

ICEEPSY 2016 : 7th International Conference on Education and Educational Psychology

Leadership and Pedagogical Interaction as Predictors of Learning Outcomes in Physical Education

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Abstract

<http://dx.doi.org/10.15405/epsbs.2016.11.7>

This research aims to understand the relative contribution of leadership styles and teacher-student and student-student pedagogical interaction concerning learning performance and academic achievement in Physical Education. A quantitative methodology was implemented, comprising a sample of 447 students attending a school grouping located in the coastal region of central Portugal. In order to verify the nature, the strength and the direction of the relations among the variables, correlation and multiple regression analyses were used. For this, scales already validated and used in other researches were applied. The results show that the learning performance and the academic achievement are significantly associated with teacher leadership styles and teacher-student and student-student pedagogical interaction. A stronger association was obtained with leadership styles, especially the democratic one. It should be mentioned that these factors provide a higher relative contribution to the learning performance than to the academic achievement. The analysis conducted highlights the importance of the democratic teacher leadership style and of the pedagogical interaction established within the classroom towards the improvement of students' ability to understand the gains and the effort made in learning.

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Keywords: Pedagogical leadership; pedagogical interaction; learning performance; academic achievement; Physical Education.

1. Introduction

Educational action is based on a complex process of human interactions and expresses itself in the classroom in the dynamics of the pedagogical relationship between teacher and students and among the students themselves, based on a particular conception of the role of the teacher and the student, which in turn reflects values and standards of society (Postic, 2007).



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The idea of a mentor teacher who gives orders, who knows all the answers, telling students what to do and how to do it, has been replaced by a teacher endowed with leadership skills, having a vision, a will and a commitment to construct collective knowledge, stimulating students' interest and activity in the constant search of better academic results (Murphy, 2005).

When teachers are learning facilitators, they provide an interactive and dialectic classroom environment that is conducive to higher student motivation and participation in the learning process (Abrantes, Seabra, & Lages, 2007; Paswan & Young, 2002). Also, students learn more when they are involved in classroom and positively interact with their peers (Hay, Hodgkinson, Peltier, & Drago, 2004).

Given the importance of leadership and pedagogical interaction in learning outcomes, the following research problem was defined: Are the teacher leadership style and the teacher-student and student-student pedagogical interaction related to the learning performance and the academic achievement in Physical Education in basic schooling?

2. Literature review

2.1. Leadership and learning outcomes

Leadership is a complex concept that has attracted the attention of many researchers. According to Stogdill (1997), it is considered "the process (act) of influencing the activities of an organized group in its efforts toward goal setting and goal achievement" (p. 114).

Pedagogical leadership can be categorized as authoritarian, democratic and assertive (Robertson, 2002). In the authoritarian style, teachers tell students what they should do, they decide and students obey. It is a style centred on the teacher; decision making is done by teachers themselves and announced to students. In the democratic decision-style, teachers say what they would like to be done, make suggestions and help students decide their path. It is a style centred on cooperation, in which students are seen as an integral part of the educational process, being allowed to participate in some decision-making. In the assertive style, teachers present themselves as professionals responsible for enforcing the rules and maintaining order, but without being personally involved with students or without judging their behaviour. They are described as impartial, respectful, assertive, confident and resolute.

There are some dimensions of leadership that make it effective, promoting the improvement of academic achievement: setting of goals; strategic management of resources; curricular organization based on cooperation and sharing; structured and relationally shared environment; promotion of teachers' professional development. The latter is considered the most prominent dimension concerning learning and the academic achievement obtained by students (Robinson, 2011). This is in line with what is advocated by Elmore (2010), who states that the quality of the teaching staff, together with the centrality attributed to the role of students in the teaching-learning process, are essential factors for school success.

Success in leadership depends on an ability to build and maintain positive interactions. In Physical Education classes the importance of collaborative work among peers is essential and depends on teachers' skills, motivations and commitments, as well as on the characteristics of their working

context (Bolívar, 2012). Exercised properly, leadership promotes a pedagogical interaction consistent with learning, reflecting itself on the improvement of learning outcomes.

