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ADAPTATION AND STANDARDIZATION OF THE DIFER TESTS IN SLOVAKIA

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ABSTRACT

The importance of diagnosing a child's individual development is becoming increasingly important in the local areas. In the framework of pedagogical diagnostics, it is particularly important to know the basic skills that are necessary for a successful entry into the first year of primary school - i.e., to successfully master the role of a pupil. Pedagogical diagnostics of preschool children is only in its infancy in Slovakia. Standardized diagnostic tools for determining the school readiness and abilities of a child are also absent. The presented study portrays the fundamental aspects and progress of the KEGA project - *Adaptation and standardization of DIFER (Diagnostic systems for assessing development) for 4-8-year-old children*, the main purpose of which is to contribute to the improvement of the quality of pedagogical diagnostics in kindergartens and primary schools with Hungarian as the language of instruction in Slovakia, namely by adapting a foreign research tool.

Keywords: pedagogical diagnostics, developmental level of a child, testing school readiness, DIFER

INTRODUCTION

The results of numerous international studies show that the first eight years of a person's life are an incredibly sensitive period in terms of personality development (Fink et al., 2019) and investing in early childhood education has a long-term socio-economic return (Józsa et al., 2022). In this sensitive period, various determinants, as well as developing programs, can have an impact on the favourable development of a child's personality. It is a fact that there are differences in the contemporary developmental level of children that must be accepted, and taking into account the diversity of a given class, adequate differentiation must be applied in the educational process. The starting and conditioning factor of differentiation is the implementation of adequate and effective pedagogical diagnostics, with the help of which the teacher determines the current level of development of the individual in defined areas of development. Based on the evaluation of the acquired facts, the teacher is then able to plan and implement activities, set an educational goal, or if necessary, apply developing programs in order to ensure further development.

Diagnosing the Developmental Level of Children

The requirement to know developmental differences in children's abilities and skills before they enter school is given special emphasis, as this milestone in a child's life has an impact on their future success in school. School readiness testing represents the criteria that a child must meet before entering school as a prerequisite for successfully managing the demands of school and the educational process (Burchinal et al., 2015; Duncan et al.; 2020; Keating, 2007; Snow, 2006).

The period of starting school is a very sensitive period both in the development of cognitive abilities and social skills. Numerous experts deal with the study of this period of a child's life, such as Nagy (1980), Snow (2006), Driscoll & Nagel (2008), Józsa et al. (2018) and Józsa and Barrett (2018), who focus their research on identifying skills that play a significant role in a child's cognitive and affective development in early childhood in the first place. Moreover, their research also demonstrates whether there is a provable predictive power of the level of skill development in early childhood on later school success. In their findings, they state that children who, when entering

school, lag behind their peers in either cognitive or affective areas, are at a great disadvantage, which is reflected in their performance and motivation to learn. Therefore, it is necessary for children to have an adequate level of fundamental competences when entering school, and to achieve the desired level of school maturity and readiness.

In the international context, attention is paid to the development of abilities of children under the age of five, yet there are only a few countries in which standardized tools are available for measuring and evaluating the cognitive abilities of children at this age. On the other hand, it is possible to monitor the skills of children from 4 to 8 years old using standardized diagnostic tests in Hungary (Józsa, 2022; Nagy et al., 2004a; Nagy et al., 2004b).

The importance of diagnosing a child's individual development is gaining increasing importance in our country as well, whilst it is emphasized mainly at the theoretical level only. In the framework of pedagogical diagnostics, it is particularly important to know the basic skills that are necessary for successful school adaptation. Based on the ideas of Snow and Van Hemel (2008), we emphasize that valid and reliable diagnostic tools are needed to determine whether a child has reached the necessary level of development to start school. The availability of appropriate and easy-to-use diagnostic tools plays an important role in a child's successful entry into school. Unfortunately, this area in Slovakia is very problematic as there are no standardized diagnostic tools for determining school aptitude - teachers do not have them at their disposal.

