



International Academic Conference on Teaching, Learning and Education

School Management in Preparation of Pre-service Science Teachers

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Abstract

The domain of school management represents an important part in pre-service teachers' vocational preparation and in experienced teachers' advancement. The question is what kind and depth of knowledge should they have at command before entering the school building, or the classroom. In the contribution there are several proposals how university students can acquaint themselves with different areas of school management interest. The purpose is to describe and to analyse approaches to the teaching it in Slovak conditions. The eight year's lasted experience is presented and during this period 446 pre-service science teachers went through the content in semestral study. We were analysing their effort, their products created during lessons, or assignments prepared for the lessons. Several of the problems were solved in small groups (usually of three members), some of them were handed in individually, always precisely elaborated and evaluated. There were used the elements of basic analysis and the skilled observation of the students' group or individual work. Many of the topics presented were considered positively remembering that they are connected and could be probably helpful for practice. A great advantage was, that when students had passed the school management course, they were going to sit in on class for their first professional experience and could discuss and elaborate many different problems live in school environment.

Keywords: comparative pedagogy, pre-service science teacher, school management

1. Introduction

Nowadays school management domains represent a matter of great concern in professional pre-service teachers' preparation. This does not mean that all teachers should be prepared for the role of school managers. However they certainly should be on the alert for classroom management, self-management, time-management, for coping with conflicts etc.

The aspirants for science teacher's profession are expected to improve their knowledge in science and in pedagogical and psychological disciplines. The preparation of pre-service science teachers at universities, at different faculties around the world usually consists of two parts: special preparation in chemistry, biology, physics, etc., and pedagogical, psychological and teaching background, where the school management is set in schedule (Haláková et al, 2017, 2018).



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1.1 Background

We reflected what kind of content could be attractive for our target group. The school management specialists in our surroundings (Obdržálek, 2002; PISOŇOVÁ, 2014; Trojan, 2012) offered a principled approach and a concrete structure of this pedagogical discipline. There are many topics that can be elaborated during school management lessons. It seems logical to start with comparison of educational systems in different countries (Mourshed et al. 2010) to find parallels between school leading and organisation leading. It is not required to know about all of them, but to compare the home country educational system with that, established abroad, in another country, to be able to analyse them, to find advantages or disadvantages. It could be inspirational and beneficial. Shaked and Schechter (2017), Park and Jeong (2013) saw the mediation role of school principals crucial in the process of education reform formation.

Therefore we considered very useful to be acquainted with basic school management terminology (organisation management, school management, structure of organisation, etc.), to know and to study some management theories (traditional, human-relations, modern, empirical), models of school management, classroom management, inspectional activity, educational documentation, self-management and time-management.

1.2 Thematic comprehension

Personality of a school manager was elaborated from different point of view. The OECD's the Teaching and Learning International Survey (TALIS) provided a survey across 23 countries inter alia about the styles of leadership and characteristics in different countries according to instructional and administrative leadership. The school leadership style was compared with teachers' beliefs about instruction, teaching practices, co-ordination and professional collaboration among teachers, classroom disciplinary climate, time on task and the teacher – student relation indices, teacher's job satisfaction and self-efficacy, the objectives of teacher appraisals, the outcomes of teacher appraisals, professional development of teachers, types of evaluation (OECD 2009). In 2018 TALIS there were specified four domains in a principals' profession: qualification, recruitment and development; role, function, and action; distributed leadership and teacher leadership; system leadership and leadership in networks of schools (OECD 2018). The characteristics of effective principal designated e.g. Farah (2013) and the differences in managing school by males and females principals noticed Coleman (2005), Eagly et al. (1992), Shaked et al. (2018). Massry-Herzallah and Arar (2019) found out that the teachers appreciate to have more leeway in everyday obligations, the superiors' participation on making decisions and school operations together with teachers and well-adjusted principal – teacher relationship. Goodall (2018), Hoover-Dempsey and Sandler (1997) pursued the parental participation on children's learning and cooperation to achieve learning purposes and Jeynes (2018) emphasized its support and cooperation with school management.

