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Searching for the impact of national educational policy on student outcomes: An international effectiveness study

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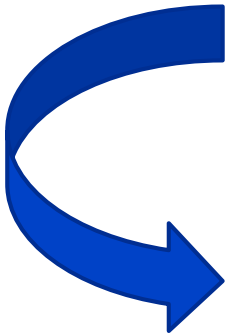
Introduction

- **Educational Effectiveness Research (EER)** has shown great improvement in the last three decades.

- However it has shown ethnocentric tendencies.
  - Most of the school effectiveness studies are conducted in one single country (Reynolds, 2006).

- Assumption: The educational effectiveness knowledge base can be used for the improvement of education



The need for international studies searching for methods that can increase national standards has extensively been discussed by researchers across countries (e.g., Reynolds, Creemers, Stringfield, Teddlie, & Schaffer, 2002; Sammons, 2006)

International comparative studies

- A large number of comparative studies focusing on educational achievement in different outcomes of schooling have been conducted.

→ Ultimate goal: Isolate factors related to student learning which could be manipulated through policy changes.

- Media attention given to the results of this kind of studies has put pressure on the educational systems (Creemers, 2006).

International comparative studies

- **Results:**

  - Simplistic suggestions for raising standards based on ‘‘transplantation’’ of knowledge from one country to another have been proposed.

  - Researchers in the area of educational effectiveness have become concerned about the over simple potential transfer of educational policies (e.g., Creemers, Kyriakides & Sammons, 2010).

Internationalization of EER

Research could gain considerably if there was an internationalization of EER.

Reasons:

- International comparative studies are able to search for the **impact of system level factors** on student achievement gains.
- These findings may contribute to the development of the **theoretical framework of EER**.
- Empirical support to the impact of system level factors could be provided.
- **Suggestions to policy makers** on how to improve the Quality of education.

The European project "Establishing a knowledge base for quality in education: Testing a dynamic theory of educational effectiveness"

- ***Aims:***
  - To contribute to the development of the international dimension of EER.
  - To provide a response to the knowledge gaps in the field.

- **Specific study: Part of the project**

  Aims:
  - To develop a **theoretical framework** that may provide insight into improving student learning outcomes and on broader issues concerned with educational policies.
  - To investigate the extent to which the ***Dynamic model of Educational Effectiveness*** (Creemers & Kyriakides, 2008) could be used as a starting point for establishing such a framework.

THE DYNAMIC MODEL OF EDUCATIONAL EFFECTIVENESS: AN OVERVIEW

- The dynamic model is **multilevel** in nature and refers to four different levels: **student, classroom, school and system**.

  - The **teaching and learning** situation is emphasized.
  - The roles of teacher and student are analyzed.
  - **School-level factors** are expected to influence the teaching and learning situation.
  - **System level:** refers to the influence of the educational system through developing and evaluating the educational policy at the national/regional level.

THE DYNAMIC MODEL OF EDUCATIONAL EFFECTIVENESS: The system level factors

- The dynamic model refers to the most important factors operating at the system level that may affect achievement. Emphasis is given to:

  A. National policy and the actions taken to improve the **quality of teaching** and the **School Learning Environment** (SLE)
  B. **Evaluation** of the national educational policy
  C. **Wider educational environment** of a country and especially its ability to increase opportunities for learning and develop positive values for learning.

The five dimensions of the dynamic model

- Each factor can be defined and measured by using five dimensions: *frequency, focus, stage, quality,* and *differentiation*.
  - **Frequency:** It is a quantitative mean of measuring the functioning of each effectiveness factor. Most effectiveness studies to date have only focused on this dimension.
  - The other four dimensions: examine the **qualitative characteristics** of the functioning of the factors.

METHODS

- In each participating country (i.e., Belgium/Flanders, Cyprus, Germany, Greece, Ireland, and Slovenia) stratified sampling procedure (Cohen, Manion, & Morrison, 2000) was used to collect a sample of **at least 50 primary schools** (n=334).
- Written tests in **mathematics and science** were administered to all grade 4 students (n= 10742) at the beginning and at the end of school year 2010-2011.
- For the construction of the tests, permission was obtained from IEA to use the released items of **TIMSS 2007**.
- The properties of each item and the relation with the curricula of grades 3 and 4 in each country were taken into account for developing the two types of test.