At present, measurements are almost exclusively carried out by psychologists (occasionally by special educators) and mostly with the help of psycho-diagnostic tests. Such diagnosis of children's current developmental level is not mandatory, which means that not all school-age children will participate in it. In other words, provided that the parent does not request such testing, the child cannot take it. For this reason, the parent often has no knowledge of the level of abilities and skills of their child, unless they are informed by the teacher themselves based on personal opinions. However, the teacher's opinions without objective measurements supported only by observation can be very subjective. Therefore, we came to the conclusion that it is necessary to standardize a comprehensive diagnostic tool for the conditions of Slovakian education, which would measure the level of defined competence areas of 4-8-year-old children and thus provide a starting point for their

individual development. Such a standardized diagnostic tool would also be useful for diagnosing children's school readiness.

As a result of the facts mentioned above, our research team working at the Department of Primary and Pre-school Education of the J. Selye University in Komárno showed interest in this issue and decided to construct a research tool for diagnosing children's school readiness. The construction of a research tool is a precise and systematic activity, where the prearranged steps lead the constructor to their goal - the creation of a reliable and valid research tool. As Gavora (2012) states, a researcher has two options – either create an original research tool, or adopt an existing one. We decided to adapt and standardize the already existing DIFER research tool that is used abroad. The implementation of our intended activity took place from 2021 as part of the KEGA project - *Adaptation and standardization of DIFER (Diagnostic systems for assessing development) for 4-8-year-old children*, which we deal with in more detail in the following parts of the study.

DIFER

The DIFER is a complex diagnostic program that consists of two parts. It contains diagnostic tests for determining the current developmental level of 4-8-year-old children, as well as methodological materials for the subsequent development of the investigated areas (Nagy et al., 2004a). The DIFER diagnostic tool was created in Hungary in 2004 as a revised form of the PREFER diagnostic tool from 1970 to determine the current developmental level of children in relation to school readiness. The research was initiated by Professor József Nagy (Józsa & Zsolnai, 2022).

Its updated version, known as DIFER, was standardized in Hungary, and with the aim of statistical optimization, a shortened version was also created (Nagy et al., 2004a). The validity and expected reliability of the diagnostic tool were confirmed by the results of tests undertaken in empirical research. The research sample comprised children from the entire territory of Hungary, who began to fulfil their compulsory school attendance in the given year (Józsa, 2014; Nagy et al., 2004b).

The DIFER tests were first presented in Hungary in 2004, and since then they have become increasingly popular among Hungarian teachers. The DIFER program was created at the University of Szeged, which has been developing

diagnostic tools in relation to school readiness for more than 40 years. The standardization of the DIFER tool in Hungary was based on the results of research in which 23,000 respondents participated (Józsa, 2022). The purpose of developing the program was to provide teachers with a tool that would help developing abilities and skills of children in kindergartens and primary schools, and which is also used as a school readiness testing tool. DIFER tests determine the current developmental level of 4-8-year-old children in seven basic areas, which can be further developed through methodical materials. Each of the individual areas, or skills, is an important prerequisite from the point of view of personal development and the successful start of compulsory schooling:

- *Fine motor skills*: in this area, the current developmental level of pre-reading and reading literacy in the field of graphomotor skills is determined - a prerequisite for successful learning to write,
- *Phoneme perception*: in this area, the current developmental level of pre-reading and reading literacy is determined - a prerequisite for the successful acquisition of reading and writing,
- *Relational reasoning*: in this area, the current developmental level of cognitive competence is determined - a prerequisite for successful understanding of the meaning of words and verbal instructions in relation to space and relations,
- *Pre-mathematics skills*: in this area, the current developmental level of mathematical literacy is determined - a prerequisite for successfully mastering the basics of mathematics, critical thinking and problem solving,
- *Deductive reasoning*: in this area, the current developmental level of cognitive competence is determined in relation to understanding the assignment and drawing conclusions based on one's own experiences.
- *Contextual understanding*: in this area, the current developmental level of cognitive competence is determined – a prerequisite for understanding certain contexts in relation to tasks being solved and critical thinking,
- *Social skills*: in this area, the current developmental level of social literacy is determined - a prerequisite for successful establishment of social relationships, cooperation with adults and peers, and

integration into a new social-school environment (Nagy et al., 2004b).