A teacher is defined as a person whose professional activity involves the transmission of knowledge, attitudes and skills to the students enrolled in an education programme (OECD 2018). The importance of developing the teacher leadership was elaborated by several authors (Harris & Jones, 2019, Cooper et al. 2016, Wener & Campbell 2017). Science teacher is a person, who has a great opportunity to enchant and to fascinate the pupils for science.



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The deliberate utilization of tried and tested working methods with the aim to optimize time and opportunities, individual has, is called a self-management (Kirillov et al., 2015). It includes a time-management as well, the managing activities, planning, eliminating stress. The survey of TALIS in 2018 showed, that the students of a lower secondary education spend in the classroom 913 hours per year on average in the OECD countries. Teachers stated that they spend 78% of classroom time on actual teaching and learning, 13% keeping order and 8% on administrative tasks (OECD 2019).

2. Methods

The course of school management has been attended by students for eight years. There had been enrolled 446 respondents in this course at Faculty of Natural Sciences, Comenius University, Slovakia. It started as two-hour seminar a week and since the academic year 2017/2018 with one hour weekly more. After passing the exam students used to go for their first professional experience to primary or secondary grammar schools and they could utilize their new knowledge. The purpose of this study was to describe approaches to the teaching school management and to analyse eight year's experiences in Slovak conditions.

2.1 Research question

1. Which topics of school management domains should be presented in lectures to engage pre-service science teachers?
2. Do the chosen topics correlate among each other? Is any theme not appropriately implemented to the lectures?
3. Is there any difference between students' performance in dealing with any theme according to a gender or a duration of the lesson?

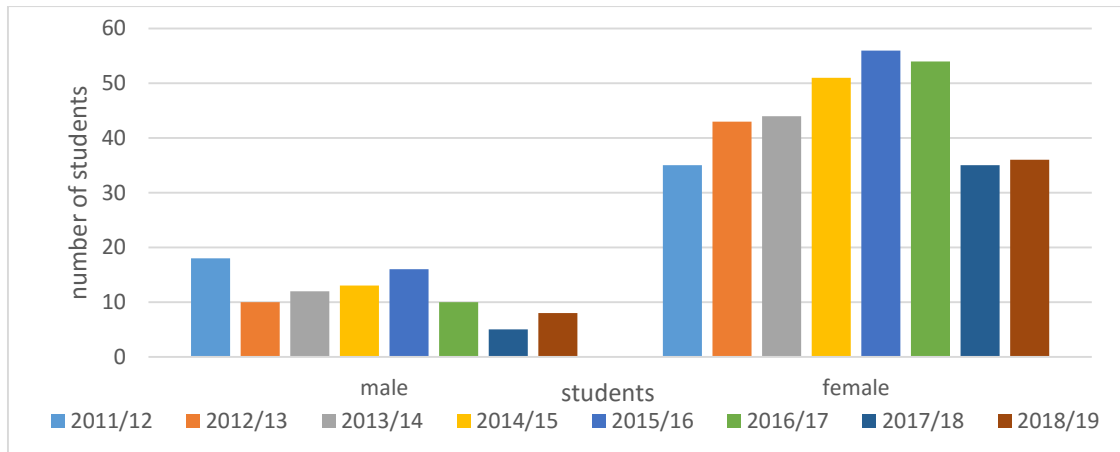
2.2 Research Sample

The research sample consisted of 446 students (92 males, 354 females) of science teaching at Faculty of Natural Sciences, Comenius University in Slovakia, who attended the school management course during the sixth semester of their bachelor studies. Gender distribution in every academic year is indicated in Figure 1. The lectures of last two academic years (2017/18 and 2018/19) were enriched in one lesson of contact teaching (N = 84).

Figure 1: Gender distribution of graduates of school management lectures in eight-year's period



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2.3 Data Analysis

Data were analysed using the statistical software package for data analysis Statgraphic Centurion Version XVII. Data were not normally distributed. The tightness of the relation between pairs of variables was derived by Spearman's correlation coefficient (Table 1). The non-parametric one-way analysis of variance was used (Table 2) and the value of Kruskal-Wallis test calculated for two affecting factors: a gender and duration of the school management lesson.

