

SCTCMG 2021
International Scientific Conference «Social and Cultural Transformations in the Context of
Modern Globalism»

POSSIBILITIES OF ONLINE TESTING PLATFORMS FOR
CREATING A HEALTH INFORMATION SYSTEM

Damadaeva Angela Sergeevna (a)*, Behoeva Asya Abdulmuslimovna (b),
Orlova Elena Aleksandrovna (c)
*Corresponding author

(a) Dagestan State Pedagogical University, Makhachkala, Republic of Dagestan, Russia, angelasagidova@mail.ru

(b) Chechen State University, Grozny, Chechen Republic, Russia, behoeva@mail.ru

(c) RANEPa, Moscow, orlova.elena64@yandex.ru

Abstract

The analysis of the problem showed that online testing is popular but little used by psychological departments of educational organizations. The article discusses the two-year experience of a regional operator diagnosing addictive behaviors through a set of psychological online tests. The idea of developing a new computer monitoring program of the mental and emotional state of children and adolescents with the construction of a health information map is described. The article analyzes the data obtained through the monitoring using the Internet technologies EM SPT developed by Zhuravlev. The technological effectiveness of this Internet testing with a wide range of data obtained when analyzing the array and effectiveness of monitoring and tracking of targets for early prevention of non-medical consumption of narcotic drugs and psychotropic substances among young people was substantiated. The study revealed statistically significant post-test differences between the percentages of risk-generating groups before ($\chi^2 = 184.7$; D.f. = 3; $p < 0.001$) and after ($\chi^2 = 72.03$; D.f. = 2; $p < 0.001$) taking preventive measures. It was proven that quantitative indicators of the post-test group decreased. The diagnostic work performed through the online testing is more effective than the traditional computer testing and provides more data on personalized preventive measures. The data obtained can improve the technological online platforms that are ergonomic for monitoring the emotional and psychological health of schoolchildren, when planning individual correctional activities.

2357-1330 © 2021 Published by European Publisher.

Keywords: Diagnostics, monitoring, online platform, prevention, tests



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1. Introduction

With the lockdown of 2020 and the implementation of distance learning methods in educational institutions, the role of online methods of collecting information has increased. The landscape of online testing technologies is wide. There are many similar Internet platforms where you can create screening tests (e.g., open digital platforms DigitalPsiTools, SunRav Web Class, ISpiring, StartExam, Indigo), designed to provide informational support for the longitudinal psychological research. However, in reality, these digital platforms require a certain format and are expensive for psychological departments of general education schools. These platforms are in great demand, since the issue of mental health of the younger generation is very acute; such platforms would help to make the monitoring of mental health effective, fast and informative. This issue is crucial for psychologists; the neuropsychiatric disorders in adolescents are one of the most pressing issues in child psychiatry. According to Kessler, about 10–20 % of adolescents have mental health problems that are not properly diagnosed and not treated appropriately (Kessler, 2007). With the 2020 pandemic, this process has gained scale and variability. The world community draws attention to the consequences of the pandemic, which have affected both the physical and psychological health of children and adolescents.

The relevance of the study of the psychological well-being of schoolchildren is due to the fact that the interest of specialists in the psychological well-being and mental health of the growing generation has increased. Many experts (Akbieva et al., 2016; Kholmogorova et al., 2011; Magomedova et al., 2018; Sokolova & Korshunova, 2007) discussed an increase in the number of mental health disorders in modern adolescents. Despite many research publications on this issue, the share of practice-oriented studies is negligible. Along with direct indicators of mental health, one should also study the indirect ones. First of all, these include the frequency of suicides and violent murders.

Negative content and the Internet can have a negative impact on the destructive manifestations in adolescents. The fact of deviant behavior in adolescence is a reality that teachers, psychologists, and parents are faced with. The strategy for the prevention of behavioral disorders and their recurrence is based on an assessment of risks, despite the fact that over the centuries scientists have sought to provide a theoretical basis for psychosomatic and behavioral disorders (Gribenkin, 2006; Khomich, 2006; Lichko, 1983; Nechiporenko & Shamrey, 2007; Schneider 2005). The issue of educating young people with antisocial behaviors, studying its characteristics and dynamics, determining ways of timely correction of these manifestations, as well as diagnosing and predicting various forms of deviant behaviors using digital information platforms, have become relevant. In order to prevent destructive behaviors in students, qualified psychodiagnostics is required. It makes it possible to build a psychological picture of a personality and find solutions to eliminate the psychological problems that affect the psychological state of teenagers. It is necessary to create the information system for monitoring behavioral disorders and analyze and develop individual rehabilitation plans, taking into account psychological characteristics identified.