In 2017, the authors of the diagnostic tool proceeded to its expansion by two more important areas in relation to a child's thinking (Józsa et al., 2017):

- *Conceptual thinking - systematization of knowledge*: in this area, the current developmental level of cognitive competence is determined as a prerequisite for the systematization of concepts. This is necessary not only from the viewpoint of solving tasks in the field of mathematics and information processing, but is also a necessary prerequisite for the overall mastery of the content of a curriculum at the primary level of elementary schools with the aim of continuous fulfilment of the determined performance standards.
- *Combinative thinking:* in this area, the current developmental level of mathematical literacy is determined as a prerequisite for the ability to group and sort elements, which also has an impact on inductive thinking and the overall intelligence of individuals.

As we can see, the DIFER tests measure the level of a child's abilities and skills in the nine areas defined above. The tasks in this diagnostic tool have clearly defined circumstances and in most cases the children solve them individually. The tool also includes a manual that contains a methodical procedure for entering, solving tasks and evaluating answers with strictly defined rules that are described in detail in the manual with illustrative examples. They thus meet the standard requirement, which according to Bačíková and Janovská (2018) a research tool must meet in addition to variability and reliability. At the same time, this manual contains tables on the basis of which the child's resulting raw score is converted to a standard score, which is an indicator of the individual's position in relation to a representative sample of the population.

After obtaining data through test tasks, a quantitative evaluation of the results is carried out in each researched area separately. By summarizing these results, a so-called DIFER-index is created, which is expressed by a single number representing both the individual's overall developmental level and a reliable indicator of competence in relation to school readiness. Currently, there also is an abbreviated diagnostic tool available - SHORT DIFER, which allows

us to determine the results already after a single measurement (Nagy et al., 2004b).

After evaluating the results, the indicators obtained by the pedagogical diagnosis provide the teachers with possibilities of maintaining their pedagogical work in terms of setting specific goals in the field of the child's individual development. For this process, the authors developed a *Notebook of development indicators* (Nagy & Józsa, 2016), in which the results of the measurement are recorded, thus a diagnostic map of the child is formed (see Figure 1).

