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Multidimensional diagnostics and assessment in physical education

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To carry out a successful transformation in PE, adequate changes in diagnostics and assessment have to be made. A multidimensional approach, emphasizing especially cognitive, formative, behavioral, informative, motivational, psychosocial, and ethic dimensions, is an important facet of the assessment. National standards and competencies in PE play a key role in diagnostics and assessment. PE diagnostics prefers alternative and authentic approaches to diagnostics and assessment, which are based on humanistic, holistic and phenomenological ideas. Further development of PE diagnostics and assessment requires the development of evidence-based teaching.

Key words: evaluation, curriculum, approach, strategy, tools

Wielowymiarowa diagnostyka i ocena w wychowaniu fizycznym

W celu przeprowadzenia udanej transformacji w wychowaniu fizycznym powinny być dokonane odpowiednie zmiany w diagnostyce i ocenie. Wielowymiarowe podejście, przede wszystkim w wymiarze poznawczym, kształtującym, behawioralnym, informacyjnym, motywacyjnym, psychospołecznym i etycznym, jest ważnym aspektem oceny. W diagnostyce i ocenie kluczową rolę odgrywają normy krajowe i kompetencje. Preferuje się podejście oparte na ideach humanistycznych, holistycznych i fenomenologicznych. Dalszy rozwój diagnostyki i oceny w wychowaniu fizycznym wymaga wdrażania nauczania opartego na dydaktyce naukowej.

Słowa kluczowe: program nauczania, ocena, strategie, narzędzia

INTRODUCTION

Diagnostics and assessment represent inseparable parts of education process in Physical Education (PE). Their role was changing in dependence on dominant philosophical approaches, teaching concepts and emphasized teaching theories. A typical example of changes in diagnostics is represented by the occurrence of theory of programmed teaching in PE (Czabański 1986; Daus 1979; Fetz 1978; Frömel 1991; Schaller 1980). Diagnostics and evaluation became an inherent part of teaching process, unlike the phase approach. Similar changes

occurred when phenomenology entered teaching theories.

The question of diagnostics and assessment in PE and their effective application requires:

a) multilevel approach (at the levels of education system, school system, curricula, school educational programs, lessons, teaching process, motor skills learning process, etc.),

b) systemic approach concerning major factors of education process (teacher, student, program/ curriculum, conditions), and other factors outside of school (parents, sports clubs, other institutions),

TABLE 1. The most frequently stated types of diagnostics and evaluation in Physical Education (Frömel & Sigmund 2003)

Quantitative	Qualitative
Subjective	Objective
Rational	Spontaneous
Internal	External
Normative	Criteria (multi-criteria)
Comparative	Preferential
Traditional	Alternative
Integrative	Differential
Self-evaluation	Mutual evaluation (peer assessment)
Formal	Authentic
Formative	Final/summative
Continuous	Final
Partial	Overall
Aimed at process	Aimed at result
Own assessment	Others' assessment
With a technique	Without a technique
Apparent	Latent
Competitive	Cooperative
Individual	Group
Single	Continual
Unique	Participative
Verbal	Non-verbal
Intra-	Inter-
Etc.	Etc.

c) multidimensional approach (cognitive, formative, behavioural, informative, motivational, psychosocial, regulative, ethic),

d) structural approach (motor skills, knowledge, attitudes, including preferential spheres related to PE activities, etc.).

Clear distinction of the level and the approach allows better diagnostics and assessment and also broader evaluation in PE. The systemic approach points at the broad and comprehensive diagnostics in PE. The multidimensional level stresses various aspects and major dimensions of diagnostics and evaluation in the context of the preferred teaching concept. Diagnostics and assessment cannot be based only on the subject-object level of teacher and pupil. The structural approach attempts at the operationalization of diagnostics and assessment in particular teaching areas in compliance with the suggested competencies and standards.

Diagnostics in PE has primarily an explorative and explanative function in all the named approaches, and it regards obtaining and interpretation of the information concerning the major factors in the teaching process and their interaction, and thus leads to the assessment – grading-diagnosis or possibly to prognosis. Assessment in PE means to attribute some value to something or somebody in different interactions, aspects and dimensions.

