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Transformational and Instructional Leadership in Cross-Thematic Teaching

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Abstract

Over the last decades, rigorous research has been carried out concerning the most appropriate leadership style of school principals and the two basic conceptual models of transformational and instructional leadership. However, the practices and behaviours of principals as they affect the successful implementation of cross-thematic integration have not been sufficiently explored. This article examines the relationship between the factors' "transformational leadership" and "instructional leadership" for enhancing cross-thematic teaching. Quantitative empirical research was conducted on a sample of 251 principals of Greek primary schools. The results reveal a positive and statistically significant relationship between the two main factors of this study.

Résumé

Au cours des dernières décennies, des recherches rigoureuses ont été menées sur le mode de direction qui serait le plus approprié pour les directeurs d'école ainsi que sur les deux modèles conceptuels de base que sont le leadership transformationnel et le leadership pédagogique. Cependant, l'exploration n'a pas été suffisante en ce qui a trait aux pratiques et comportements des directeurs ayant un effet sur la mise en place réussie de l'intégration multithématique. Cet article examine le rapport entre les facteurs « leadership transformationnel » et « leadership pédagogique » qui permettrait d'améliorer l'enseignement multithématique. Pour ce faire, une recherche

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empirique quantitative a été menée sur un échantillon de 251 directeurs d'écoles primaires en Grèce. Les résultats révèlent un rapport positif et statistiquement significatif entre les deux facteurs principaux de cette étude.

Keywords / Mots clés: school leadership, transformational leadership, physical education, cross-thematic teaching, structural equation modelling (SEM), Greece / leadership à l'école, leadership transformationnel, éducation physique, enseignement multithématique, modélisation d'équations structurelles, Grèce

Introduction

Much has been written about the need for schools to engage in innovative activities that promote the academic achievement of their students (e.g., Lecat, Beausaert, & Raemdonck, 2018; Vennebo & Ottesen, 2015). Overall, an important factor that seems to significantly affect student achievement is leadership (Allen, Grigsby, & Peters, 2015; Tan, 2018). This article examines whether transformational leadership, as exercised by school principals, is successful in promoting cross-thematic integration and, more specifically, cross-thematic teaching with physical education. Under that context, it explores the implementation of the cross-thematic curriculum in primary schools. It is based on an empirical survey conducted in Greece with a sample of 251 principals that represent 35.4 percent of the school population of a specific geographical region.

Theoretical background/literature review

The work of the educational administration, or management, is expressed in the activity of school principals. They identify the educational objectives, apply the rules that regulate the everyday operations, develop and maintain an appropriate working environment, make the best possible use of available resources in order to improve the educational process, as well as determine the degree of overall effectiveness of the educational organization (Rhodes & Brundrett, 2009). According to Yukl (2010), a school principal, apart from his regular duties (school management, everyday operations, medium-term planning), he has a significant role as a leader. Therefore, the school principal is also responsible for change management and long-term school efficiency (Masci, De Witte, & Agasisti, 2018; Notman, 2017).

According to Hoch, Bommer, Dulebohn, and Wu (2018), transformational leadership makes profound changes to both leaders and organizations. It is based on the power of influence, putting special emphasis on people. Moreover, it is based on a culture of change, rather than on structures or processes. Also, leadership focuses on communication, confidence-building, care, and empowerment that leads to increased employee self-efficacy (e.g., Hendriks & Scheerens, 2013; Northfield, 2014).

Wang, Demerouti, and Le Blanc (2017) describe transformation leadership as a leadership approach in which leaders transform the perceptions and behaviours of their subordinates, through critical thinking, spiritual stimulation, influence (i.e., charisma), and motivation. Various authors have examined the transformational leadership styles that enhance the commitment to school objectives and conclude that

leaders should develop a common vision between all relevant stakeholders (e.g., Dumay & Galand, 2012; Selamat, Nordin, & Adnan, 2013).

The seminal study of Leithwood, Harris, and Hopkins (2008) identify eight characteristics of transformational leadership: individual support, common goals, shared vision, mental stimulation, culture-building, adequate wage, increased expectations, and imitation of good examples. The same authors argue that school leadership is the second most significant factor, after classroom teaching, that has a positive effect on student learning. Leithwood et al. conclude that educational leaders can indirectly improve both teaching and learning processes via their influence on teacher motivation, commitment, and overall working conditions.

On the other hand, since the 1980s, instructional leadership has also contributed to improvements in teaching quality (Hallinger & Heck, 2010), while also establishing that leadership assists in change, development, and efficiency of educational organizations (Bush & Glover, 2014). Rhodes and Brundrett (2009) explore the various instructional leadership practices in English schools, highlighting four factors that are significant for enhancing overall school efficiency: social skills, communication skills, respect for the staff, and development of a clear leadership vision.

Several dimensions (or factors) are influenced by instructional leadership, motivating the teaching staff and creating an effective school (Mestry, Moonsammy-Koopasammy, & Schmidt, 2013). The first dimension is goal-oriented, reflecting the extent to which the school vision is clearly formulated and understood by all school members. The second dimension focuses on the decision-making process, reflecting the degree of teacher participation. The third dimension, innovation, reflects the extent to which school members adapt to change, while adopting an open attitude towards educational innovations. Finally, teacher cooperation, the fourth dimension, reflects the formal and informal relationships between staff members (Devos & Bouckenooghe, 2009).