METHODS

Data on the system level factors of the dynamic model:

Three methods of data collection

- Detailed content analysis of the **policy documents** in each country
- **Semi-structured interviews with policy-makers** and other stakeholders were conducted.
- A **questionnaire** which measured the perceived impact of educational policy at the school level and was completed by the **head teachers** of the school-sample.

This paper refers to the analysis of the head-teachers' questionnaire, to examine the perceived impact of educational policy at the school level.

Head-teachers' questionnaire

- It aimed at measuring the perceived impact of the national/state policy on:
  a) the policy on teaching
  b) the policy on the school learning environment
  c) on evaluation of the national/state policy

- The **five measurement dimensions** were taken into account.

- Average of response rate 60%.

- **Cronbach alpha** was very high (a= 0.96).

RESULTS

A) Testing the validity of the head teacher questionnaire

- **Separate Confirmatory Factor Analysis (CFA)** was conducted for each of the three overarching system factors of the dynamic model.

- **Three models that fit to the data** were developed and **three second order factors** were identified.

  - The **first overarching factor** (X^2= 208, df=176, CFI=0.984, RMSEA=0.031) (school policy on teaching) consists of the factors measuring:
    a) quantity of teaching,
    b) quality of teaching and
    c) provision of learning opportunities
    And their measurement dimensions

RESULTS

- The **second overarching factor** (X^2= 35, df=31, CFI=0.99, RMSEA=0.029) (Policy on the School Learning Environment) consists of five factors measuring:

  a) teacher collaboration,

  b) partnership policy,

  c) relation with the community,

  d) differentiation of the learning resources, and

  e) use of the learning resources (quantitative aspects)

RESULTS

- The **third overarching factor** (X^2= 82, df=62, CFI=0.987, RMSEA=0.041)refers to the policy on school evaluation and consists of the factors measuring:

  a) The different dimensions of the policy on school evaluation (frequency, quality, stage and differentiation),

  b) Teacher evaluation, and

  c) School evaluation

- Teacher evaluation and school evaluation are not included in the dynamic model but were identified from the data.

RESULTS

- The **loadings** of the items and the factors were all high (>0.50), providing further support to the construct validity of the questionnaire.
- Based on the loadings of the items from the SEM analysis **factor scores** were estimated for each factor.
- These factor scores were used for the **multilevel analysis**, to identify the impact of the system factors on student achievement in mathematics and science.

RESULTS

B) Searching for the impact of system factors on student achievement

- The first step was to run a **two-level model** (*school level and student level) without any explanatory variables (empty model) to determine the variance at each level.

* the system-country level could not be included in the model due to the small number of participating countries (N= 6) and the **lack of statistical power**

- In **model 1** the context variables were added to the empty model.
  - Students' **prior achievement** and **average prior achievement at the school level** had a statistically significant effect on each outcome.

RESULTS

- For each student outcome, **different versions of model 2** were established.
- In each version of model 2, the first order factor scores of the SEM models which refer to the system-level factors of the dynamic model were added one by one to model 1.
- **All system factors have significant effects on student achievement in mathematics and science** except of the factor concerned with the **partnership policy** (for mathematics)**.**

- In **models 3a-3c** we have added in model 1 the **three overarching factors separately** to see their impact on student achievement.
  - **All three overarching factors were found to be associated with student achievement in each subject.**

DISCUSSION

- This study reveals that the system factors that are included in the dynamic model are **associated with student achievement**.

- The results from the analysis of the head teacher questionnaire data should be compared with the results of the analyses of the data collected through

→the interviews with the educational policy-makers, and

→the analysis of the policy documents

- In spite of the fact that this study was in a position to identify factors that have an effect on student achievement, more **studies** are needed to test the generalizability of the findings (collecting data from more countries and countries outside Europe).

Thank you for your attention!

Table 1 Parameter Estimates and (Standard Errors) for the analysis of student achievement in mathematics (Students within schools)