Effective diagnostics and assessment are associated with the development of evidence-based

teaching in PE. PE evidence-based teaching deals with the management of the education process and learning process on the basis of proved teaching patterns, theories and facts which increase the chance of being successful and eliminates the risk of failure. It is based on the assumption of bringing scientific ideas into teaching, i.e. that also diagnostics and evaluation should be based on proved evidence. Evidence-based diagnostics and assessment in PE is not, however, a mere transition of research techniques and methods into PE, although this is possible under certain conditions. Research and praxeology diagnostics and assessment approaches have to be clearly distinguished. In accordance to the development in medicine, we can argue there is a need to establish changes in research strategy, professional preparation and praxis at schools.

The difficulty to establish a comprehensive and clearly defined theory of diagnostics and assessment in PE is documented by the frequently cited types of diagnostics and assessment.

MULTIDIMENSIONAL DIAGNOSTICS AND ASSESSMENT

The major dimensions in diagnostics and assessment in PE are:

- cognitive,
- formative,
- behavioral,
- informative,

- motivational,
- psychosocial,
- regulative,
- ethic.

Other dimensions such as technological, economical, international, historical, multicultural, media and others need to be also considered.

Individual dimensions (aspects) are mutually interwoven and are an inherent part of the education process. As it is usual in teaching, the role and importance of diagnostics and assessment can be in a simplified way determined by questions: Why and what for? Who and what is assessed? How and with what? What will be the effect?

TABLE 2. Basic ideas of contemporary approach to diagnostics and assessment in PE

<i>Situation (earlier or contemporary)</i>		<i>Trend (existing or preferred)</i>
Teacher's assessment decreases	⇒	The share of pupils in the activity of assessment increases
Only the assessment teacher → pupils	⇒	Increasing assessment pupils → teacher
More external assessment	⇒	More self- assessment
More assessment teacher → pupil, teacher → pupils	⇒	More assessment pupil → pupil, pupil → pupils, pupils → pupils
More inter-assessment and comparison	⇒	More intra-assessment and assessment of individual changes
More quantitative (point, numeric)	⇒	More qualitative (verbal)
More performance	⇒	More changes in performance and other effects
More testing of sport achievement	⇒	More fitness testing
More testing and measurement	⇒	More alternative and authentic assessment (portfolio etc.)
More result	⇒	More progress
More resultative	⇒	More immediate and continuous
More summative	⇒	More formative
More grading	⇒	More assessment but less grading
Secondary motivation for assessment	⇒	Primary motivation for assessment
More responsibility on a teacher	⇒	More responsibility on pupils
Less public supervision	⇒	More public supervision
Less ethical limitation	⇒	More ethical limitation
More whole class	⇒	More collective and individual
More orientation on shortcomings	⇒	Greater orientation on strengths
Realization of diagnostics and assessment	⇒	Acquisition of diagnostics and assessment
Objectivity and accuracy dominate	⇒	Justice, simplicity and attractiveness dominate

- motivational,
- psychosocial,
- regulative,
- ethic.

Other dimensions such as technological, economical, international, historical, multicultural, media and others need to be also considered.

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The present transformation of educational systems worldwide and changes in PE (Darst & Pangrazi 2002; Gröbning 1993; Kurz 1995; Rink 2005; Pangrazi 2007) suggest the following background and trends in diagnostics and assessment in PE (see the scheme). Please note that the statements partially simplify the complexity of the problem.

In contemporary teaching, trends in which "pupil's role", individuality, self-evaluation, wide spectrum of values within intention – "self-assessment" (Pangrazi 2007), "authentic assessment" (Mintah 2003), "alternative assessment" (Rink 2005), "portfolio assessment" (Butler & Hodge 2001; Grineski 1996; Kinchin 2001; Kirk 1997; Kyriacou 1996; Lund 1997; Martin 2000; Melograno 1997, 2000; Mohnsen 1997; Pettifor 1999; Scherler 2000; Zhu 1997), "peer assessment" (Miller 2006; Wikgren et al. 1999) protrude significantly are primarily preferred. At the same time, classical elaborated approaches to testing are not regarded to be surpassed. The most extended systems are within "American Association for Health, Physical Education and Recreation" (AAHPER), and especially FITNESSGRAM and ACTIVITYGRAM (Morrow, Zhu, Franks, Meredith & Spain 2009).

Diagnostics and assessment must direct to the most authentic evaluation, for which the "use of portfolio" is quite typical. It is based on qualitative, complex, global, widely interpreted, developmental, and close to natural and common life type of assessment. A pupil is the co-author of a portfolio with high decisive competence and responsibility. The portfolio is a representative collection of documents, paper work, evaluations, creative activities, achievements, obtained licenses, and engagement in various activities etc.