3. Results

During one semester each student work out eight activities or products individually or in group and took a final test. The first activity was to study an educational system in chosen country in groups, to prepare an interesting presentation of it and the suggestions for discussion. As a model there was presented the education system in Slovakia because the vast majority of students were part of it. In a group work during that eight years there were introduced the educational systems (145 products altogether) in: Great Britain (13¹), Germany (12), Finland (12), Czech Republic (10), Spain (9), Austria (7), France (7), Australia (6), Poland (6), Japan (6), Hungary (5), USA (4), Russia (4), Serbia (4), Canada (4), Norway (3), Switzerland (3), Sweden (3), Holland (3), Denmark (3), Italy (2), China (2), Island (2), Armenia (1), Belgium (1), India (1), Israel (1), Ireland (1), Cuba (1), Luxembourg (1), Mexico (1), Peru (1), Singapore (1), Syria (1), South Korea (1), Estonia (1), Thailand (1), Mongolia (1). There were evaluated the relevance of the sources, the importance of applied information, graphical data processing, an oral presentation and effectivity of a group working.

According to the theoretical background presented during the lecture, the next week activity was associated with the theories of management. The assignment for a group work was to use the theory of management in school conditions. Students chose the Maslow's (20), the Taylor's (20), the Fayol's (19), the Webber's (18) theories, the mathematical approach (15), the Mayo's



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(13) and the Herzberg's (12) theories, the systematic (11), the empirical (10) and the decision-making (8) approaches to management and the modern theory (once). Creativity and originality appeared in many cases and were special rewarded with a bonus.

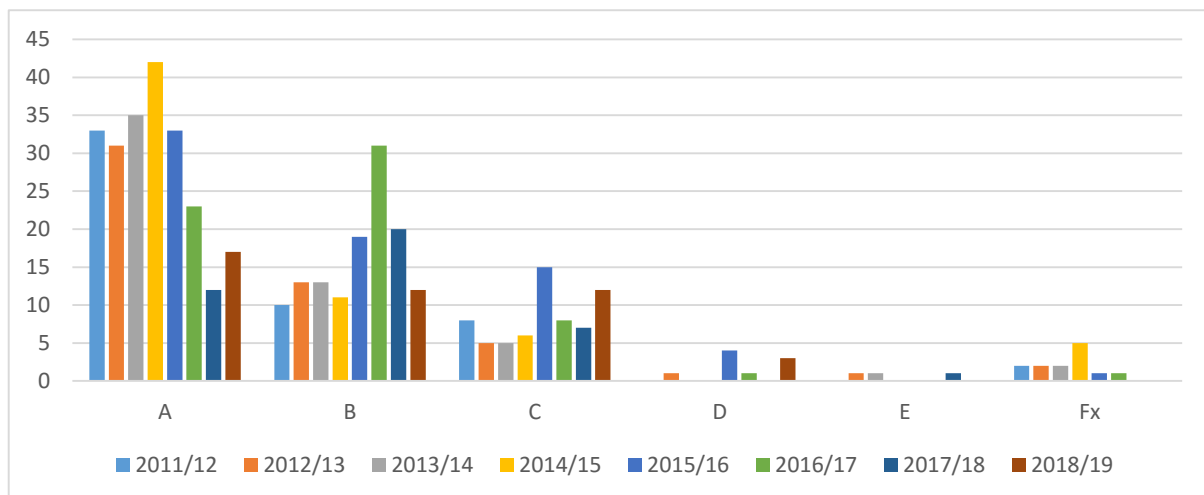
We took a look into the field of school an inspectors' and principals' job content, we were remembering students' experience with the principals at primary and secondary grammar schools they had been attended.

Another managing position is situated in a classroom, where the teacher is responsible for teaching process, pupils' work, atmosphere in class, etc. A space of time could be spend on studying the educational documentation to show how to complete and fill in the forms, which of them are important, commonly or rarely used.