Empirical research has linked transformational leadership with higher student achievements. Sun and Leithwood (2017) analyzed 107 studies on transformational leadership in the field of education, conducted between 1996 and 2008. They focused on the relationship between leadership practices, teacher feelings, and student achievements and examined the following factors: personalized support, intellectual stimulation, modelling of desirable practices, commitment, collective efficiency, and trust in others. Their results argue that most leadership practices have a positive effect on teacher feelings and student achievements (Sun & Leithwood, 2017). Transformational leadership has been found to significantly increase overall educational performance and is linked to effective schooling (Hendriks & Scheerens, 2013; Leithwood et al., 2008; Makgato & Mudzanani, 2019; Sun & Leithwood, 2017; Wang, 2019).

Similarly, regarding instructional leadership, a literature review by Waters, Marzano, and McNulty. (2004) includes articles published between the early 1970s and the late 1990s and examines the impact of instructional leadership on student achievement. Empirical results indicate a high correlation between these two concepts. Sixty-six leadership practices were recognized, incorporated into 21 leadership responsibilities, each with a statistically significant correlation with student achievement (Waters et al., 2004).

Cross-thematic integration in teaching is a concept that entails linking different subjects between different fields or linking different subjects within the same field (Papaioannou, Milosis, & Gotzaridis, 2019; Savelides, Fasouraki, Georgousis, Kolokotroni, & Savelidi, 2020). A cross-thematic curriculum does not only constitute a significant change in the organization and delivery of various courses, but it represents a different way of using knowledge to solve real-life problems (Al Salami, Makela, & de Miranda, 2017; Gosselin, Manduca, Bralower, & Egger, 2019; Karppinen, Kallunki, & Komulainen, 2019).

During the last decades, reorganization of the educational curriculum has been at the heart of the educational policy debate in many countries (Venville, Wallace, Rennie, & Malone, 2002). For example, in the United Kingdom, a revision of the core national curriculum promoted cross-thematic integration to support six main areas of teaching and learning (Rose, 2009). Physical education was one of these six areas (Hayes, 2010). Northern Ireland promoted the unified nature of knowledge in the context of the country's reformed curriculum (Greenwood, 2013), while in the United States, modern reform efforts emphasized the need for linking different thematic areas (Czerniak, 2007; Parker, Heywood, & Jolley, 2011). The arguments in favour of an integrated, unified curriculum are based on the seminal work of authors who support a more constructive approach to learning (e.g., Beane, 1995; Jacobs, 1989; Fogarty, 1991).

The three main cross-thematic teaching models (connected model, shared model, and partnership model) provide tools that help integrate the skills and concepts of two or more disciplines (Cleland Donnelly & Millar, 2019; Warren, Hutchison, DeHaan, Krause, Murphy, & Velez, 2018). The linked model adopts a simple approach, in which content from one area is used to increase, or complement, the learning experience of others. The shared model emphasizes linking similar themes, concepts, and skills from two or more thematic areas (disciplines), always in collaboration with other teachers. The (even more) ambitious collaborative model provides a strategy for complex content integration from two or more thematic areas (Cone & Cone, 2007; Rodić, 2013).

Cross-thematic teaching helps students activate their intelligence, develop their social skills (Hayes, 2010), and strengthen their knowledge process (Pauley, McKim, Curry, McKendree, & Sorensen, 2019). Previous studies found a positive correlation between cross-thematic teaching with physical education in both the cognitive process and the academic performance of students (Chen, Cone, & Cone, 2007). A longitudinal study conducted between 1990 and 2014 revealed that, for students aged between five and 13, physical fitness significantly affects their learning efficiency, brain structure, and brain function, while physical education programs strongly affect their concentration, attention, and academic performance (Donnelly, Hillman, Castelli, Etnier, Lee, Tomporowski, Lambourne, & Szabo-Reed, 2016). Additionally, cross-thematic programs of physical education were found to significantly affect physical fitness (Greene & Dotterweich, 2013), cognitive processes, and academic performance of students (Chen et al., 2007).

In summary, the literature highlights the positive effects of cross-thematic teaching on cognitive, social, and emotional skills, while also underlining that physical exercise

affects the cognitive, social, and emotional skills of students (Donnelly et al., 2016; Karagiannidis, Barkoukis, Gourgoulis, Kosta, & Antoniou, 2015). Of course, the contribution of physical exercise in enhancing life quality and health, in general, is widely recognized throughout the entire literature (e.g., Karasimopoulou, Derri, & Zervoudaki, 2012). Overall, the theoretical and empirical literature demonstrates the significant role of the school leader in the development of effective school units (e.g., Robinson, Lloyd, & Rowe, 2008; Welch & Hodge, 2018). Best leaders adopt behaviours that assist in the acceptance of a common vision between employees, enhance participation in the decision-making process, develop good working relations, and implement educational innovations (Bush & Glover, 2014; Heck & Hallinger, 2014; Hendriks & Scheerens, 2013). However, empirical studies linking transformational leadership with instructional leadership and especially examining its impact on interdisciplinary teaching do not exist. This article aspires to bridge that gap.