2. Problem Statement

Despite numerous studies devoted to the deterioration of mental health of children and adolescents, the mechanism for tracking and monitoring their emotional well-being remains relevant. Research results show that emotional disturbances in modern Russian schoolchildren are the most dangerous phenomena, aimed at destroying personality and the state power. It is necessary to develop mechanisms to regulate this process. Thus, following numerous researchers, we consider the emotional well-being of schoolchildren as a factor and indicator of their mental and physical health. An analysis of psychological online testing in the system of diagnostics tools for deviant, suicidal and addictive behaviors of adolescents will make it possible to build an information system for monitoring correctional activities. Since the peculiarity of adolescence is the distance from the world of adults, and it is often difficult to visually identify psychological problems in a child, it is more effective to monitor some competencies using online platforms and process and build individual trajectories of preventive work.

The positive development and socialization of minors is defined as the main value and significant result of modern education. Caring for mental and physical health of schoolchildren, prevention of risks of growing up, and identification of social and personal problems remain the priority tasks for educational organizations. One of the conditions is early prevention of social maladjustment, reduction of social and psychological deviations. It is necessary to implement pedagogical, medical and psychological measures for the psychological well-being.

3. Research Questions

Research interest is focused on various aspects, such as parameters that allow considering psychological health in relation to the psychological well-being of an individual in the context of the educational environment, namely, through the protection of mental health and psychological well-being of children and adolescents; the importance of a qualitative and in-depth analysis of various features of socio-cultural (mental) and individual characteristics that hinder the mental health and psychological well-being of schoolchildren, the possibility of comparing personal and socio-psychological factors influencing the process of development of mental ill-being and mental destabilization of schoolchildren; the possibility of quantitative presentation of results for further mathematical and statistical processing.

4. Purpose of the Study

Due to the urgency of the problem chosen, the purpose is to build an information system for the prevention and early detection of psychological problems in adolescent schoolchildren and creation of a computerized program for monitoring the health-saving environment in educational organizations.

5. Research Methods

The unified method of socio-psychological testing was used to identify students with an increased likelihood of involvement in addictive behaviors based on the ratio of risk factors and protection factors, basic concepts and analysis of age-psychological characteristics of personality development, as well as

patterns identified on the basis of regional statistical data. The questionnaire method was used to identify latent and obvious risks of socio-psychological conditions. The methods of correlation and statistical analysis of data processing were also used.

6. Findings

The problem of prevention and early detection of addicted behaviors in schoolchildren and young people is a priority for the regional education system. Since 2019, social and psychological testing of schoolchildren has been carried out throughout Russia for the early detection of non-medical drug use using the unified methodology (EM SPT. Testing of students of general, professional and higher educational organizations). Since 2014, testing was conducted using different methods: "Propensity to deviant behaviors" (Orel), "Propensity to addicted behavior" (Mendelevich), "Methodology for assessing the risk of drug addiction" (Latyshev), "Risk group of drug addiction" (Khasan), etc. The technologies for collecting information were heterogeneous, difficult to process. Given the massive coverage of respondents, this significantly reduced the reliability of the ISS research and caused numerous questions to information gathering. The unified methodology that has passed approbation, including the analysis and assessment of the ratio of all risk factors, made testing with diagnostic tools easy to carry out.

Online testing has been conducted in the Russian Federation for the second year, and every year regional norms are calculated for testing, which increases the validity of results presented. Every year adolescents aged 13-18 take part in the testing; depending on the age of test takers, there are three variants of tests (A.B.S.). When developing the stimulus material for this test, compiled and modified questions of the diagnostic tools by Eysenck, Spielberger, Boyko, Enikolopov and Medvedeva, Efimova, Karabanova and Troyanovskaya, Krichevsky, Leontyev, Leus and Solovyova, Nikiforova, Vasiliev and Firsova, Tkhostova and Rasskazova, Khasan and Tyumeneva, Tsvetkova and others were used. Using this test methodology, we conducted online testing among senior high students in the Republic of Dagestan (160,000 people every 13–18 aged students). On the whole, there was a small percentage of students with a probable involvement in PVI, there is no high degree of risk of using psychoactive and narcotic substances in children and young people. Speaking about adolescents who demonstrated the psychological readiness for addictive behaviors, comparing with December 2019, we can talk about stable indicators of the group of adolescents who are at risk of explicit involvement in the use of narcotic and psychotropic substances; their percentage varies from 3.9 to 3.59 %. Studying the responses of children at risk, it can be noted that the group of 7- and 9-graders showed a high level of impulsivity, which is expressed in emotional instability, spontaneous, thoughtless decisions, indulgence of their weaknesses, etc. and the high rate of addictive behaviors is more likely due to the psychological characteristics of adolescence, which is a risk factor. Among the respondents in the group of 10–11 graders, the answers were more ambiguous due to the process of growing up, the meaningfulness of choices and less impulsivity. The interviewed students of professional educational organizations showed similar trends.