2.2. Pedagogical interaction and learning outcomes

Interaction is established in the daily educational activity through the role of direct and indirect participants in the educational process. It takes place both in a dyadic system – teacher’s action affects the student and vice versa – and in the broader system of the class – placing the individual in relation to the group and the subgroups (Postic, 2007)

The interdependence of behaviours performed by the two main protagonists, teachers and students, is the main way to create devices that promote successful educational pathways for all students. In Physical Education, pedagogical interaction works by using a variety of teaching techniques such as questioning, engaging students as teaching agents, feedback, rigorous transmission of contents, discipline and the atmosphere of the classroom, in order to increase the time of motor performance, striving to achieve aims within the affective, emotional and maturational domains (Sarmiento, Leça-Veiga, Rosado, & Rodrigues, 1993).

Pedagogical interaction is a two-way action, regarded as a major factor in the learning process. As shown in several studies (Abrantes et al., 2007; Cardoso, Ferreira, Abrantes, Seabra, & Costa, 2011; Cornelius-White, 2007), there is an association between a positive teacher-student pedagogical interaction and the resulting learning. There is also a positive association between a good relationship among peers and students’ learning outcomes (Cardoso et al., 2011; Costa, Cardoso, Lima, Ferreira, & Abrantes, 2015; Hay et al., 2004).

3. Method

3.1. Research design

Based on a review of the literature, hypotheses were formulated with a view to analysing the relationship between leadership and pedagogical interaction (teacher-student and student-student) in the learning performance and in academic achievement, as well as the relative contribution of each towards those results.

Empirically, a quantitative, cross-sectional research was conducted, adopting a correlational and comparative methodology, to find the nature (strength and direction) of the relationships that exist between certain variables (Ducharme & Fortin, 2003).

3.2. Survey instrument

The questionnaire was the survey instrument used to collect data. In addition to the sociodemographic characterisation items, it included several already existing and validated scales: the Hay et al. (2004) Student-Student Interaction Scale, consisting of 4 items; the Paswan and Young (2002) Teacher-Student Interaction Scale, consisting of 4 items; the Young, Klemz, & Murphy (2003) Learning Performance Scale, consisting of 6 items; the Gomes (2005) Multidimensional Sports Leadership Scale, consisting of 28 items; and 2 items adapted from Young et al. (2003) to assess academic achievement. The analysis of the items and of the respective scales shows that the measuring

instruments have psychometric properties suitable for their use in this research context, allowing thus to test the hypotheses (for a list of constructs, items, correlation coefficients, etc., see Appendix A).

3.3. Data collection and sample

All students in the 2nd and 3rd cycles of basic education [5th – 9th years of schooling] were addressed, belonging to the Albergaria-a-Velha School Grouping, located in the coastal region of central Portugal. From a universe of 809 students to whom the questionnaires were distributed, 459 were returned, of which 12 were eliminated due to incorrect filling. The sample thus became 447 students. The return percentage was 55.25%, which is considered satisfactory.

The age of the students ranged between 10 and 15 years, with a mean age of 12.84 years ($SD=1.53$), obtaining a standardized asymmetry of 0.85. With regard to gender, the sample has a balanced distribution, with 49.22% male students and 50.78% females. The difference in the distribution of the gender variable is not statistically significant ($\chi^2(1)=0.110$, $p=.741$).

4. Results

Descriptive and inferential statistical analysis was done to analyse the data and verify the hypotheses, using the SPSS (Statistical Package for the Social Sciences), version 20.

By reading the correlations matrix in Table 1, one can find the existence of statistically significant correlations among the study variables.

The highest correlation coefficients occur among the F1-democratic leadership factor and the teacher-student interaction (.676); the student-student interaction and the teacher-student interaction (.591); and the F1-democratic leadership factor and the learning performance (.557). Between the learning performance and the academic achievement, operationalised through the levels obtained in Physical Education in the 2nd term of the 2013/2014 school year, there is a moderate positive correlation (.428).

Table 1. Correlations matrix among the variables.

	Factor 1 Democratic Leadership	Factor 2 <i>Laissez-faire</i> Leadership	Factor 3 Authoritarian Leadership	Student- Student Interaction	Teacher- Student Interaction	Learning Performance	Level obtained for PE 2nd term
Factor 1- Democratic Leadership	1						
Factor 2- <i>Laissez-faire</i> Leadership	.015 ^{ns}	1					
Factor 3- Authoritarian Leadership	.410**	.316**	1				
Student-Student Interaction	.468**	-.060 ^{ns}	.075 ^{ns}	1			
Teacher-Student Interaction	.676**	-.089 ^{ns}	.269**	.591**	1		
Learning Performance	.557**	.003 ^{ns}	.301**	.412**	.419**	1	
# Level obtained for PE 2nd term	.316**	-.003 ^{ns}	.041 ^{ns}	.211**	.133**	.428**	1

^{ns} not significant; ** $p < .01$

Level obtained in Physical Education in the 2nd term

Regarding the study of the relationship between leadership and learning outcomes, two hypotheses were analysed: H1 “There is a significant relationship between leadership and learning performance” and H2 “There is a significant relationship between leadership and academic achievement”.