		Mathematics								
System Factors	Model 0	Model 1	Model 2a	Model 2b	Model 2c	Model 2d	Model 2e	Model 2f	Model 2g	Model 2h	Model 2i
Fixed part (intercept)	330.5(1.9)	33.7(9.9)	-38.5(16.2)	-8.8(12.8)	-14.8(10.9)	-14.2(11.8)	36.5(9.4)	44.1(9.8)	-3.7(13.0)	19.4(11.9)	13.2(11.4)
Student Level											
Context											
Prior achievement		0.68(0.01)	0.68(0.01)	0.68(0.01)	0.68(0.01)	0.68(0.01)	0.68(0.01)	0.68(0.01)	0.68(0.01)	0.68(0.01)	0.68(0.01)
School Level											
Context											
Prior achievement		0.32(0.03)	0.25(0.04)	0.30(0.03)	0.23(0.03)	0.24(0.04)	0.18(0.04)	0.19(0.04)	0.25(0.04)	0.30(0.04)	0.27(0.04)
System Level											
Evaluation (Frequency)			72.8(13.4)								
Evaluation (Quality)				39.1(7.9)							
Evaluation (Differ.)					43.9(5.6)						
Evaluation (Stage)						53.4(8.2)					
School Evaluation							20.4(3.3)				
Resources (Differ.)								19.4(3.6)			
Resources (Quantity)									32.6(7.6)		
Teacher Collaboration										13.2(6.2)	
Relations Community											25.1(7.3)
Variance components											
School	23.7%	4.9%	4.3%	4.4%	3.7%	4.0%	4.1%	4.3%	4.5%	4.8%	4.6%
Student	76.3%	47.5%	47.5%	47.5%	47.5%	47.5%	47.5%	47.5%	47.5%	47.5%	47.5%
Explained		47.6%	48.2%	48.1%	48.8%	48.5%	48.4%	48.2%	48.0%	47.7%	47.9%
Significance test											
Loglikelihood	103307	98607	98579	98584	98553	98567	98571	98579	98590	98603	98596
Reduction		4700	28	23	54	40	36	28	17	4	11
Degrees of freedom		2	1	1	1	1	1	1	1	1	1
p value		0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001

Note: For each alternative Model 2 (i.e., Models 2a up to 2p) and for each alternative Model 3 (i.e., Models 3a up to 3c) the reduction is estimated in relation to the deviance of Model 1 (continued)

Table 1 Parameter Estimates and (Standard Errors) for the analysis of student achievement in mathematics (Students within schools) **(continued)**

			Mathematics									
System Factors	Model 0	Model 1	Model 2j	Model 2k	Model 2l	Model 2m	Model 2n	Model 2o	Model 2p	Model 3a	Model 3b	Model 3c
Fixed part (intercept)	330.5(1.9)	33.7(9.9)	-61.4(19.3)	13.7(11.0)	14.1(13.7)	22.3(9.9)	-8.5(13.8)	8.6(10.3)	21.0(10.3)	-44.9(13.1)	-0.11(11.8)	-10.5(11.8)
Student Level												
Context												
Prior achievement		0.67(0.01)	0.68(0.01)	0.68(0.01)	0.68(0.01)	0.68(0.01)	0.68(0.01)	0.68(0.01)	0.68(0.01)	0.68(0.01)	0.68(0.01)	0.68(0.01)
School Level												
Context												
Prior achievement		0.32(0.03)	0.28(0.03)	0.24(0.04)	0.32(0.03)	0.26(0.04)	0.31(0.03)	0.19(0.04)	0.27(0.04)	0.21(0.03)	0.22(0.04)	0.22(0.04)
System Level												
Quantity of Teach. (Qual)			54.4(9.7)									
Quantity of Teach. (Focus)				24.6(6.5)								
Learning Opp. (Focus)					11.7(5.7)							
Learning Opp. (Quantity)						14.7(2.9)						
Learning Opp. (Quality)							24.1(5.7)					
Learning Opp. (Differ)								41.5(6.9)				
Quality of Teaching									16.9(4.7)			
Overarching Evaluation										91.3(11.2)		
Overarching SLE											52.6(10.7)	
Overarching Policy Teach.												54.4(8.9)
Variance components												
School	23.7%	4.9%	4.2%	4.6%	4.8%	4.4%	4.5%	4.2%	4.6%	3.6%	4.4%	4.1%
Student	76.3%	47.5%	47.5%	47.5%	47.5%	47.5%	47.5%	47.5%	47.5%	47.5%	47.5%	47.5%
Explained		47.6%	48.3%	47.9%	47.7%	48.1%	48.0%	48.3%	47.9%	48.9%	48.1%	48.4%
Significance test												
Loglikelihood	103307	98607	98578	98594	98603	98584	98590	98574	98595	98548	98584	98573
Reduction		4700	29	13	4	23	17	33	12	59	23	34
Degrees of freedom		2	1	1	1	1	1	1	1	1	1	1
p value		0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001

Note: For each alternative Model 2 (i.e., Models 2a up to 2p) and for each alternative Model 3 (i.e., Models 3a up to 3c) the reduction is estimated in relation to the deviance of Model 1.