The results of the respondents in the risk group can be explained both by their age, peculiarities of development of mental processes and deeper internal attitudes, personal assessments of certain situations, etc. The trends towards "normalization" increase with age in risk groups, respondents demonstrate greater deliberation of their actions, less susceptibility to external influences, and cope better with difficult

situations. Nevertheless, in order to find out real reasons for the results obtained, individual psychological diagnostics measures are required (e.g., preventive or corrective classes). In order to test the hypothesis about the advantage of online platforms with subsequent computer data processing, we conducted the testing including two stages:

1. Initial data on the characteristics of adolescents demonstrating psychological readiness for addiction were collected a year before the main study (2019).
2. Observation data were collected and analyzed in dynamics, against the background of preventive measures (2020).

We revealed statistically significant post-test differences between the indicators of risk factors and the quality of preventive measures. The sample size was calculated on the basis of data on the group with the highest risk profile in the Republic of Dagestan (according to our data, this percentage was 13.32 % in 2019, in one of the cities of the Republic of Dagestan). The designated targets of preventive measures made it possible to reduce the percentage of the risk-generating group to 4.71 % in 2020.

The statistical processing:

- 1) Qualitative variable – pre-test (the initial percentage of adolescents demonstrating psychological readiness for addictive behaviors of the total number).
- 2) Quantitative variable – post-test (the percentage of adolescents who demonstrate psychological readiness for addictive behaviors after taking total preventive measures).

The following formula was chosen to calculate the sample, taking into account the fact that the characteristic was expressed by a relative value, (Lisitsyn, 2010), using which we were able to calculate the pre-test indicators for comparison with the post-test ones.:

$$n = t^2 \times p \times q \div \Delta^2$$

where: n – planned sample size;

t – confidence coefficient at p=99 % = 3;

p – the prevalence indicator (prevalence of riskiness) in percentage, which is taken from the previous studies; the prevalence of riskiness was 13,32 %;

q – index equal to difference of 100 % – p % (100 – 13,32 = 86,68 %);

Δ – the maximum permissible error, which is set by the researcher (set at the level of 5 %).

Thus, the required sample size was:

$$n = 2^2 \times 13,32 \times 86,68 \div 5^2 = 184,7$$

The results were analyzed using the descriptive statistics methods. For categorical variables, data were absolute and relative figures. For quantitative data, central trends were measured, and the result is expressed as a mean ± standard deviation. For qualitative data, the statistical significance of differences in groups was determined using the Chi-square test (χ^2), for quantitative data – using Student's t-test. The critical level of significance of differences was p < 0.05. The statistical analysis was conducted using the SPSS 20 program. After calculating the sample, we selected a target set of the sample population, taking into account the specified criteria for inclusion in preventive programs. The ongoing preventive work based on the test results begins with diagnostics, risk groups are identified and targets of practical work are determined to conduct a correlation analysis of the quality of measures implemented over two years. It is necessary to analyze tools of prevention and psychological assistance, to create a preventive space.

The second stage of the experimental study was calculated using the same formula and showed the effectiveness of preventive works. The results of assessing the number of adolescents showing the psychological readiness for addictive behavior decreased in baseline $n = 2^2 \times 4,71 \times 95,59 \div 5^2 = 72,03$; ($\chi^2=72,03$; D.f.=3; $p<0,001$).

7. Conclusion

Abilities of computerized online systems designed for collecting, processing and storing information with subsequent processing and analysis of risk-generating areas were analyzed. They can be used to develop personalized preventive measures. The analysis followed by the correlation processing of the data showed that targets of preventive activities can effectively manage corrective measures.

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