Main research question/hypothesis

This research explores the effect of *transformational leadership* on *instructional leadership for enhancing cross-thematic teaching*, a factor neglected in the relevant literature. When *transformational leadership* is implemented, leaders and followers unite in pursuing common strategic goals (Le & Lei, 2019). *Transformational leadership* is based on the power of influence, emphasizing the role of individuals, and significantly affecting organizational culture (Watts, Steele, & Den Hartog, 2019). *Instructional leadership* focuses on defining the direction of the school and teacher behaviour, and aims to instruct students through the positive influence of their teachers (Bush & Glover, 2014; Hallinger & Heck, 2010). Finally, *instructional leadership for enhancing cross-thematic teaching* is defined in this article as the degree to which school leaders (namely, directors) have the intention and ability to link various scientific fields with the field of physical education (PE).

When teachers develop the cross-thematic curriculum, they focus on common themes, concepts, and skills from various disciplines, in a way that better facilitates learning. Linking different areas of knowledge provides a deeper understanding of main concepts. Previous research has demonstrated that transformational leadership that entails personalized support, spiritual stimulation (Sun & Leithwood, 2017), and emphasis on human relations (Katou, Budhwar, & Chand, 2020) leads to stronger teacher relations (Hendriks & Scheerens, 2013) and open attitudes towards educational innovations (Devos & Bouckenooghe, 2009). This article argues that this mechanism leads to the significant reinforcement of cross-thematic teaching.

Innovation, a major part of transformational leadership, reflects the extent to which the teaching staff adapts and adopts to educational innovations (Devos & Bouckenooghe, 2009). According to Hayes (2010), cross-thematic teaching is largely based on the adoption of innovations. this means transformational leadership has the propensity to affect cross-thematic teaching. Based on these arguments, this article hypothesises that

> *transformational leadership has a positive impact on instructional leadership for enhancing cross-thematic teaching.*

Research methodology

Random sampling techniques were used to collect empirical data and accomplish the main objectives of the study. The research methodology was as follows.

Population

Greece has 13 administrative regions, each with a regional district of primary education. In this study, two of the 13 regions were selected for data collection (cluster sampling). The target population consists of primary school principals from two regions of Greece: Central Macedonia and Eastern Macedonia & Thrace (n = 958).

Principals in Greece constitute a homogeneous sample in terms of social characteristics, academic qualifications, teaching, and administrative responsibilities. Moreover, they receive similar supervision from each regional district of primary education and ministry of education. Since primary schools in Greece operate based on the same laws and regulations issued by the ministry of education, the schools in the sample have identical internal operations to schools in the the other eleven regions. Moreover, their organizational structures, resources and facilities, curricula, and the selection criteria for principals are also identical. Therefore, the findings of this empirical study can be generalized to the country's whole school population.

Research instrument

The participants initially provided some basic demographic information (part A). Afterwards, they completed a questionnaire (parts B and C), (see Appendices). The second part of the questionnaire included a set of 20 questions that measured the characteristics and behaviours of *transformational leadership*. These questions were adapted from Leithwood, Jantzi, and McElheron-Hopkins' seminal study (2006), as translated and used by Theofilidis (2012). They contained questions from the International Successful School Principal Project (ISSPP) (Leithwood et al., 2006; Hendriks & Scheerens, 2013).

The third part of the questionnaire included 28 items that evaluated the pedagogical (instructional) role of the principal in kinetic cross-thematic teaching approaches (*instructional leadership for enhancing cross-thematic teaching*). The questionnaire was based on the pedagogical role of the principal (Smith & Andrews, 1989), as used by Theofilides (2012). For this study, all questions were enriched with the concept of cross-thematic teaching (Theofilidis, 2012; Matsangouras, 2012; Kysilka, 2006). For example, "Promotes educational activities for teaching staff" was modified to "Promotes cross-curricular training activities for teaching staff." All items were measured using a five-point Likert scale (1 = totally disagree, 5 = totally agree). Table 1 includes all the items used in the questionnaire.

Content validity

The validity of the questionnaire was tested in two steps: prior to the data collection process and again once the empirical data were collected. The main objective of the study was to examine the impact of transformational leadership on the instructional leadership that facilitates cross-thematic teaching. As such, the validity of its two factors (transformational leadership and *instructional leadership for enhancing cross-thematic teaching*) and their causal effects (using structural equation modelling) were tested.

The test for the content validity of the questionnaire (research instrument) included consultation with experienced practitioners (school principals) and various academics. More specifically, 20 principals and academics were asked to complete the final draft of the questionnaire and comment on their level of understanding. The discussions helped to clarify whether the questions were appropriately phrased and if the various measurement scales were relevant and representative of the constructs they were supposed to measure. The participants' comments helped to improve various aspects of the questionnaire (phrasing, appropriate terminology, etc.).

Data collection

The study was officially approved by the ministry of education, which increased acceptance from the members of the sample (i.e., primary school principals). A full list with the contact information (emails and telephone numbers) of all 958 principals of the target-population was officially provided by the two regional educational offices.

Data were collected via an online, self-administered questionnaire that was created in Google Forms (the questionnaire was anonymous). To ensure the uniqueness of the responses, the option "Allow only one response per person" was selected. A link to the form was sent by email to the principals in the target population, after firstly establishing contact via phone and receiving their permission to do so. A few days later, the principals were contacted via phone to confirm they received the link and to increase the response rate of the survey.

Of the 958 principals, the researchers were able to contact 943. Of these 943 principals, 713 (75.6%) agreed to participate in the study and, thus, received the link to the online questionnaire.