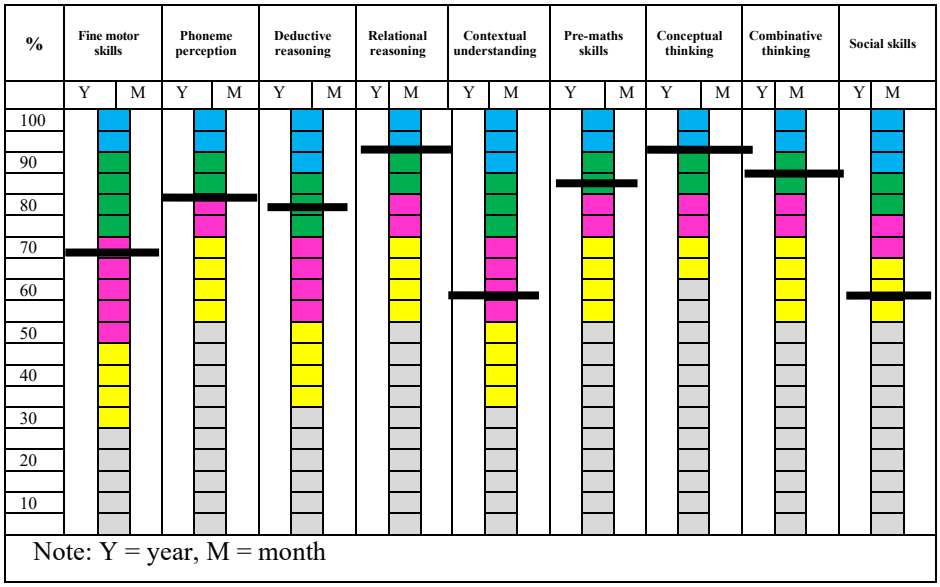

Figure 1. Diagnostic map of a child

In the map above, there are accurate data on the areas the individual is in their development and the exact areas where they require further improvement. The authors recommend the pedagogical diagnostics to be carried out at least once a year or semi-annually. The notebook of development indicators contains columns where the results of diagnostics can be recorded several times.

In favour of a qualitative interpretation of the DIFER-index, which is a numerical expression of the level of the child's abilities and skills in the measured area, the authors of the tests developed a five-stage developmental model. It means that, based on the numerical score, the child is classified into

one of the five levels of development - preparatory (Figure 1. gray colour), beginner (Figure 1. yellow colour), advanced (Figure 1. purple colour), finished (green colour), and optimal level (blue colour) (Nagy et al., 2004b). Achieving an optimal level of development is considered desirable, which means that the individual development of a child must be continued until it reaches the optimal level. In case they do not reach this level in pre-school age during pre-primary education, it is necessary to continue in the period of younger school age (Nagy, 2008), which ensures the continuity of pre-primary and primary education.

Adaptation and Standardization of the DIFER in Slovakia

As it has already been mentioned above, our research team working at the PF JSU has been dealing with the adaptation and standardization of the DIFER diagnostic tool (which has been standardized and used in educational practice in Hungary for several years) since 2021 as part of the KEGA project - *Adaptation and standardization of DIFER (Diagnostic systems for assessing development) for 4-8-year-old children*.

Conducting this scientifically oriented research project is based on the analysis of the fundamental conditions and is a response to the requirements of pedagogical practice - lack of tests that can be used by teachers to diagnose the developmental level of children in kindergartens and at the primary level of elementary school in the context of school readiness. The study is also based on the fact that in Slovakia the teachers themselves are very often the creators of tests and of various diagnostic tools, which, however, are usually not subject to verification on larger population groups (they are not standardized).

Our goal is to equip kindergarten and primary level teachers with such a standardized diagnostic tool, with which they can determine a child's current developmental level, as well as the child's level of school readiness. At the same time, we wish for ensuring that the tool could be used to verify (monitor) the individual education of children in compulsory pre-primary education in accordance with current legislation.

On the basis of the purpose of our project, we carried out empirical research in which 1609 respondents between the ages of four and eight from kindergartens and elementary schools with Hungarian as the language of instruction in the Slovakian Republic participated. In addition to the adaptation and standardization of the Hungarian research tool to Slovakian cultural and

social conditions, our goal was also to develop the diagnostic competences of students (but also of in-practice teachers). The students of the study program of Primary and Pre-school Education of the J. Selye University participated in the acquisition of research data. After theoretical preparation and provision of material and spatial conditions, students had the opportunity to apply their theoretical knowledge in practice. Since they participated in the data collection, they could get an insight into the world of research and thus acquired certain skills in the field of collecting and recording research data. Therefore, before the implementation of the research, we had modified the information sheet of the subject *Pedagogical Diagnostics*, into which work with DIFER tests had been included. At the same time, students, kindergarten teachers and primary school teachers had the opportunity to participate in educational programs and workshops, online webinars and seminars, during which they became familiar with the professional use of the DIFER research tool.

Process of the Project

As our research is focused on the adaptation of a foreign research instrument, we considered it important to follow certain steps that ensured that the given research instrument would become credible, objective, valid and reliable also in our educational environment (Fajrianthi et al., 2020). Likewise and Gavora (2012) highlight that a research tool that is not adapted to our environment is of little value, as it does not reflect our educational environment. The result of this is that it cannot produce valid data.

