



INFORMATION SYSTEM “DIAGNOSTIC” AS A TOOL OF ACTION RESEARCH

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Abstract

In order for schools to be able to manage the demanding tasks that are imposed on them today, they must be ready for internal transformation. This transformation cannot be driven by chance or intuition, or managed from the outside, but has to be executed on the basis of exact internal data. This data can be obtained through the methods of action research carried out at schools, with the help of the prepared information system called Diagnostic. Using long-term data gathering and processing, as well as other activities, school can become a learning organisation, which can adequately react to the changing external conditions, and constantly improve its quality.

Keywords

school quality, action research, longitudinal research, organisational learning, IS Diagnostic

Introduction

Schools today face the constant stream of new problems and ambitious challenges, which create extreme pressure on their transformation. Schools are expected to act towards their own development. They are often affected by educational politics, educational research and professional public discussions – that is, by activities that might provide short-term, even random, goals and solutions. But school development cannot be driven by chance or even intuition. Long-term and systematic steps need to be taken when developing the professional skills of teachers and school management representatives; detailed reflections, evaluations and presentations of the importance of individual phenomena and processes are needed, in order to show how these work in reality and what results they bring. It is important to emphasise the importance of internal school development, of proactive school behaviour, and of the *organisational learning* of schools. One of the possibilities to meet these requirements is the *action research*, supported by suitable *information system* for obtaining, storing and processing data.

The aim of this report is directed by the intention to complementarily examine the phenomenon of school quality and its development using the processes of action research that is supported by an information system. We present theoretical/research groundwork for the quality of school as an educational organisation, in which we refer to the systems of quality indicators that were elaborated by J. Sanders and E. Davidson (2003) under the applied model of school evaluation. We further draw on the findings by the OECD/CERI (1995) experts and R. R. Verduga and M. Schneider (2005). The connection to the construct of teacher quality and the possibilities of evaluating this quality in relation to the process of pupil learning is also inspiring.

In connection with the school quality concept, this article further covers the approaches to the action research that is carried out in pedagogical practice. We work with the approaches by J. McNiff (2002); J. Hendl (2005), A. McIntyre (2008), J. McNiff and J. Whitehead (2009). We discuss the methodological characteristics of the action research, its procedural demands, and mostly the intervention-based and applicable character of gathered information; the analysis and evaluation of the data demand the arrangement of supportive information system. In the end, we introduce a draft of the information system Diagnostic, which constitutes a crucial technological support for monitoring and evaluating school quality.

School quality and its management using the longitudinal research design

In general, we can agree on the important factors of the effort to evaluate schools in their aggregate quality and in all their pedagogical and educational services they provide. Schools play significant role in nurturing the national cultural heritage as well as the personal development of their pupils and students. But to actually choose the criteria that would represent this quality¹, to determine their right mix as well as to scale the individual criteria in terms of their importance, to create their clear and easily comprehensible characterisation; here the agreement is not that easy to reach. One of the many remaining questions asks whether the quality of school and teachers can significantly influence the learning of pupils, the quality of their results and their further life fulfilment, if we take into account the role of various socio-cultural backgrounds of their families, or the role of their personalities and developmental characteristics. The effort to create a universal model of good school is complicated by at least one other factor – a certain point of view, or a question: “*quality for who?*” How to specify the desirable and expected level through the different views of pupils, parents, teachers, headmasters, inspectors, school authorities, sponsors?

Nowadays the traditional belief that only the results of pupils can be used as a significant indicator of school’s quality is being abandoned. A more complex notion of quality is being adopted and we try to specify the features that characterise good school of high quality, creating a basis for school management and development. To learn about and deeply understand the complex structure of school is the prerequisite for discovering, naming and solving the problems that are part of this intricate living system. School therefore resembles “*a living*

¹ When evaluating certain pedagogical phenomenon, we want to find out if and how much it is in correspondence with the criteria and indicators that determine whether the phenomenon can be marked as “of high quality”. *Quality* defined in this way represents the optimal, desirable level, certain degree of perfection, and thus becomes a normative category; the examined phenomenon is compared with this normative category.

organism, in which every element assures its healthy state and modification of each element affects the function of the whole” (translated from Walterová, 1994, p. 8).