The survey was conducted over a period of three months (January 2019 to March 2019). In total, 251 principals successfully completed the online questionnaire and participated in the survey (26.2% of the target population). The response rate was 35.2 percent (251 out of 713 principals who agreed to participate in the survey).

As mentioned earlier, cluster sampling was initially used (two of the 13 educational regions of Greece were selected for data collection). Cluster sampling is a method of random (probability) sampling, which is especially efficient when a population consists of homogeneous groups/clusters (Blair & Blair, 2014). Focusing on the two selected regions, every attempt was made to contact all members of the target population. It can be argued that random sampling was used, since all members of the target population had equal opportunity to participate in the survey.

Considering the size of the target population (958 primary school principals) and the final sample size (251 principals), the margin of error is 5.32 percent (for a confidence level of 95%; 3–5% is generally considered acceptable). Moreover, the final sample size is deemed to be satisfactory, since it is also well above the sample size used by other empirical studies in the same field (e.g., Gumus & Akcaoglu, 2013; Ng & Kenneth Chan, 2014; Wan, Law, & Chan, 2018; Weinstein, Raczynski, & Peña, 2020).

There was almost equal participation from principals in the two regions (54.1% from the region of Central Macedonia and 45.9% from the region of Eastern Macedonia & Thrace). In addition, 65.7 percent were male and 34.3 percent were

female. In terms of experience, 75.8 percent had over 21 years of teaching experience, 14.3 percent had between 16 and 20 years' experience, and the rest (9.9%) had less than 15 years' experience. Moreover, 25.8 percent of the sample was age 41 to 50, while 74.2 percent was age 51 to 60. Finally, the highest percentage (31.4%) had less than three years of experience in a principal position, 23.3 percent had four to six years, and 39.1 percent had seven to 12 years.

Independent-samples, *t*-test and one-way ANOVA, were performed to test whether demographics (region, gender, age, work experience as a teacher, work experience as a principal) differentiated the mean scores of the two research factors (*transformational leadership* and *instructional leadership for enhancing cross-thematic teaching*). The analysis revealed that no statistically significant differences exist.

Instrument validation (validity and reliability)

The research instrument was tested for both its content and construct validity, as previously described. Construct validity was tested with the use of a methodology adapted from Churchill (1979). More specifically, the following steps were followed:

I. Exploratory factor analysis (EFA) was conducted to determine the structure of the main factors of this study (transformational leadership, instructional leadership for enhancing cross-thematic teaching). It was conducted with the principal component analysis (PCA) and varimax rotation methods. The following test were performed (Hair, Black, Babin, & Anderson, 2014):
    - The Kaiser-Mayer-Olkin (KMO) statistical test (values over 0.7 are satisfactory, while values over 0.5 are acceptable).
    - The Bartlett's test of sphericity (it should be statistically significant, at the 0.05 level).
    - The eigenvalue criteria (factors with a +1 eigenvalue were selected).
    - To determine the percent of the total variance that is explained by the proposed factor(s), total variance explained (TVE) was used (TVE should be more than 50%).
    - To test the significance of the items, their factor loadings were examined (a loading over 0.5 was considered significant).
    - To test the reliability of the various factors, the statistical measure Cronbach Alpha was used (in general, values greater than 0.7 are considered to be valid).

Table 1 presents the results of the above analysis. For the factor *transformational leadership*, three factors were extracted: 1) developing a vision and giving direction (six items), 2) providing information and individual attention (four items), and 3) cooperative climate (three items). Five items were dropped because their factor loading was less than 0.5. Two more items were dropped because they formed a factor with a Cronbach's Alpha that was less than 0.7. After making all the necessary amendments, statistical indices were found to be within their acceptable limits.

For the factor *instructional leadership for enhancing cross-thematic teaching*, three factors were extracted: 1) cross-thematic teaching guidance (17 items), 2) encouraging cross-thematic teaching with physical education (seven items), 3) encouraging cooperation for cross-thematic teaching with physical education (three items). Only

one item was dropped, since its factor loading was less than 0.5. After making all the necessary amendments, statistical indices were found to be within their acceptable limits (see Table 1 for more details).

II. The extracted factors were tested for their goodness of fit. After considering the modifications that resulted from conducting EFA and reliability analysis (Step I), main factors (constructs) were evaluated for "good fit" using confirmatory factor analysis (CFA). The following measures were examined (Hair et al., 2014; Schumacker & Lomax, 2010):

- X^2: For the proposed model to be regarded acceptable, chi-square (X^2) should be statistically insignificant ($p > 0.05$) and exceed the value of df (degrees of freedom).
- *Normed* X^2 *(X^2/df)*: This measure is used because "X^2" seems to be extremely sensitive to sample size. Values between 1 and 3 are desirable, while values between 1 and 5 are acceptable.