In this context, we implemented the adaptation of the research tool, which represents, according to Gavora (2012), the determination of edumetric qualities - validity and reliability in the target sample of subjects. This was followed by the standardization process, which included setting the standards of the adopted instrument for the given target group in our country. The adaptation process itself took place in accordance with scientific ethics, as the research tool is freely available - the authors have not limited its use. At the same time, a member of our research team is Prof. Krisztián Józsa, who is one of the authors of the original DIFER diagnostic tool. Subsequently, during the implementation of our research, we decided on the number and types of items of the DIFER research tool for the needs of kindergartens and elementary schools in Slovakia with Hungarian as the language of instruction. After

creating the items of the research instrument, we determined the subjects of the research and implemented the piloting of these items. As part of piloting, we verified the comprehensibility of the items with several subjects (23), who have similar characteristics as the target group of respondents. Based on the results, we proceeded with the following modifications – omitting one item and simplifying the expressions in three items. Subsequently, the adaptation process took place, which included determining the validity and feasibility of the research instrument. The aim of the validation was to remain as dedicated as possible to the original concept of the research instrument. However, in order for the research tool to meet the needs of the Slovakian educational environment, we specifically modified it in the context of the needs of kindergartens and elementary schools with Hungarian as the teaching language in Slovakia in the manner mentioned above. After this stage, preliminary research was conducted through which we verified the final form of the research instrument on a smaller sample of respondents with the aim of eliminating minor shortcomings. This was followed by the establishment of criterion standards for children and children aged 4 to 8 years. In the next phase, we proceeded to the implementation of the research measurement itself on a sample of 1506 respondents - children from kindergartens and children from primary schools in Slovakia with Hungarian as the language of instruction, followed by an evaluation of the results. In order to maintain the objectivity of the research findings, the data collection took place in two stages in 2021 and 2022, while the researcher's instructions were clear and identical in both measurements. The researcher did not influence the respondents' answers, and the steps in the prescribed order were followed when evaluating the results.

Measuring Validity and Reliability

The validity of the DIFER diagnostic tool was demonstrated in Hungary in several steps. Content validity was examined through reviews of a panel of experts based on a comparison with the theoretical structure of DIFER skills (as an external criterion). We would like to note that the areas measured by the DIFER tests are not determined by the curriculum and educational programs of kindergartens, but by the theoretical-psychological model of the given skill (Nagy, 2008). In Hungary, the construct validity of the tests was confirmed by factor analysis (Józsa, 2016) – during the first investigations, exploratory factor

analysis (EFA) was conducted and in later studies confirmatory factor analysis (CFA) was carried out. Concurrent validity was expressed by a correlation coefficient, where its convergence was demonstrated by a number of tests that measured the child's intellectual development (Gerebenné & Vidákovich, 1989; Józsa et al., 2022). Divergent validity was demonstrated by separation from affective variables (Józsa, 2007). The proven predictive validity of the DIFER program is extremely important for pedagogical practice. DIFER measurements have significant predictive power in preschool age for later school success (Józsa, 2014, 2016).

Based on the information provided above, it is clear that many studies have already dealt with the validation of the DIFER program in Hungary. Considering the nature of our research, we investigated the content validity of the test battery in Slovakia as part of the validation procedure. Content validity refers to the extent to which the content and structure of a research instrument match the domain that the instrument measures. According to Gavora (2012), content validity expresses the extent to which the items of the research instrument represent the properties or phenomena under investigation. At the same time, we also determined whether the content of the research tool was in line with our goal. We, similarly to Hungary, established content validity based on the opinions of a panel of experts in the field. Experts commented on individual areas, parts and specific items of the research instrument in terms of the extent to which they met their representativeness. In addition to this activity, before determining the construct validity, a factor analysis had been performed. The factorial validity of the DIFER tests was verified by confirmatory factor analysis (CFA). The quality indicators are adequate as they reach the limit values given in the literature in all cases. This means that in the case of children attending kindergartens and primary schools with Hungarian as the language of instruction in Slovakia, the validity and reliability of the tests are the same as the values obtained in Hungary. These psychometric indicators indicate that the DIFER tests can also be applied in Slovakia.