Value structure changes with the change of the concept of Physical Education assessment. Tondl (1999) within this context talks about "world of values" and its philosophical dimensions.

The current structure of values (common categories of diagnostics and assessment) of the PE education process from pupil's aspect:

- physical and mental condition with respect to the individual's precondition,
- fund of skills in connection with lifelong physical activity,
- sphere of sport interests and preferences and its satisfaction,
- relation to and participation in physical activity and the role of physical activity in lifestyle (creation of an individual's fitness program),

- sport "literacy" (a minimum of the most important knowledge, skills, abilities, and habits),
- health effects of physical activity (state of movement system, habits connected with physical load, hygienic habits...),
- psychosocial effects of physical activity (social experience, communication, cooperation, enjoyment, satisfaction of needs, gender equality...),
- behavioral-physical-cultural sphere (physical behavior, conduct in physically active/sport environment).

National **standards and competence for PE** (national curriculum) as well as „International Standards for PE and Sport for School Children" (IPCHER-SD 2000), "National Standards for PE-K12" (NASPE 2001) have dominant position in the PE value structure.

Means for multidimensional diagnostics and assessment in PE

Clear criteria for classification for systematic diagnostics and assessment means are difficult to determine. Therefore, we insist on traditional classification of means:

1. Test:

- Motor tests of physical abilities;
- Motor test of physical conditions;
- Motor test of physical skills;
- Psychomotor and motivational tests;
- Comprehension tests of the PE area, but also physical culture, lifestyle, health etc.;
- Experiment.

2. Non-test:

- Monitoring of physical activity (pedometers, accelerometers, heart rate monitors, GPS, records, journals, logs, self-monitoring sheets, etc.);
- Observation and judgment (evaluating scales, rating scales, records, "scoring sections" – sets of evaluating criteria, self-assessment list, checklist, etc.);
- Survey (conducting a conversation);
- Interviews;
- Questionnaires (diagnosis of physical activity level, e.g. the IPAQ short, IPAQ long, NQLS, GPAQ, PAQ, pupils' relation to PE lessons etc.);
- Analysis of students papers (written exams, projects, event tasks, fitness programs etc.);
- Video analysis (analysis of physical performance etc.).

CONCLUSIONS

Changes in PE concept require changes in diagnostics and assessment emphasizing alternative and authentic approaches and a change of teacher's and pupils' role.

Complex and holistic concept of diagnostics and assessment in PE is based on multidimensional approach with the emphasis on cognitive, formative, behavioral, informative, motivational, psychosocial, and regulative and ethic dimensions.

Increased attention needs to be devoted to introduction of portfolios and other diagnostic and assessing means that involve more effectively pupils into the education process.

Broad scale of diagnostics and assessment means including traditional ones must support assertion of preferred PE concept at schools of all types as well as in PE teachers' professional preparation.