The F1-democratic leadership factor shows a high positive correlation with learning performance (.557) and a moderate correlation with academic achievement (.316). In turn, the F2-laissez-faire leadership factor does not correlate significantly with learning performance or with academic achievement. The F3-authoritarian leadership factor, however, obtained a moderate positive correlation with learning performance (.301), but did not correlate with academic achievement. Given the totality of these data, it can be concluded that only for F1-democratic leadership are the proposed hypotheses confirmed.

Concerning the study of the relationship between teacher-student interaction and learning outcomes, two hypotheses were also analysed: H3 “There is a significant relationship between teacher-student interaction and learning performance” and H4 “There is a significant relationship between teacher-student interaction and academic achievement”.

Considering the data presented, there is a moderate positive correlation between teacher-student interaction and learning performance (.419), but a relatively low correlation with academic achievement (.133). It can therefore be concluded that H3 as well as H4 are confirmed, although the association value is low for the latter.

With regard to the study of the relationship between student-student interaction and learning outcomes two further hypotheses were analysed: H5 “There is a significant relationship between student-student interaction and learning performance” and H6 “There is a significant relationship between student-student interaction and academic achievement”.

The data obtained show that student-student interaction has a moderate positive correlation with learning performance (.412), but a low correlation with academic achievement (.211). Given the above, it can be concluded that both hypotheses are confirmed, although the relationship between student-student interaction and learning performance has a greater intensity.

In the regression equation shown in Table 2, leadership styles, student-student interaction and teacher-student interaction entered as predictors. Academic achievement in Physical Education in the 2nd term was the criterion variable.

Table 2. Regression equation for academic achievement.

R^2	Adjusted R^2	F	p		
.135	.125	13.78	.000		
Non-standardised coefficients		Standardised coefficient			
	B	Standard error	β	t	p
(Constant)	2.756	.241		11.444	.000**
Factor 1- Democratic Leadership	0.336	.050	.436	6.778	.000**
Factor 2- <i>Laissez-faire</i> Leadership	0.006	.035	.008	0.175	.861 ^{ns}
Factor 3- Authoritarian Leadership	-0.061	.035	-.091	-1.741	.082 ^{ns}
Student-Student Interaction	0.170	.066	.145	2.597	.010*
Teacher-Student Interaction	-0.219	.066	-.223	-3.321	.001**

^{ns} not significant ** $p < .01$; * $p < .05$.

The model is statistically significant and explains 13.5% of the variance. In leadership styles, only the F1-democratic leadership factor is a predictor of academic achievement, as well as student-student interaction.

In the regression equation shown in Table 3, leadership styles, student-student interaction and teacher-student interaction entered as predictors. The criterion variable was learning performance.

Table 3. Regression equation for learning performance.

R^2	Adjusted R^2	F	p			
.352	.345	47.960	.000			
		Non-standardised coefficients		Standardised coefficient		
		B	Standard error	β	t	p
(Constant)		1,997	,181		11,050	,000**
Factor 1- Democratic Leadership		0,284	,037	,425	7,641	,000**
Factor 2- <i>Laissez-faire</i> Leadership		-0,023	,026	-,035	-0,860	,390 ^{ns}
Factor 3- Authoritarian Leadership		0,077	,026	,132	2,915	,004*
Student-Student Interaction		0,228	,049	,225	4,642	,000**
Teacher-Student Interaction		-0,034	,049	-,040	-0,694	,488 ^{ns}

The model is statistically significant and explains 35% of the variance. In leadership styles, the F1-democratic leadership factor and the F3-authoritarian leadership factor are predictors. Student-student interaction is a predictor of learning performance, the same not being the case for teacher-student interaction.

5. Discussion

The correlational analysis highlights the importance of leadership (structured in three styles: democratic, *laissez-faire* and authoritarian) in learning performance. Indeed, the intensity of the relationship between these variables is high with the democratic style and moderate with the authoritarian style. However, regarding the correlation of leadership with academic achievement in Physical Education, the data were less significant, because it turns out that the intensity of the relationship between these variables is smaller, though significant, being only moderate with the democratic style.