The basis of quality management and development is grounded in the more or less elaborately structured body of indicators as specific and qualifiable characteristics of selected phenomena and processes happening in the school environment. The indicators have descriptive character and give school actors (pupils, teachers, parents) but also evaluators and self-evaluators the possibility to “*stimulate productive thinking and discussion on the needs of changes and on the course of school development*” (Sanders, Davidson, 2003, p. 810). However, Sanders and Davidson (2003) also warn about certain risks in using this approach and recommend a certain caution when using it. They especially point out the problems when creating national standards that contain a general delimitation of the indicators, which do not take into account the specifics of individual schools, such as personality characteristics of their pupils, or the resources school has at its disposal. In order for the system of indicators characterising the desired quality of school to work properly, it has to meet several requirements. First of all, it has to be complex enough to enable a full assessment of school in the whole wide range of services the school provides, and be potentially convenient for each individual school and all the participants. Among other requirements is the option for every school to choose from the available set of indicators and create its own specific profile of quality. Furthermore, it is desirable to consider any system of indicators as an open one; one that can be changed, if necessary, and its creation should be cooperative and based on consensus, especially when considering the sensitive, and in the Czech Republic unknown, process of self-evaluation. At the same time, however, it is necessary to agree on and specify the indicators clearly and at the beginning of any evaluating processes (more in Seberová, Malčík, 2010).

Material and Methods

Action research – concept and groundwork

Action research was defined in the middle of the 20th century by a social psychologist Kurt Lewin. One of the key premises of action research is its direct participation in solving problems that emerge during teaching. It has an influencing character, because its results shape the reality of the given professional area, and among its main goals is to identify, in as much detail and complexity as possible, all the processes of a given practice and their contexts, and therefore be able to postulate and propose wide range of inspiring solutions. Action research in the field of teaching practice is defined as a process in which teachers/practitioners and other actors of school life carefully and systematically examine their own pedagogical practice and phenomena and processes connected with teaching and learning by using the strategies, methods and techniques of pedagogical research. These are the attributes that should be generally observed (Walterová, 1995; O’Brien, 1998; Ferrance, 2000; McNiff, 2002; Nezvalová, 2002; Hendl, 2005):

- The research is aimed at problems that are identified by the participants themselves; the real environment is reflected - in all its complexity (complexity of views on the impact of conditions and forms of social action); teacher’s own teaching is examined;

- The research is a process of learning and change, teacher's own teaching is the object of the research, the effectiveness is improved through interiorisation of the needs of specific interventions, changes can be implemented that are improving the quality of pedagogical practice;
- The research is carried out by professional as well as unprofessional researchers, who are therefore both subjects and objects of the research; the participants have an equivalent position, they cooperate and they also participate in evaluating and interpreting the results;
- If teachers cooperate as a research team, a way to transfer tacit knowledge opens up and school becomes a learning organisation, which consequently enables the growth of professional self-confidence as well as the prestige of the teaching profession;
- The research results are published for the needs of all groups of participants.

The methodological speciality of the action research is the permanent spiral cycling process of several phases: 1. *Reflection – identifying problems, issues, major and initial ideas, or the needed changes*; 2. *Collecting data and information (consulting literature, choosing the method of data gathering and analysis, planning and executing the research)*; 3. *Analysis and interpretation of findings, suggestions for changes and corrective measures*; 4. *Action – implementation of changes*; 5. *Reflection – evaluation of the plan of changes and its modification*. The cycle comes to end and it is followed by the phase 1 again: gathering and analysing data to evaluate the effects of implemented changes, identifying problems, ... (Lewin, 1948 in Smith, 2007; Ferrance, 2000; Hendl, 2005). The following diagram clearly shows the cycle of individual phases:

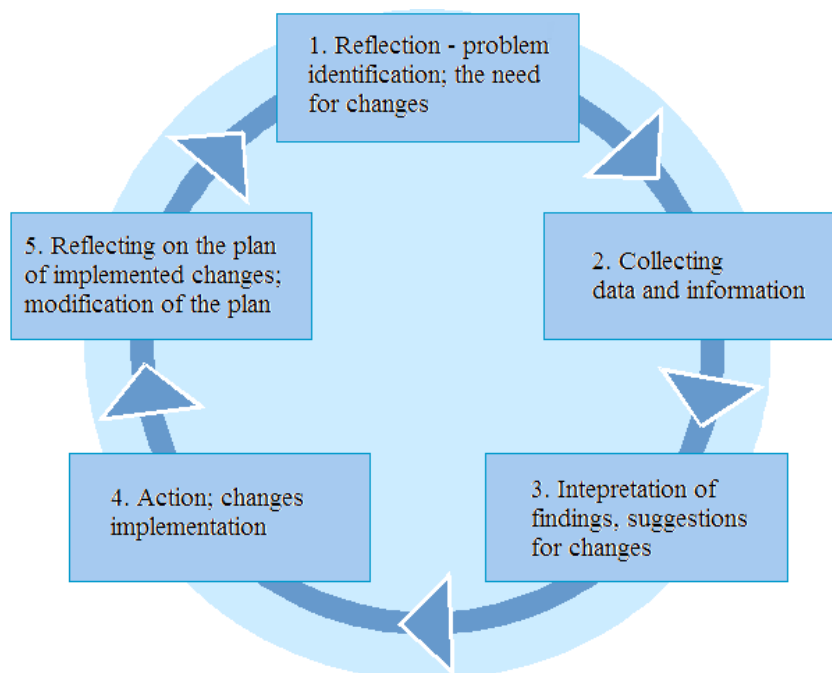


Fig. 1: Diagram: The action research process phases

Results and Discussion

Information system “Diagnostic” and its application in the longitudinal monitoring of school quality

The information system Diagnostic has been developed to support the monitoring and evaluation of school quality as the key feedback for all the participants of the educational process. The information system Diagnostic is a web-based application that stems from the EFQM Excellence Model² and the Model for School Quality Improvement.³ During its use, school self-evaluate their own educational reality in the following basic areas- Education conditions; Course of education; School culture; School management; Education results; School results in relation with the education conditions and financial resources.

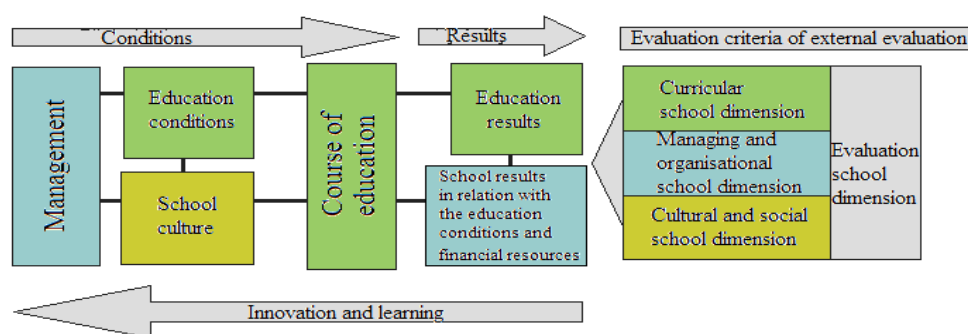


Fig. 2: Block diagram of school dimension evaluation related to the dimensions of school educational reality (based on EFQM®, modified by M. M.)

The Figure no. 2 shows the schematics of developing system of relations between the areas and dimensions of good school. The self-evaluation is always checked by an external evaluation, where the individual school dimensions are evaluated in accordance with pre-formulated evaluation criteria, as indicated by the left-pointing arrow in the block diagram. The left part of the closed diagram represents the school’s self-evaluation carried out in the areas as defined by the Ministry of Education, Youth and Sports law no. 15/2005 and inspired by the EFQM®. The right part of the closed diagram represents the external evaluation, containing three dimensions – curricular, managing and organisational, and cultural and social. All these dimensions are empowered by the *evaluative* dimension, because all the elements of individual dimensions can be and should be subjected to the action research.

The information system Diagnostic stems from the basic requirements of working with information, i.e. to provide enough relevant and correct information, at the right time to the right users.

Among other functions, the IS Diagnostic allows to:

- Apply internal and external diagnostic tools on the education reality of schools (techniques of action research);

² The EFQM Excellence Model® is a customer-oriented system for quality management.

³ The Model for School Quality Improvement was developed in the Association for School Quality [Společnost pro kvalitu školy, o. s.] (Malčík, Hudec, 2010).

- Continually store the gathered data from the action research – the managed process of self-evaluation – for further use, mainly in the long-term evaluation;
- Analyse data in compliance with the law no. 101/2000 on personal data protection; enable school benchmarking;
- Assign outputs from diagnostic tools, i.e. information from a carried out action research, to individual dimensions/sub-dimensions;
- Insert suggestions for modifications; as the basis for the Plan of School Further Development;
- Monitor and compare the development of various areas/sub-areas in the self-evaluation of certain school in time.