Students consider the self-management and the time-management as very interesting topics with doing the self-reflection how do they spend and organize the time they have for different obligations, leisure-time activities, for family, etc. They recognized and tried the methods, techniques and strategies of time-management, e.g. the Pareto's principle, the Eisenhower's matrix, Pomodoro method etc.

An average of each activity score achieved is in Table 1 and the final assessment is documented in Figure 2. A maximum of scoring represented five points in each activity and ten points in final test. There were 97.08 % of the students who passed an exam (A is the best mark and Fx means to fail an exam).

Figure 2: Distribution of graduates of school management lectures according to marks in eight years' period



Spearman coefficient measures the strength of the association between the variables. In 36 associations among 9 variables, only 5 were not statistically significant difference in results on 95 % level of significance (not coloured in Table 1: P – I, I – ThM, I – FTL, FTL – TiM, SO – TiM).

Table 1: Characteristics of variables and Spearman coefficients between variables



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	average	standard deviation	ThM	P	I	FTL	SR	SO	TiM	T
ES	3.92	1.5170	.1999	.1986	.1361	.1207	.2225	.1172	.1654	.3084
ThM	4.16	1.3865		.2021	.0590	.2265	.1504	.1959	.1911	.1601
P	4.48	1.1883			.0764	.2096	.1970	.2543	.1075	.1923
I	4.31	1.5304				.0895	.2403	.1088	.0959	.3009
FTL	4.03	1.3169					.2068	.1301	.0420	.2197
SR	4.04	1.3292						.3833	.1171	.2886
SO	4.62	1.3663							.0660	.2388
TiM	3.94	1.9688								.1836
T	7.08	2.0090								

ES – educational system, ThM – theory of management, P – principal, I – inspector, FTL – form of teacher’s lecture, SR – school report, SO – school order, TiM – time-management, T – test

Another view on the data can indicate, that girls full in the school documents better and achieved higher score in test than boys (Table 2). The second aspect is, that it seems more time for lesson helps to deal with the understanding of an educational system in other countries, with discussion about the experience with a former principal at their primary or secondary schools and it also helps to deal with organizing their time for study, work and hobbies (Table 2).

Table 2: Results of non-parametric one way analysis of variance (ANOVA)

dependent variable	factor	value of Kruskal – Wallis test	
		gender	duration of lesson
educational system		2.346	21.031***
theory of management		1.599	.497
principal		.020	4.644*
inspector		1.042	.041
form of teacher’s lecture		.004	.052
school document/report		4,988*	2.636
school order		1.075	23.133***
time-management		.003	5.654*
test		10.029**	12.224***

In general, there is expected, if more time was spent on teaching and learning a specific content, it would lead to many effective results and products. The values in Table 2 show that the teacher will be responsible for carefully and coherently thinking about activities if it is needed more time for an elaboration, a discussion, working, and about activities, when two-hour lesson is quite enough.



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4. Discussion

We were asking, discussing and elaborating, what topics are the most important for pre-service science teachers in the field of school management. According to the disposal time and the opportunities we specified eight themes, interesting and useful for our target group. Every week we analysed different part of this discipline and there was a space for students' opinions, experiences, ideas, conceptions to share, to discuss, to dispute. Each topic was connected with a separate group or an individual activity, and students turn in a report or a product. Their performance was evaluated in complexity.

The pre-service teachers were working in the temporary self-selecting groups, meeting excluding the school-time and school-area, distributing the responsibility and the obligations among members of group, informing each other about their progress and playing the roles. They were forced to study some materials in foreign language (about an educational system in foreign country, about theories of management, etc.), to manage their time, to respect the others and their limitations. That is considered as added value.

Scager et al (2016) and Wilson et al. (2018) recommend a group work to solve highly complex or ill-structured problems that require a collaboration. Our assignments for students were in such quality. One third of activities were done as a group work and contributed to an active learning. Hassanien (2006) summarized the benefits of a group-based work: the development of critical thinking, of a range of generic skills (organisation, negotiation, delegation, cooperation, conflict resolution, time-management, leadership and following instructions), social interaction, exchanging knowledge, combination of expertise, greater depth and breadth of students' projects, responsibility, moral support and motivation. It was also enriching for the teacher to observe and to monitor the group working process.