The results obtained by multiple regressions, with learning performance as the criterion variable, reveal that democratic and authoritarian leadership styles are predictors of learning performance. Nevertheless, when academic achievement is the criterion variable, only the democratic leadership style is a predictor academic achievement.

These data underline the importance of the democratic style of pedagogical leadership of Physical Education teachers concerning students' learning performance and academic achievement. The data is in line with Robertson (2002), who states that the democratic style of pedagogical leadership is focused on guidance, cooperation and positive stimulation, emphasizing respect for the student, always supported by the teacher's technical and pedagogical competence, which is consistent with an interactive pedagogical model centred on student learning.

In the same line of Gomes (2005) and Murphy (2005), pedagogical leadership should be based on a multidimensional model of transformational nature, in order to enhance students' capabilities, encouraging them, guiding them, sharing responsibilities and perceiving needs, so as to use methodologies that allow lasting and transverse knowledge and skills to be acquired.

Regarding pedagogical interaction, the results obtained by correlational analysis show a moderate correlation between teacher-student interaction and learning performance and a low correlation with academic achievement in Physical Education. These data confirm the importance of a positive interactive pedagogical context that encourages students to express their views, place their doubts and uncertainties and discuss matters, in order to build knowledge (Cardoso et al., 2011; Cornelius-White, 2007; Hay et al., 2004).

Student-student interaction is more important than teacher-student interaction in relation to learning outcomes. The obtained data show a moderate correlation with learning performance and a relatively lower, but still significant, correlation with academic achievement. Through multiple regression, it could also be verified that student-student interaction is a predictor of both criterion variables, learning performance and academic achievement.

These results are consistent with those that Cardoso et al. (2011) and Costa et al. (2015) obtained and which also showed a moderate association between student-student interaction and learning performance and between the latter and the students' academic results, indicating greater learning when students are involved in the educational process and when they interact positively with their peers.

6. Conclusion

The results highlight the influence of leadership, especially the democratic style, on learning performance. Pedagogical interaction, in this study, did not obtain such an expressive intensity of association with learning performance and academic achievement as leadership did. Nevertheless, the intensity of the relationship between the independent variables is quite significant, which leads us to conclude that there is an important symbiosis between leadership and pedagogical interaction in the educational process.

In response to the problem statement, pedagogical leadership is a predictor of learning performance and academic achievement, while pedagogical teacher-student and student-student interactions are predictors of learning performance, but only slight predictors of academic achievement in Physical Education concerning students attending the 2nd and 3rd cycles of basic education.

The results emphasise the importance of students' involvement in the educational process, in order to improve learning performance and, consequently, academic achievement, by providing relevant information for teachers in classroom context and school directors, as promoters of a local educational policy.

On the one hand, the director has the task of promoting a school culture based on the principles of sharing and democratic participation of all its members, on monitoring, overseeing, defining goals, assessing processes, managing resources, professional development and collaboration with other school organizations.

On the other hand, the teacher has the role of learning facilitator, involving students in learning, through a more open and shared participation among peers, and among them and the teacher, in order to increase learning opportunities. If this is the case, we will no longer have a one-way teaching model, going in the teacher-student direction, but rather a multidirectional teaching system, centred on the student, yet having the teacher as a guide. The focus of the educational process moves from how to teach and who teaches to who learns and how to learn, thereby redefining the image of the student as an indispensable partner in the construction of knowledge.

Acknowledgements

The Portuguese Foundation for Science and Technology (FCT), and the Center for Studies in Education, Technologies and Health (CI&DETS) of the Polytechnic Institute of Viseu.

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Appendix A

Table 1. Means, standard deviations, corrected correlations, factorial saturations and commonalities of the Teacher-Student Interaction Scale.

Teacher-student interaction items	Mean	Std. deviation	Corrected correlation	Saturation	Commonality
1. Teacher encourages students to express opinion.	3.74	1.05	.69	.86	.73
2. Teacher is receptive to new ideas and others' views.	3.74	0.99	.67	.83	.69
3. Students have the opportunity to ask questions.	4.28	0.91	.65	.82	.67
4. Teacher generally stimulates class discussion.	3.54	1.14	.50	.69	.47

Cronbach's alpha of the scale ($\alpha=.81$)

Source: Adapted from Paswan and Young (2002)

Table 2. Means, standard deviations, corrected correlations, factorial saturations and commonalities of the Student-Student Interaction Scale.