REFERENCES

- Butler S.A., Hodge S.R., 2001, *Enhancing student trust through peer assessment in physical education*, "The Physical Educator", vol. 58, no. 1, pp. 30–41. ISSN 0031-8981.
- Czabański B., 1986, *Optymalizacja uczenia się i nauczania czynności sportowych*, Akademia Wychowania Fizycznego we Wrocławiu, 128 s. ISBN 000925252.
- Darst P.W., Pangrazi R.P., 2002, *Dynamic physical education for secondary school students*, San Francisco, CA: Benjamin Cummings, 529 p. ISBN 0805378820.
- Daugis R., 1978, *Programmierte Instruktion und Lerntechnologie im Sportunterricht*, München: Minerva, 484 s. ISBN 3597100783.
- Fetz F., 1978, *Programmierter Sportunterricht*, Wien: Österreichischer Bundesverlag, 128 s. ASIN B00259M54I.
- Frömel K., 1991, *Teorie programovaného učení v tělesné výchově*, Praha: Státní pedagogické nakladatelství, 302 s. ISBN 8070670843.
- Frömel K., Sigmund E., 2003, *A complex approach to the evaluation of the educational process in physical education* [in:] R. Bartoszewicz, T. Koszczyk & A. Nowak (eds.), *Kontrola i ocena w wychowaniu fizycznym*, Wrocław: Wrocławskie Towarzystwo Naukowe, s. 83–89. ISBN 83-7374-005-8.
- Grineski S., 1996, *Cooperative learning in physical education*, Champaign, IL: Human Kinetics, 138 p. ISBN 0-87322-879-0.
- Grössing S., 1993, *Bewegungskultur und Bewegungserziehung. Grundlagen einer sinnorientierten Bewegungspädagogik*, Schorndorf: Karl Hofmann, 26 s. ISBN 3778035800.
- ICHPERSD, 2000, *International standards for physical education and sport for school children* [cit. 2009/05/20]. Dostępné w internecie: <http://www.ichpersd.org>
- Kinchin G.D., 2001, *Using team portfolios in a sport education season*, "Journal of Physical Education, Recreation & Dance", vol. 72, no. 2, pp. 41–44. ISSN 07303084.
- Kirk M.F., 1997, *Using portfolios to enhance student learning & assessment*, "Journal of Physical Education, Recreation & Dance", vol. 68, no. 7, pp. 29–33. ISSN 07303084.
- Kurz D., 1995, *Braucht der Schulsport eine neue curriculare Leitidee?* [in:] H. Aschebrock (ed.), *Schulsport in Bewegung*, Soest: Verlag für Schule und Weiterbildung. ISBN 3816521991, s. 63–80.
- Kyriacou C., 1996, *Klíčové dovednosti učitele. Cesty k lepšímu vyučování*, Praha: Portál, 155 s. ISBN 8071780227.
- Lund J., 1997, *Authentic assessment: Its development & applications*, "Journal of Physical Education, Recreation & Dance", vol. 68, no. 7, pp. 25–28, 40. ISSN 07303084.
- Martin K., 2000, *Sportdidaktik zum Anfassen*, Schorndorf: K. Hofmann, 145 s. ISBN 3778072803.
- Melograno V.J., 1997, *Integrating assessment into physical education teaching*, "Journal of Physical Education, Recreation & Dance", vol. 68, no. 7, pp. 34–37. ISSN 07303084.
- Melograno V.J., 2000, *Designing a portfolio system for K-12 physical education: A step-by-step process*, "Measurement in Physical Education and Exercise Science", vol. 4, no. 2, pp. 97–115. ISSN 1091-367X.
- Miller D.K., 2006, *Measurement by the physical educator: Why and how*, New York, NY: McGraw-Hill, 330 p. ISBN 0071244662.
- Mintah J.K., 2003, *Authentic assessment in physical education: Prevalence of use and perceived impact on students' self-concept, motivation, and skill achievement*, "Measurement in Physical Education and Exercise Science", vol. 7, no. 3, pp. 161–174. ISSN 1091-367X.
- Mohnsen B.S., 1997, *Teaching middle school physical education*, Champaign, IL: Human Kinetics, 350 p. ISBN 0880115130.
- Morrow J.R., Zhu W., Franks B.D., Meredith M.D., Spain C., 2009, *1958–2008: 50 years of youth fitness tests in the United States*, "Research Quarterly for Exercise and Sport", vol. 80, no. 1, pp. 1–11. ISSN 02701367.
- NASPE 2001, *Standards for advanced programs in physical education teacher education* [cit. 2009/05/20]. Dostępné w internecie: <http://www.aahperd.org>
- Pangrazi R., 2007, *Dynamic physical education for elementary school children*, San Francisco, CA: Benjamin Cummings, 750 p. ISBN 0805379088.
- Pettifor B., 1999, *Physical education methods for classroom teachers*, Champaign, IL: Human Kinetics, 343 p. ISBN 0880118423.
- Rink J.E., 2005, *Teaching physical education for learning*, Boston: WCB McBraw-Hill, 416 p. ISBN 0072973048.
- Schaler H.-J., 1980, *Programmiertes Lernen im Sport*, Wuppertal: Putty, 164 s. ISBN 3876500303.
- Scherler K., 2000, *Messen und Bewerten* [in:] P. Wolters, H. Ehni, J. Kretschmer, K. Scherler, W. Weichert (eds.), *Didaktik des Schulsports*, Schorndorf: K. Hofmann, s. 16–186. ISBN 377803491X.
- Tondl L., 1999, *Hodnocení a hodnoty. Metodologické rozměry hodnocení*, Praha: Filosofia, 178 s. ISBN 8070071311.
- Zhu W., 1997, *Alternative assessment: What, why, how*, "Journal of Physical Education, Recreation & Dance", vol. 68, no. 7, pp. 17–18. ISSN 07303084.
- Wikgren S. et al., 1999, *Physical education methods for classroom teachers*, Champaign, IL: Human Kinetics, 343 p. ISBN 0880118423.