From the point of view of reliability, it is important to remember that the DIFER test system originally contained seven tests (we tested six). In 2017, the DIFER tests were expanded to include two new areas (we also dealt with these areas) – measuring the ability to systematize knowledge, abstract thinking and combinative thinking (Józsa et al., 2017). In general, we know that the

reliability coefficient expresses the extent to which the research instrument is affected by the error variance (Kline, 2000), while as Borg and Gall (1989) state, the closer the correlation coefficient is to 1.00, the smaller the error variance and the more accurately it measures the differences between respondents. As part of our research, the internal consistency of the DIFER research tool was determined, where the coefficient of internal consistency was calculated using Cronbach's alpha reliability indicator. This determines the relationships between the items of the research tool and between the research tool as a whole, or between items and a given dimension of the research instrument. According to the correlations between the items of the research instrument and the research instrument as a whole, it was shown that individual items are correlated with the questionnaire as a whole.

The values obtained by our testing and their comparison with the Hungarian results are included in the table below (see Table 1). The value of Cronbach's alpha is above 0.75 in the case of all eight DIFER tests applicable in kindergartens and elementary schools with Hungarian as the language of instruction in Slovakia, which represents a sufficiently high value.

Table 1. Reliability of DIFER tests- comparison of results in Hungary and Slovakia

Subtest	**Hungary**	**Slovakia**
Social skills	.932	.938
Fine motor skills	.865	.934
Phoneme perception	.880	.750
Pre-maths skills	.915	.949
Relational reasoning	.726	.806
Deductive reasoning	.880	.872
Systematization	.936	.936
Combinative thinking	.873	.872

The item-level reliability was analyzed by examining the reliability of omitted items. We determined the agreement between evaluators using a smaller sample of respondents (30) with the involvement of 2-2 evaluators. The reliability of stability on a sample of 30 people was also determined periodically with repeated measurements over 14 days. A good way to determine reliability is, according to Gavora (2012), repeating the assignment of the research

instrument to the same subject. The goal of our analyses was to ensure that tests with adequate validity and high reliability were also available for children of Hungarian nationality living in Slovakia. Based on the results, we concluded that the results were positive - they reached the necessary values.

CONCLUSION

Based on the data we provide above, it can be concluded that the results are positive, i.e., the validity and reliability of the DIFER tests reached the required values. As a result, the use of the DIFER diagnostic tool in kindergartens and primary schools with Hungarian as the language of instruction in Slovakia is appropriate, favourable and effective. The adaptation and standardization of the DIFER diagnostic tool will allow the teachers of the Slovakian Republic to assess not only the current developmental level of a child when determining their school readiness, but also when monitoring their individual development in the established compulsory pre-primary education.

With the outputs of our project, we can guarantee the innovation of pedagogical diagnostics at the mentioned levels of education, which will contribute to a flexible response to changes in education - in the upbringing and education of children of preschool and younger school age. At the same time, we are of the opinion that the adaptation of the mentioned tests contributes to a considerable extent to the improvement of the quality of the educational process in kindergartens and primary schools with Hungarian as language of instruction in Slovakia, as teachers will have at their disposal a standardized and research-verified tool that they can apply as part of pedagogical diagnostics. Pedagogical diagnostics in the educational practice of pre-primary education will not be based only on the opinions of the teachers without objective measurements. After the successful adaptation and standardization of the DIFER tests for kindergartens and primary schools with Hungarian as the language of instruction in Slovakia, we are considering creating a Slovakian version of it in the future for the needs of teachers of kindergartens and elementary schools with Slovakian language of instruction.

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