Student-student interaction items	Mean	Std. deviation	Corrected correlation	Saturation	Commonality
1. The course provides an opportunity to learn from other students.	3.88	0.87	.53	.75	.56
2. Student interaction is an important learning component of this course.	3.96	0.87	.50	.72	.52
3. I have sufficient opportunity to interact with other students on this course.	3.89	0.92	.51	.74	.54
4. Each student is encouraged to contribute to class learning.	3.99	0.97	.58	.79	.63

Cronbach's alpha of the scale ($\alpha=.74$)

Source: Adapted from Hay et al. (2004)

Table 3. Means, standard deviations, corrected correlations, factorial saturations and commonalities of the Learning Performance Scale.

Learning performance items	Mean	Std. deviation	Corrected correlation	Saturation	Commonality
1. The knowledge you gained.	3.81	.81	.68	.79	.63
2. The skills you developed.	4.01	.87	.73	.83	.69
3. The effort you expended.	4.07	.83	.60	.72	.52
4. Your ability to apply the knowledge you gained.	3.95	.90	.61	.73	.53
5. Your desire to learn more about this subject.	3.93	.97	.68	.79	.62
6. Your understanding of this subject.	3.89	.83	.66	.77	.60

Cronbach's alpha of the scale ($\alpha=.86$)

Source: Adapted from Young et al. (2003)

Table 4. Means, standard deviations, corrected correlations, factorial saturations and commonalities of Factor 1.

Items related to Factor 1 (Democratic Leadership)	Mean	Std. deviation	Corrected correlation	Saturation	Commonality
1. Commends me in front of the others for good performance.	3.39	1.25	.64	.65	.47
5. Speaks enthusiastically about what needs to be done.	3.65	1.17	.64	.68	.48
6. Tells me when I did a good job.	3.76	1.29	.71	.73	.60
8. Lets me participate in decision-making.	3.14	1.29	.64	.62	.50
10. Suggests new ways to accomplish tasks	3.67	1.22	.71	.76	.59
14. Acts so as to gain my respect.	3.71	1.23	.70	.73	.55
15. Expresses satisfaction when I play or perform well.	3.76	1.23	.74	.78	.63
17. Expresses the affection felt for me.	2.82	1.48	.58	.53	.48
21. Shows a sense of power and confidence.	3.60	1.31	.72	.82	.68
22. Seeks to set the example and be a role model for the athletes.	3.67	1.27	.72	.80	.64
23. Leads me to look at a problem from different points of view.	3.45	1.27	.80	.82	.71
24. Fosters in me a desire to succeed.	3.54	1.27	.82	.86	.75
25. Rewards me when I deserve it.	3.05	1.47	.66	.63	.54
27. Fosters in me the will to strive more and more.	3.73	1.26	.72	.79	.62

Cronbach's alpha of the Factor 1 ($\alpha=.94$)

Source: Adapted from Gomes (2005)

Table 5. Means, standard deviations, corrected correlations, factorial saturations and commonalities of Factor 2.

Items related to Factor 2 (<i>Laissez-faire</i> Leadership)	Mean	Std. deviation	Corrected correlation	Saturation	Commonality
4. Tries not to get involved when issues become important.	2.64	1.40	.44	.67	.48
12. Refuses to compromise.	2.60	1.32	.57	.71	.55
13. Avoids making decisions.	2.44	1.38	.52	.69	.49
18. Puts off responding to urgent issues.	2.41	1.42	.53	.72	.53
26. Lets the issues go on before doing something.	2.25	1.39	.65	.78	.67

Cronbach's alpha of the Factor 2 ($\alpha=.77$)

Source: Adapted from Gomes (2005)

Table 6. Means, standard deviations, corrected correlations, factorial saturations and commonalities of Factor 3.

Items related to Factor 3 (Authoritarian Leadership)	Mean	Std. deviation	Corrected correlation	Saturation	Commonality
7. Sets various types of punishments and penalties for when I don't comply with what is established.	3.32	1.44	.57	.80	.67
11. Favours the use of sanctions and punishments to change my behaviour.	3.34	1.34	.57	.74	.64
28. Often uses sanctions/punishment.	2.98	1.29	.53	.65	.55

Cronbach's alpha of the Factor 3 ($\alpha=.73$)

Source: Adapted from Gomes (2005)