Table 2 Parameter Estimates and (Standard Errors) for the analysis of student achievement in science (Students within schools)

			Science									
System Factors	Model 0	Model 1	Model 2a	Model 2b	Model 2c	Model 2d	Model 2e	Model 2f	Model 2g	Model 2h	Model 2i	Model 2j
Fixed part (intercept)	318.0(2.1)	40.4(10.2)	-122.3(14.9)	-9.5(14.2)	-22.7(11.7)	-46.1(10.2)	45.4(8.7)	44.7(9.8)	-20.5(14.7)	5.5(11.7)	2.6(12.2)	-12.0(10.4)
Student Level												
Context												
Prior achievement		0.54(0.01)	0.54(0.01)	0.54(0.01)	0.54(0.01)	0.54(0.01)	0.54(0.01)	0.54(0.01)	0.54(0.01)	0.54(0.01)	0.54(0.01)	0.54(0.01)
School Level												
Context												
Prior achievement		0.39(0.04)	0.18(0.03)	0.38(0.03)	0.29(0.03)	0.15(0.03)	0.10(0.04)	0.26(0.04)	0.33(0.04)	0.32(0.04)	0.29(0.04)	0.20(0.04)
System Level												
Evaluation (Freq.)			175.5(13.5)									
Evaluation (Quality)				42.3(8.7)								
Evaluation (Differ.)					53.5(6.1)							
Evaluation (Stage)						117.9(8.5)						
School Evaluation							39.5(3.5)					
Resources (Differ.)								23.7(3.8)				
Resources (Quantity)									43.0(7.8)			
Teacher Collaboration										37.8(7.0)		
Partnership Policy											31.0(6.0)	
Relations Community												78.7(7.9)
Variance components												
School	30.9%	7.8%	4.2%	7.1%	5.9%	3.9%	5.0%	6.9%	7.0%	7.0%	7.0%	5.4%
Student	69.1%	49.0%	49.0%	49.0%	49.0%	49.0%	49.0%	49.0%	49.0%	49.0%	49.0%	49.0%
Explained		43.2%	46.8%	43.9%	45.1%	47.1%	46.0%	44.1%	44.0%	44.0%	44.0%	45.6%
Significance test												
Loglikelihood	99395	95962	95826	95939	95894	95810	95854	95925	95932	95934	95936	95876
Reduction		3433	136	23	68	152	108	37	30	28	26	86
Degrees of freedom		2	1	1	1	1	1	1	1	1	1	1
p value		0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001

Table 2 Parameter Estimates and (Standard Errors) for the analysis of student achievement in science (Students within schools) **(continued)**

			Science									
System Factors	Model 0	Model 1	Model 2k	Model 2l	Model 2m	Model 2n	Model 2o	Model 2p	Model 2q	Model 3a	Model3b	Model 3c
Fixed part (intercept)	318.0(2.1)	40.4(10.2)	-110.4(21.1)	-7.3(11.3)	-10.4(14.5)	33.9(8.7)	-30.1(13.1)	-6.5(10.6)	5.4(10.1)	-82.2(12.8)	-33.1(11.3)	-51.9(10.7)
Student Level												
Context												
Prior achievement		0.54(0.01)	0.54(0.01)	0.54(0.01)	0.54(0.01)	0.54(0.01)	0.54(0.01)	0.54(0.01)	0.54(0.01)	0.54(0.01)	0.54(0.01)	0.54(0.01)
School Level												
Context												
Prior achievement		0.39(0.04)	0.36(0.03)	0.24(0.04)	0.40(0.03)	0.17(0.04)	0.33(0.03)	0.22(0.04)	0.28(0.04)	0.21(0.03)	0.15(0.04)	0.16(0.03)
System Level												
Quantity of Teach. (Qual)			80.5(10.1)									
Quantity of Teach. (Focus)				51.4(6.7)								
Learning Opp. (Focus)					29.8(6.2)							
Learning Opp. (Quantity)						37.7(3.3)						
Learning Opp. (Quality)							47.4(6.2)					
Learning Opp. (Differ)								63.5(7.2)				
Quality of Teaching									40.6(4.8)			
Overarching Evaluation										144.6(11.5)		
Overarching SLE											119.7(11.4)	
Overarching Policy Teach.												118.7(8.9)
Variance components												
School	30.9%	7.8%	6.1%	6.3%	7.1%	4.9%	6.2%	5.9%	5.9%	4.3%	5.2%	4.1%
Student	69.1%	49.0%	49.0%	49.0%	49.0%	49.0%	49.0%	49.0%	49.0%	49.0%	49.0%	49.0%
Explained		43.2%	44.9%	44.7%	43.9%	46.1%	44.8%	45.1%	45.1%	46.7%	45.8%	46.9%
Significance test												
Loglikelihood	99395	95962	95904	95907	95940	95854	95908	95890	95896	95834	95867	95820
Reduction		3433	58	55	22	163	54	72	66	128	95	142
Degrees of freedom		2	1	1	1	1	1	1	1	1	1	1
p value		0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001