Table 1. Exploratory factor analysis (EFA)

Factors	Sub-factors	No. of items	Items	Bartlett's Test	KMO	Eigen-value	TVE	Cronbach Alpha
A. Trans-formational leadership	A1. Developing a vision and giving direction	6	TL1, TL3, TL4, TL5, TL12, TL13	535.748 *p < 0.01*	0.849	5.104	57.606	0.799
	A2. Providing information and individual attention	4	TL6, TL7, TL18, TL19					0.708
	A3. Cooperative climate	3	TL2, TL8, TL9					0.744
	Total	**13**						
B. Instruct-ional lead-ership for enhancing cross-thematic teaching	B1. Cross-thematic teaching guidance	17	IL10, IL12, IL13, IL14, IL15, IL16, IL17, IL18, IL19, IL20, IL21, IL22, IL23, IL24, IL25, IL26, IL27	420.812 *p < 0.01*	0.944	18.118	78.227	0.982
	B2. Encouraging cross-thematic teaching with physical education	7	IL1, IL2, IL3, IL4, IL5, IL6, IL11					0.937
	B3. Encouraging cooperation for cross-thematic teaching with physical education	3	IL7, IL8, IL9					0.890
	Total	**27**						

- *RMSEA (Root Mean Square Error of Approximation)*: Measures the error of approximation, while taking sample size into account. RMSEA should be less than 0.08 (or 0.1).
- *RMR (Root Mean Square Residual)*: The difference between the residuals of the sample covariance matrix and the hypothesized model. RMR should be less than 0.08 (or 0.1).

- *CFI (Comparative Fit Index)*: Examines the model fit, taking into consideration the discrepancy between the data and the hypothesized model. A value of 0.90 or higher is generally considered to indicate acceptable model fit.
- *GFI (Goodness of Fit Index)*: Measures the fit between the hypothesized model and the observed covariance matrix. A value of 0.90 or larger is generally considered to indicate acceptable model fit.

The results of the above analysis are presented in Table 2. As can be seen in Table 2, satisfactory results were produced for all factors (all thresholds were fully met).

Table 2. Confirmatory factor analysis (CFA)

Factors	Sub-factors	No of items	Items	X^2/df	CFI	GFI	RMR	RMSEA
A. Transformational leadership	A1. Developing a vision and giving direction	6	TL1, TL3, TL4, TL5, TL12, TL13	1.314	0.960	0.906	0.028	0.051
	A2. Providing information and individual attention	4	TL6, TL7, TL18, TL19					
	A3. Cooperative climate	3	TL2, TL8, TL9					
	Total	**13**						
B. Instructional leadership for enhancing cross-thematic teaching	B1. Cross-thematic teaching guidance	17	IL10, IL12, IL13, IL14, IL15, IL16, IL17, IL18, IL19, IL20, IL21, IL22, IL23, IL24, IL25, IL26, IL27	1.919	0.934	0.856	0.061	0.058
	B2. Encouraging cross-thematic teaching with physical education	7	IL1IL2IL3IL4IL5IL6IL11					
	B3. Encouraging cooperation for cross-thematic teaching with physical education	3	IL7, IL8, IL9					
	Total	**27**						

The study used multiple questions (items) to measure its two factors (*transformational leadership* and *instructional leadership for enhancing cross-thematic teaching*). The results of the statistical analysis reveal that each of these factors is divided into three sub-factors. The members of the research team, after carefully reviewing the sub-factor and the items used for their measurement (presented in the Appendix), attempted to offer appropriate definitions. This is in line with the methodology of factor analysis (Fabrigar & Wegener, 2011).

The definitions of the three sub-factors measuring *transformational leadership* are the following:

a) **Developing a vision and giving direction:** The degree to which a school principal develops a general organizational vision and provides direction to teachers.

b) **Providing information and individual attention:** The degree to which a school principal provides information about educational issues and offers individual attention to teachers.

c) **Cooperative climate:** The degree to which a school principal assists in developing a climate of cooperation in the school.

The definitions of the three sub-factors measuring *instructional leadership for enhancing cross-thematic teaching* are the following:

a) **Cross-thematic teaching guidance:** The degree to which a school principal guides the whole effort of cross-thematic teaching. For example, the school principal clearly explains the pedagogical reasons for enhancing cross-thematic teaching.
b) **Encouraging cross-thematic teaching with physical education:** The degree to which a school principal encourages cross-thematic teaching using various concepts of physical education. For example, the school principal, during official meetings, highlights the significance of using cross-thematic approaches.
c) **Encouraging cooperation for cross-thematic teaching with physical education:** The degree to which a school principal encourages the cooperation of various teachers with the teacher of physical education to enhance cross-thematic teaching. For example, the school principal asks teachers to consult with the teacher of physical education to develop a common curriculum.

Taking into consideration the results of the instrument validation (validity and reliability test), the following hypotheses (causal relationships) will be tested:

Hypothesis 1a: Developing a vision and giving direction has a positive impact on cross-thematic teaching guidance.

Hypothesis 1b: Developing a vision and giving direction has a positive impact on encouraging cross-thematic teaching with physical education.

Hypothesis 1c: Developing a vision and giving direction has a positive impact on encouraging cooperation for cross-thematic teaching with physical education.

Hypothesis 2a: Providing information and individual attention has a positive impact on cross-thematic teaching guidance.

Hypothesis 2b: Providing information and individual attention has a positive impact on encouraging cross-thematic teaching with physical education.

Hypothesis 2c: Providing information and individual attention has a positive impact on encouraging cooperation for cross-thematic teaching with physical education.

Hypothesis 3a: Cooperative climate has a positive impact on cross-thematic teaching guidance.

Hypothesis 3b: Cooperative climate has a positive impact on encouraging cross-thematic teaching with physical education.

Hypothesis 3c: Cooperative climate has a positive impact on encouraging cooperation for cross-thematic teaching with physical education.