Each and every sub-area of the school education reality is periodically evaluated in accordance with the methodology for school quality improvement; the evaluation of each area is calculated by the following formula:

$$O_k = 0,4 * \frac{\sum_{i=1}^l r_i}{l} + 0,3 * \frac{\sum_{i=1}^l o_i}{l} + 0,2 * \frac{\sum_{i=1}^l n_i}{l} + 0,1 \frac{\sum_{i=1}^l t_i}{l}, \quad (1)$$

Where O_k is the result of the evaluation of k -area; l is the number of sub-areas of k -area; r_i is the value of the real evaluation of i -sub-area; o_i is the value of the verification possibility evaluation of i -sub-area; n_i is the value of evaluation of suggestions of i -sub-area; and t_i is the evaluation of trends of i -sub-area. $O_k \in \langle 1,4 \rangle$. Weighted values are setted according to Information system adjusting.

The output of the information system is the evaluation of individual areas and sub-areas, comparison with other evaluated schools of the same type, pre-generated report of the school self-evaluation and the option of a long-term monitoring of selected indicators, showing trends and predictions.

If we take $k=6$ and so we realize school evaluation in six selected areas, school output could look like this $School = \{1,5;2,3;3,5;2,4;3,1;2,8\}$.

The information system Diagnostic is currently used by about 400 Czech primary and secondary schools and first outcomes and outputs appeared.

School quality improvement

It is more and more difficult to define all the characteristics and attributes that quality schools should have today. Society constantly succumbs to new socio-cultural, political and economic changes; new developments in technology and science bring an ever-growing amount of easily reached information, they enable more and bigger “possibilities” for man. We can communicate easily with transoceanic countries and at the same time be unable to come to understanding with people around us. What is the task of schools in contemporary society? Which quality is

the most important? Which quality should schools strive for in order to prepare today's children for tomorrow's problems?

Processes connected with school quality management, and its further development, are a long-term issue. Their longitudinal character predestines them to be realised in a long time span of several years or even decades. If the longitudinal research on school quality state and management is to be systematic, orderly and methodologically correct, so that its findings are valid and reliable, it has to be grounded in a specific research design. With its practical, intervention-driven focus, the action research suits these requirements very well, supported by a suitable information system for obtaining, storing and processing the data.

Experts agree that the action research carried out by teachers is not mere uncovering of problems and looking for what is wrong and unsuitable, but finding knowledge that enables qualitative growth. Action research is not only about discovering and understanding why we make certain decisions or implement certain strategies, but more about thinking what can be done better and what can be changed to facilitate learning of pupils (Ferrance, 2000; McIntyre, 2008; McNiff, Whitehead, 2009, Kostolányová, Šarmanová, Takáč, 2012).

When carrying out action researches, it is important to take into account the conditions of the actual environments as they influence the course of the researches. Equally important and desirable, however, is to help schools in carrying out such demanding and professionally specific activities. One of the helping hands is certainly offered by supportive information systems that facilitate the gathering, analysis and interpretation of the longitudinally handled data and information. The information system Diagnostic presented in this paper also enables to adhere to the methodological specifics of the action research in school environment. It brings up-to-date analysed and evaluated data, thus ensuring that the data can be used to continually help the decision-making during the course of the research, and that the partial results are put into practise and the effects of the proposed changes and interventions can be immediately and constantly monitored.

More than ever, school has to prepare its pupils for an unknown tomorrow. For that reason, more than ever before, school must become a learning organisation (Collinson, Cook, 2007, Senge, 2001), it must monitor its quality and be ready for a change that comes from within and that is a reaction to the objective understanding of the described educational reality at school. As stated for instance Lankshear, Knobel, (2004), these requirements evidently comply action research strategy especially in qualitative-quantitative research designs. In order to succeed in this demanding task, school needs wide information support. Although it is standard that schools today use information systems to manage their operational and economic activities, it is not usual for them to use information systems to manage the quality of their main processes (Seberova, Malcik, 2010). And school quality management cannot be done only on the basis of documentation, however well compiled; it is necessary to notice and analyse, as objectively as possible, the individual domains of school educational reality, with the possibility to run benchmarking and further analyses. These requirements are met by the developed Diagnostic information system that builds upon the Model for School Quality Improvement that utilises, in a sense, the simplified model of action research.