Figure 1: The second-order factor model of the head teacher questionnaire measuring system factors on the school policy on teaching with factor parameter estimates

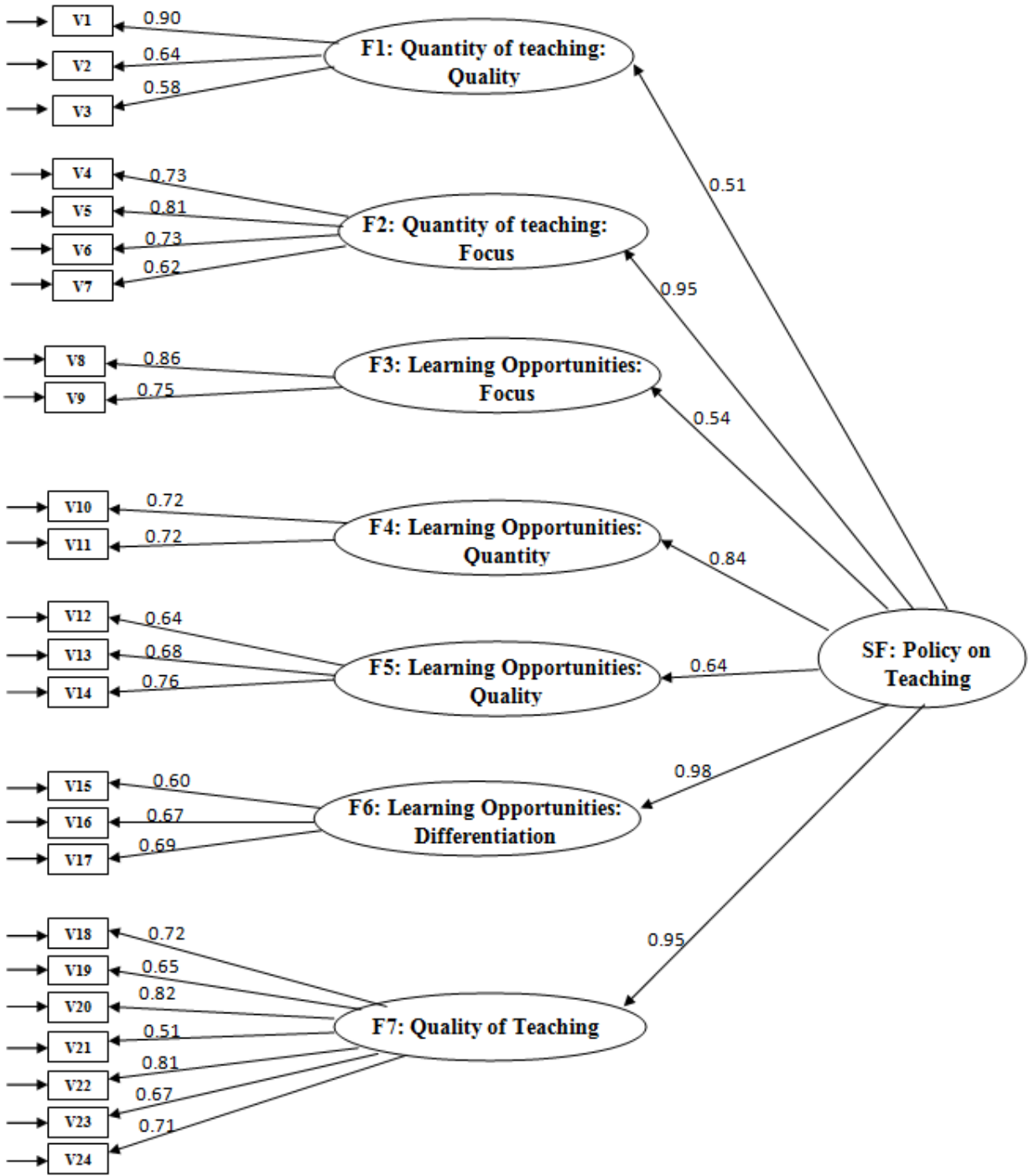


Figure 2: The second-order factor model of the head teacher questionnaire measuring system factors on the school learning environment with factor parameter estimates