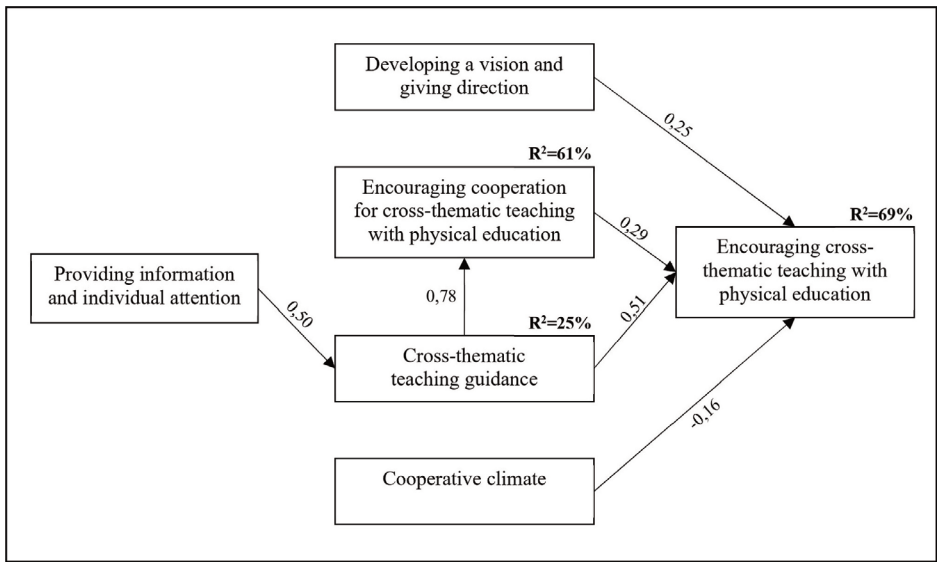
Data analysis/empirical results

Statistical analysis was conducted using the Structural Equation Modelling (SEM) tech-

nique (the Maximum Likelihood Estimation method was employed). The Covariance Matrix was used as the table of entry and the extraction of the Standardized Completely Solution was requested (Hair et al., 2014; Kelloway, 1998). The (modified) structural model fitted the data quite well. To evaluate the fit of the overall model the chi-square value (X^2 = 3,734 with 4 degrees of freedom) and the *p*-value (p = 0.442) were estimated. These values indicate a very good fit of the data to the overall model. However, the sensitivity of the X^2 statistic to the sample size highlights the need for supplementary measures for evaluating the overall model (Smith & McMillan, 2001), such as the Normed-X^2 index (0.936), the RSMEA index (0.000), the CFI (0.976), and the GFI (0.990), which all indicate a very good fit.

Moreover, the factors that are included in the modified model can explain 61 percent, 69 percent, and 25 percent variance of the dependent factors encouraging cooperation for cross-thematic teaching with physical education, encouraging cross-thematic teaching with physical education, and cross-thematic teaching guidance respectively.

Figure 1. The overall structural model (hypotheses testing results)



It must be noted that three new paths were added to the model, based on modification indexes of IBM AMOS. This resulted in a structural model with improved fit and explanatory power. Figure 1 demonstrates the overall structural model, along with the extracted path coefficients and the adjusted R^2 scores. Table 3 also summarizes the results of the analysis. Finally, Table 4 includes the direct, indirect, and total effects between all research factors.

Table 3. Hypotheses testing results (direct effects)

Hypothesis	Path	Path coefficient	Remarks
H1a	Developing a vision and giving direction → Cross-thematic teaching guidance	*	*Rejected*
H1b	Developing a vision and giving direction → Encouraging cross-thematic teaching with physical education	0.246***	Accepted
H1c	Developing a vision and giving direction → Encouraging cooperation for cross-thematic teaching with physical education	*	*Rejected*

Table 3. (Continued)

Hypothesis	Path	Path coefficient	Remarks
H2a	Providing information and individual attention → Cross-thematic teaching guidance	0.498***	Accepted
H2b	Providing information and individual attention → Encouraging cross-thematic teaching with physical education	*	*Rejected*
H2c	Providing information and individual attention → Encouraging cooperation for cross-thematic teaching with physical education	*	*Rejected*
H3a	Cooperative climate → Cross-thematic teaching guidance	*	*Rejected*
H3b	Cooperative climate → Encouraging cross-thematic teaching with physical education	-0.158***	Accepted
H3c	Cooperative climate → Encouraging cooperation for cross-thematic teaching with physical education	*	*Rejected*
Proposed causal relationships			
	Cross-thematic teaching guidance → Encouraging cooperation for cross-thematic teaching with physical education	0.781***	New path
	Cross-thematic teaching guidance → Encouraging cross-thematic teaching with physical education	0.509***	New path
	Encouraging cooperation for cross-thematic teaching with physical education → Encouraging cross-thematic teaching with physical education	0.285***	New path