There are many examples of common practice describing how a teacher influenced the professional orientation and decision of child to be a scientist, an engineer, a doctor etc. Gezer and Bilen (2007) determined several characteristics of an effective science teaching and an effective science teacher. The fundamental prerequisite is to be an excellent specialist in subject he/she is teaching, to know how to teach effective and with interest. The adequate knowledge of school management domains belongs to complete awareness.

5. Conclusion

We are responsible for a quality preparation of pre-service teachers for their practice (Deming, Figlio, 2016) and we may not be negligent in a conception of the lectures such as school management. It's our obligation to draw up the content in an interesting and useful way, to show what kind of topics are the components of the school management domains, which part of it could they be experienced with, through a reflection and their own memories (principal as a family member, an inspectional activity at school they attended, students' own educational documents, the employment documents, e.g. agreement, payslip, notice), how should be the teaching process always under teacher's control.

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The implementation of curriculum and school managers' support for teachers and their work are very necessary preconditions for complex development. Development in school organisations has to be connected with the transformation of education across the country (Gallie et al., 1997). The initiatives, changes and reforms need to be implemented in schools all around the world (Ball et al., 2012).

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References

- [1] Ball, J. S., Maguire, M. and Braun, A. (2012). *How Schools Do Policy: Policy Enactments in Secondary Schools*. London: Routledge 173p.
- [2] Coleman, M. (2005). Gender and Secondary School Leadership, *International Studies in Educational Administration*, vol. 33, no. 2, pp. 3-20.
- [3] Cooper, K. S., Stanulis, R. N., Brondyk, S. K., Hamilton, E. R., Macaluso, M. and Meier, J. A. (2016). The Teacher Leadership Process: Attempting Change within Embedded Systems, *Journal of Educational Change*, vol. 17, no 1, pp. 85-113.
- [4] Deming, D. J. and Figlio, D. (2016). IGLIO Accountability in US Education: Applying Lessons from K-12 Experience to Higher Education, *Journal of Economic Perspectives*, vol. 30, no. 3, pp. 33-56.
- [5] Eagly, A. H., Karau, S. and Johnson, B. (1992). Gender and Leadership Style among School Principals: A Meta-Analysis, *Educational Administration Quarterly*, vol. 28, no. 1, pp. 76-102.
- [6] Farah, A. I. (2013). School Management: Characteristics of Effective Principal, *Global Journal of Human Social Science*, vol. 13, Iss.13, pp. 14-16.
- [7] Gallie, M., Sayed, Y. a Williams, H. (1997). Education in a New South Africa: The Crises of Conflict, the Challenges of Change. *Journal of Negro Education*. vol. 66, no. 4, pp. 460-467.
- [8] Gezer, K. and Bilen, K. (2007). Pre-Service Science Teachers' Views about Characteristics of Effective Science Teaching and Effective Science Teacher. *Journal of Applied Sciences*, vol. 7, pp. 3031-3037.
- [9] Goodall, J. (2018). Leading for parental engagement: working towards partnership, *School Leadership & Management*, vol. 38, no. 2, pp. 143-146.
- [10] Haláková, Z., Nagyová, S. and Nagy, T. (2017). Vzdelávanie budúcich učiteľov prírodovedných predmetov v oblasti školského manažmentu. (Education of expectant science teachers in school management), *Sborník z mezinárodní vědecké konference ICOLLE 2017*, Brno : Mendel University, pp. 89-95, ISBN 978-80-7509-503-9.
- [11] Haláková, Z., Nagyová, S. and Nagy, T. (2018). Vybrané aspekty komparatívnej pedagogiky v príprave budúcich učiteľov prírodovedných predmetov. (Selected aspects of



