesis

Responsibility for data processing**Data controller**

University of Oslo (UIO)

Project leader (research assistant/ supervisor or research fellow/phD candidate)

Name : Prof. Dr. Trude Nilsen

Position : Department of Teacher Education and School Research (ILS)

Email address : Trude.Nilsen@ils.uio.no

Telephone number : -

Will the responsibility for processing personal data be shared with other institutions (joint data controllers)?

No

Joint data controllers

Not applicable

Whose personal data will be processed.**Describe the sample**

No personal data collected; I am working with data available in TALIS 2018.

Recruitment or selection of the sample

Not applicable

Age

Not applicable

Will you include adults (18 år +) who do not have the capacity to consent?

No

Types of personal data

No personal data collected.

Methods /data sources

Select and/or describe the method(s) for collecting personal data and/or the source(s) of data:

Other

Information**Will you inform the sample about processing their personal data?**

Not applicable

How?

Not applicable

Explain why the sample will not be informed about the processing of their personal data.

Not applicable

Third persons

No

Documentation**Total number of data subjects in the project**

(Data subjects: persons whose personal data you will be processing)

- 100-999 (sample size)
- No personal data collected.

How can data subjects get access to their personal data or how they can have their personal data corrected or deleted?

Not applicable

Other approvals

Will you obtain any of the following approvals or permits for the project?

Not applicable

Processing

Where will be the personal data be processed?

No personal data collected

Upload guidelines/approval for processing personal data on private devices

Not applicable

Who will be processing/have access to the collected personal data?

No personal data collected

Which others will have access to the collected personal data?

No personal data collected

Will the collected personal data be made available to a third party or international organisation outside the EEA?.

No personal data collected

Information Security

Not applicable

Duration of project

25-09-2020 to 16-12-2021

Will personal data be stored beyond the end of project period?

No, all collected data will be deleted (No personal data collected)

For what purpose(s) will the collected personal data be stored?

Research (No personal data collected)

Where will the collected personal data be stored?

No personal data collected

Additional information

Will the data subjects be identifiable (directly or indirectly) in the thesis/publications for the project?

No

Other attachments

Not applicable

Appendix II: Data Management & Analysis Code

TITLE: How Principal's leadership affects school innovativeness? - TALIS 2018

DATA: FILE IS Principal_Q_NOR.dat;

VARIABLE:

NAMES ARE

IDCNTRY CNTRY IDSCHOOL SCHWGT
TC3G22A TC3G22B TC3G22C TC3G22D TC3G22E
TC3G22F TC3G22G TC3G22H TC3G22I TC3G22J TC3G22K
TC3G28A TC3G28B TC3G28C TC3G28D;

USEVARIABLES ARE

TC3G22B TC3G22C
TC3G22D TC3G22E TC3G22F
TC3G28A TC3G28B TC3G28C TC3G28D;

MISSING ARE ALL (-99);

WEIGHT IS SCHWGT;

ANALYSIS:

ESTIMATOR = MLR;
PROCESSORS = 4 (STARTS);
H1ITERATIONS = 100000;

MODEL:

! Measurement models

DILA by

TC3G22B*
TC3G22C;

IILA by

TC3G22F*
TC3G22E
TC3G22D;

Innov by

TC3G28A*
TC3G28B
TC3G28C
TC3G28D;

DILA-Innov@1;

! Model modifications

TC3G22D WITH TC3G22C;

! Structural model

Innov on DILA;

Innov on IILA;

OUTPUT:

STDYX;
MOD(all);

Appendix III: Supplemental Material

Table 6

Covariances matrix of the observed variables

	TC3G22B	TC3G22C	TC3G22D	TC3G22E	TC3G22F	TC3G28A	TC3G28B	TC3G28C	TC3G28D
TC3G22B	0.994								
TC3G22C	0.988	0.988							
TC3G22D	0.994	0.988	0.994						
TC3G22E	0.994	0.988	0.994	0.994					
TC3G22F	0.994	0.988	0.994	0.994	0.994				
TC3G28A	0.988	0.981	0.988	0.988	0.988	0.994			
TC3G28B	0.988	0.981	0.988	0.988	0.988	0.994	0.994		
TC3G28C	0.988	0.981	0.988	0.988	0.988	0.994	0.994	0.994	
TC3G28D	0.988	0.981	0.988	0.988	0.988	0.994	0.994	0.994	0.994