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p > 0.05$

Table 4. Direct (D), Indirect (I) and Total (T) effects between research factors

Factors		Developing a vision and giving direction	Providing information and individual attention	Cooperative climate	Cross-thematic teaching guidance	Encouraging cooperation for cross-thematic teaching with physical education
Cross-thematic teaching guidance	D	0.000	0.498	0.000	0.000	0.000
	I	0.000	0.000	0.000	0.000	0.000
	T	0.000	0.498	0.000	0.000	0.000
Encouraging cooperation for cross-thematic teaching with physical education	D	0.000	0.000	0.000	0.781	0.000
	I	0.000	0.389	0.000	0.000	0.000
	T	0.000	0.389	0.000	0.781	0.000
Encouraging cross-thematic teaching with physical education	D	0.246	0.000	-0.158	0.509	0.285
	I	0.000	0.365	0.000	0.223	0.000
	T	0.246	0.365	-0.158	0.732	0.285

The results of the statistical analysis provide support to three out of the nine initial hypotheses, while three new casual paths are being proposed (after consulting the modification indexes of the IBM AMOS software). The most important observations are presented in the following paragraph. In synopsis:

> **Hypothesis 1** is partially supported by the empirical data (only H1b is supported).
>
> **Hypothesis 2** is partially supported by the empirical data (only H2a is supported).
>
> **Hypothesis 3** is partially supported by the empirical data (only H3b is supported).

Overall, the main hypothesis of this study (*transformational leadership* has a positive impact on *instructional leadership for enhancing cross-thematic teaching*) is partially supported.

The results showed: a) the direct effect of *providing information and individual attention* on *cross-thematic teaching guidance* (r = 0.50); b) the indirect effect of *providing information and individual attention* on *encouraging cooperation for cross-thematic teaching with physical education* (r = 0.389); c) the direct effect of *cross-thematic teaching guidance* on the factor *encouraging cooperation for cross-thematic education with physical education* (r = 0.781); d) the direct positive effect of the factor *cross-thematic teaching guidance* on the factor *encouraging cross-thematic teaching with physical education* (direct effect, r = 0.509 and indirect effect, r = 0.223), e) the direct positive effect of the factor *developing a vision and giving direction* on the factor *encouraging cross-thematic integration teaching with physical education* (r = 0.246), f) the direct positive effect of the factor *encouraging cooperation for cross-thematic teaching with physical education* on the factor *encouraging cross-thematic teaching with physical education* (r = 0.285).

In particular, the results showed that the two factors of transformational leadership, *developing a vision and giving direction* and *providing information and individual attention*, have a statistically significant relationship with cross-thematic teaching with physical education. Both factors have a positive impact on teacher guidance for cross-thematic integration with physical education. The empirical results also highlight that *cooperative climate* has a negative direct effect on the factor *encouraging cross-thematic integration teaching with physical education* (r = -0.158). This negative causal effect is interpreted through the definition of transformational leadership, according to which the principal aims to create a good climate. A satisfactory school climate activates teacher commitment to the objectives of the school unit and enhances the collective effectiveness of teachers (Sun & Leithwood, 2017). Creating a good school climate reduces the need for a strong presence on behalf of the principal. Therefore, teachers need less encouragement concerning the implementation of cross-thematic teaching with physical education.

Discussion and conclusions

This article establishes a statistically significant relationship between various dimensions of transformational leadership and cross-thematic teaching. Organizing and implementing cross-thematic teaching and, in particular, cross-thematic teaching with physical education is an innovation for many schools. That empirical finding

is consistent with the results of previous studies, which highlight the role of transformational leadership in affecting innovation (Devos & Bouckenooghe, 2009), quality of teaching (Hallinger & Heck, 2010), the change process, and the overall effectiveness of the school (e.g., Bush & Glover, 2014; Waters et al., 2004). In general, this research supports the use of shared knowledge in the curriculum of primary schools (Greenwood, 2013) and advocates for linking the various thematic areas (Czerniak, 2007; Parker et al., 2011) with physical education (PE) (Greene & Dotterweich, 2013; Cone & Cone, 2007).

The research highlighted that, among the three sub-factors of the transformational leadership construct (developing a vision and giving direction, providing information and individual attention, cooperative climate), *providing information and individual attention* has both a direct and indirect effect on the dimensions of cross-thematic teaching, while the other two factors only have a direct effect on the factor *encouraging cross-thematic integration teaching with physical education*. These empirical findings provide significant information about the attitudes that motivate teachers to implement cross-thematic teaching with physical education. The results reveal that the principal should inform the staff about the overall purpose of the school, explain the reasons for developing specific initiatives, discuss the educational issues with teachers, and protect them from distractions during the teaching process.

A second important result concerns the factor *cross-thematic teaching guidance*, which has a significant impact on cross-thematic teaching with physical education. Its role is important since it has a direct impact on *encouraging cooperation for cross-thematic teaching with physical education* and both a direct and indirect effect on *encouraging cross-thematic teaching with physical education*. Therefore, this study highlights teaching guidance as a cognitive and social skill of principals that is being used to positively influence and encourage the teacher collaboration for cross-thematic teaching with physical education. The results show that the school principal should encourage teachers in cross-thematic teaching: a) with predominant concepts of physical education (e.g., developing basic social skills and accepting diversity), b) by linking disciplines (e.g., exploring the same concept in mathematics and physical education), c) using a collaborative approach of the concepts by more specialties. Also, the school principal should be aware of the principles of interdisciplinary teaching (e.g., child-centeredness, self-learning, co-investigation, information providing, holistic approach), which should be clearly explained in official discussions of the teacher association. Additionally, the school principal who implements the cross-curricular program should clearly explain the objectives, the expectations (learning outcomes), and the teacher evaluation criteria for cross-thematic teaching, and provide feedback on cross-thematic practices.