Conclusion

In recent years, schools have been facing new challenges and demanding tasks that call for their internal transformation accompanied by systematic self-reflection. In order for school to be able to cope with these tasks, it must not rely only on solutions and help from the outside, but has to be prepared to carry out long-term and methodologically relevant processes of gathering and assessing exact data and information from within. This data can be obtained through the methods of action research, carried out at schools by teachers and headmasters, using the help of the prepared information system Diagnostic. Using long-term data gathering, processing and assessing and other systematic and managed activities of self-evaluation, school can become a learning organisation, which can adequately react to the changing external conditions, and at the same time meet the increasing requirements for quality.

References

- COLLINSON, V. and T. F. COOK. *Organizational learning*. London: Sage Publications Ltd., 2007.
- FERRANCE, E. Action research. Themes in Education. Northeast and Islands regional Educational Laboratory. Brown University, 2000.
- FISCHER, A. W. and M. SCHRATZ. *Vedení a rozvoj školy*. Brno: Paido, 1997.
- HENDL, J. *Kvalitativní výzkum*. Praha: Portál, 2005. ISBN 80-7367-040-2.
- KOSTOLÁNYOVÁ, K., J. ŠARMANOVÁ, J. and O. TAKÁČZ. Adaptive form of elearning. *ICTEJournal*, vol.1, iss.2, 2012, pp.55–67. ISSN 1805-3726.
- LANKSHEAR, C. and M. KNOBEL. *TEACHER RESEARCH. From design to implementation*. New York: Open University Press, 2004. ISBN 0335210643.
- MALČÍK, M. and T. HUDEC. *Vlastní hodnocení školy – Střední školy*. Ostrava: Společnost pro kvalitu školy, o.s., 2010. ISBN 978-80-254-8254-4.
- McLAUGHLIN, C., K. B. HAWKINS and D. McINTYRE, D. *Researching Teachers, researching Schools, Researching Networks: A Review of the Literature*. Cambridge: University of Cambridge, Faculty of Education, 2004.
- McNIFF, J. Action research for professional development. Concise advice for new action researchers. 2002. Available at: <<http://www.jeanmcniff.com/>>.
- NEZVALOVÁ, D. Akčním výzkumem k zlepšení kvality školy. Available at: <<http://epedagog.upol.cz/eped4.2002/clanek02.htm>>.
- O'BRIEN, R. *An Overview of the Methodological Approach of Action research*. Toronto: University of Toronto, Faculty of Information Studies, 1998.
- OECD/CERI. *Školy pod lupou*. OECD, 1995. ISBN 80-211-0239-X.
- RUDDUCK, J. Teachers as researchers: the quiet revolution. In DfES and TTA Conference at the Queen Elizabeth II Conference Centre. 2001.

SANDERS, J., R. and E. J. DAVIDSON. A Model for School Evaluation. In KELLAGHAN, T., STUFFLEBEAM, D., WINGATE, L., A. International Handbook of Educational Evaluation, part two, 2003. pp. 807–826. Dordrecht: Kluwer Academic Publishers. ISBN 1-4020-0849-X.

SANDRETTO, S. *Action Research for Social Justice*. Crown: Teaching and Learning Research Initiative. 2007.

SEBEROVÁ, A. and M. MALČÍK. *Autoevaluace školy. Od teorie k praxi a výzkumu*. First ed. Ostrava: Pedagogická fakulta Ostravské univerzity v Ostravě, 2010. p. 136. ISBN 978-80-7368-759-5.

SENGE, P., et al. *Schools that Learn. A Fifth Discipline Fieldbook for Educators, Parents and Everyone Who Cares About Education*. London: Nicholas Brealey Publishing, 2001.

SMITH, M. K. Action research. 2007. Available at: <www.infed.org/research/b-actres.htm>.

VERDUGO, R., R. and J. M. SCHNEIDER. School Quality, Safe Schools: An Empirical Analysis. In *Revista*, Vol. 3, No. 1, 2005. Available at: <http://www.ice.deusto.es/RINACE/reice/Vol3n1_e/VerdugoSchneider.pdf>.

WALTEROVÁ, E. (ed.) *Úloha školy v rozvoji vzdělanosti (volume 1 and 2)* Brno: Paido, 2004. ISBN 80-7315-083-2.

WALTEROVÁ, E. *Akční výzkum v podmínkách české školy*. Praha, 1995.

WILE, J. and A. ZISI. Výzkum ve výuce. *Kritické listy. Čtvrtletník pro kritické myšlení*, Volume 1, no. 4, 2001. pp. 9–12.