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- comparative education in preparation of futurescience teachers). *Sborník z mezinárodní vědecké konference ICOLLE 2018*, Brno: Mendel University, pp. 110-118, ISBN 978-80-7509-569-5.
- [12] Harris, A. and Jones, M. (2019). Teacher leadership and educational change, *School Leadership & Management*, vol. 39, no. 2, pp. 123-126.
- [13] Hassanien, A. (2006). Student Experience of Group Work and Group Assessment in Higher Education, *Journal of Teaching in Travel & Tourism*, vol. 6, no. 1, 17-39.
- [14] Hoover-Dempsey, K. V., and Sandler, H.M. (1997). Why Do Parents Become Involved in Their Children's Education? *Review of Educational Research*, vol. 67, no.1, pp. 3-42.
- [15] Jeynes, W. H. (2018). A practical model for school leaders to encourage parental involvement and parental engagement. *School Leadership & Management*, vol. 38, no. 2, pp. 147-163.
- [16] Kirillov, A. V., Tanatova, D. K., Vinichenko, M. V. and Makushkin, S. A. (2015). Theory and Practice of Time-Management in Education. *Asian Social Science*, vol. 11, no. 19, pp. 193-204.
- [17] Massry-Herzallah, A. and Arar, K. (2019). Gender, school leadership and teachers' motivations, *International Journal of Educational Management*, vol. 33, no. 6, pp. 1395-1410.
- [18] Mourshed, M., Chijioke, C. and Barber. M. (2010). *How the World's Most Improved School Systems Keep Getting Better*. London: McKinsey & Company.
- [19] Obdržálek, Z. (2002). *Škola a jej manažment*. (School and its management), Bratislava: Comenius University, 223 p., ISBN 80-223-1690-3.
- [20] OECD (2009). *Creating Effective Teaching and Learning Environments: First Results from TALIS*. Executive Summary. ISBN 978-92-64-05605-3, 310 p. [Online] Available: <https://www.oecd.org/education/school/43023606.pdf>
- [21] OECD (2018). *Teaching and Learning International Survey (TALIS) 2018 Conceptual Framework* 108 p. [Online] Available: [http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=EDU/WKP\(2018\)23&docLanguage=En](http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=EDU/WKP(2018)23&docLanguage=En)
- [22] OECD (2019). *TALIS 2018 Results (Volume I): Teachers and School Leaders as Lifelong Learners*, OECD Publishing.
- [23] Park, J. H. and Jeong. D. W. (2013). School Reforms, Principal Leadership, and Teacher Resistance: Evidence from Korea, *Asia Pacific Journal of Education*, vol. 33, no. 1, pp. 34-52.
- [24] Pisoňová, M. et al. (2014). *Školský manažment pre študijné odbory učiteľstva a prípravu vedúcich pedagogických zamestnancov*. (School management for teachers' programmes and for school managers' preparation), Bratislava: Comenius University, 228 p., ISBN 978-80-223-3621-5.



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- [25] Scager, K., Boonstra, J., Peeters, T., Vulperhorst, J., & Wiegant, F. (2016). Collaborative Learning in Higher Education: Evoking Positive Interdependence, *CBE—Life Sciences Education*, vol. 15, no 4, ar. 69, pp. 1-9.
- [26] Shaked, H. & Schechter, Ch. (2017) School principals as mediating agents in education reforms, *School Leadership & Management*, vol. 37, no. 1-2, pp. 19-37.
- [27] Shaked, H., Glanz, J. & Gross, Z. (2018). Gender differences in instructional leadership: how male and female principals perform their instructional leadership role, *School Leadership & Management*, vol. 38, no. 4, pp. 417-434.
- [28] Trojan, V. (2012). *Pedagogický proces a jeho řízení*. (Educational process and its managing), Praha: Charles University, 172 p., ISBN 978-80-7290-543-0.
- [29] Wener, A., and Campbell, T. (2017). The Theoretical and Empirical Basis of Teacher Leadership: A Review of the Literature, *Review of Educational Research*, vol. 87, no 1, pp. 134-171.
- [30] Wilson, K. J., Brickman, P., and Brame, C. J. (2018). Group Work, *CBE—Life Sciences Education*, vol. 17, no. 1, fe1, 1-5.