This study makes a new and significant contribution to the schools that implement the new cross-thematic curriculum. These schools should be staffed by effective and competent leaders to meet the requirements of this new innovative curriculum. By identifying the skills that contribute to the successful operation of schools through cross-thematic teaching, this study can also help to create useful training programs for future school principals, either as part of university curriculums and postgraduate programs specializing in school management or as part of the targeted core training programs organized by the ministry of education.

This article explores the pedagogical role of the school principal in interdisciplinary teaching with physical education. Of course, it could be applied to examine the pedagogical role of the school principal in interdisciplinary teaching with drama, music, and art. In general, it could be applied in all interdisciplinary teachings that respond to the learning profile of the pupils and their different types of intelligence. The items measuring *instructional leadership for enhancing cross-thematic teaching* could be easily adapted to capture other forms of interdisciplinary teaching.

However, there are some limitations in this study. An anonymous electronic questionnaire was used in order to collect primary data. Consequently, the results of the study depend on the answers given by the principals of the sample. Also, the survey identified the views and perceptions of the principals at a specific point in time, which may change over time. Thus, a long-term study (i.e., during a four-year period) could potentially lead to more reliable findings. Also, the survey did not consider the perceptions and views of teachers involved in the educational process. Further research is therefore needed to highlight the contribution of principals, taking into account the above mentioned time and source factors in the data collection process.

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APPENDIX: QUESTIONNAIRE

A. Transformational leadership

TL1. I have high expectations for the work done by my school teachers.

TL2. I create a climate of care and confidence in my school.

TL3. I provide useful help in defining short-term goals in teaching and learning.

TL4. I encourage teachers to use data in their work.

TL5. I promote the development of leadership skills among teachers.

TL6. I inform the staff about the general purpose of the school.

TL7. I explain the reasons why initiatives are being developed to improve the school.

TL8. I encourage co-operation among the teaching staff.

TL9. I look for wide participation in the decision-making process concerning the improvement of the school.

TL10. I involve parents in the efforts to improve the school.

TL11. I provide educational personal support in my effort to improve my teaching practices.

TL12. I encourage teachers to adopt new ideas for teaching.

TL13. I give the example of a high level of professional practice.

TL14. I gain the support of the parents when trying to improve the school.

TL15. I provide resources to help the staff improve the level of their teaching.

TL16. I regularly attend learning activities in classrooms.

TL17. After attending learning activities in classrooms, I work with the teacher to improve the level of teaching.

TL18. I often discuss educational issues with every teacher.

TL19. I protect teachers from distractions in their teaching.

TL20. I encourage the use of data in order to better meet the needs of each student.

B. Instructional leadership for enhancing cross-thematic teaching

IL1. I am recognized as a point of reference in cross-thematic teaching with physical education.

IL2. I encourage everyone to overcome the barriers of cross-thematic teaching with physical education.

IL3. I encourage the linking of disciplines, such as the teaching of the same concept in Physical Sciences and Physical Education.

IL4. I encourage the linking of disciplines, such as the teaching of the same concept in Language and Physical Education.

IL5. I encourage the linking of disciplines, such as teaching the same concept in Mathematics and Physical Education.

IL6. I encourage the linking of disciplines, such as the teaching of the same concept in History and Physical Education.

IL7. I encourage teachers to develop basic social skills in co-operation with the Physical Education teacher.

IL8. I encourage teachers to develop acceptance of diversity among students in co-operation with the Physical Education teacher.

IL9. I encourage the collaborative approach of concepts from more specialties (Language-Immigration, Music-Song, Physical education-Dance-Play, Theatrical education-Dramatization), in co-operation with the Physical Education teacher.

IL10. I evaluate, together with the teachers, the learning outcomes of cross-thematic initiatives.

IL11. I organize cross-thematic teachings with Physical Education with the members of the staff.

IL12. I clearly explain the cross-thematic initiatives in formal discussions.

IL13. I clearly explain, in the official meetings of the Teachers Association, the learning outcomes that evolve around cross-thematic initiatives.

IL14. I clearly explain, in the official meetings of the Teachers Association, the aims of the school regarding cross-thematic initiatives and knowledge dispersion.

IL15. I provide feedback to teachers concerning cross-thematic practices.

IL16. I make the criteria for assessment in cross-thematic teaching very clear.

IL17. I clearly explain the principle of childhood in the cross-thematic approach to knowledge.

IL18. I clearly explain the principle of self-learning in the cross-thematic approach to knowledge.

IL19. I clearly explain the co-investigation principle in the cross-thematic approach to knowledge.

IL20. I clearly explain the principle of providing information in the cross-thematic approach of knowledge.

IL21. I clearly explain the holistic approach principle in the cross-thematic approach of knowledge.

IL22. I clearly explain the types of intelligence and propose activities concerning cross-thematic initiatives.

IL23. I clearly explain the psychological benefits associated with cross-thematic teaching.

IL24. I clearly explain the epistemological benefits associated with cross-thematic teaching.

IL25. I clearly explain the social benefits associated with cross-thematic teaching.

IL26. I clearly explain the pedagogical benefits associated with cross-thematic teaching.

IL27. I often visit the venues of collaborative cross-curricula and I follow the whole process.

IL28. I am recognized as a reference person in interdisciplinary teaching.