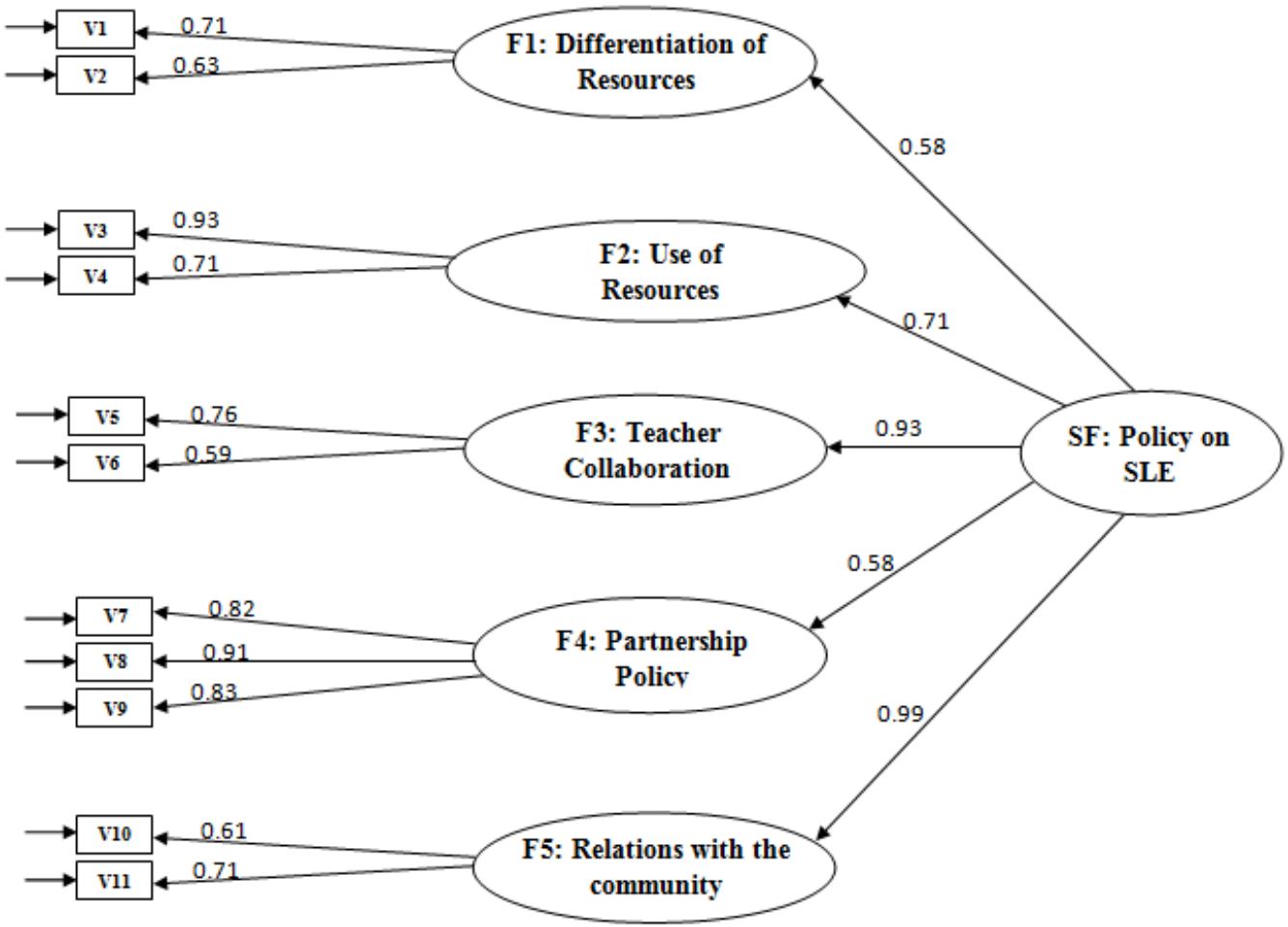


Figure 3: The second-order factor model of the head teacher questionnaire measuring system factors on school evaluation with factor parameter estimates