

Psychophysiology of Communication and Its Impact on Human Information Processing and Self-Regulation: A Case Study in Ukraine

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Abstract

The study presents the interdependence of education and health, the impact of education on students' health, in particular the emergence of school neurosis, which was accompanied by motor breakdown, uncontrolled hyperactivity with attention deficit syndrome. The method and results of the medical-psychophysiological examination of a student on the device Nexus 10 are presented. The psych-physiological results of simulation of five laboratory-created mental states are given: the calmness of a student who relaxes without any cognitive tasks; reading a poem by the student by heart from the school curriculum; the solution of the cognitive task, which is a distinction and classification of seven images in colour and form (stress test, singing the song verse, singing a song with a positive visual and acoustic accompaniment.) The medical and psychological data obtained in the course of the tests testify to the need for a harmonious combination of three components of psychophysiological functioning in the students' learning, which include the modes of silence, speech and singing; which include the efficiency and versatility, comfort and access for all children regardless of the actual level of intellectual development and health. The research covers the psychophysiological effects of the methodology, the results of medical-psychological examinations, comparison and analysis of equipment parameters of the five psychophysiological states of the student, the main of which is silence, speaking and singing.

Keywords: health training, human information processing, mental states, psychophysiological examination, self-regulation

INTRODUCTION

The interdependence of education and health, established at the end of the 19th century immediately caused an interdisciplinary discussion between doctors and educators on the role of each profession in preserving and protecting the health of students, which became more active during the 20th century, while remaining unsolved a problem for the 21st century.

Recent works reveal that low-energy aspects of health may be more likely to be mediated by variables of a more psychological nature (Murrell & Meeks, 2002). As can be seen from the style, the initiative of such a partnership belonged to the doctors, because it was they who, in their professional duties, were dealing with the elimination of disharmony and health disorders associated with school education, which

plays a significant role within the digitisation of networking and education (Relojo & Pilao, 2016).

Anti-bullying interventions to date have shown limited success in reducing victimisation and have rarely been evaluated using a controlled trial design. This study examined the effects an antibullying virtual learning intervention on escaping victimisation, and reducing overall victimisation rates among primary school students using a nonrandomised controlled trial design. The programme was designed to enhance the coping skills of children who are known to be, or are likely to be, victimised (Sapouna et al., 2010).

Using data from the first round of Demographic and Health Surveys for 22 developing countries, researchers examined the effect of maternal education on three markers of child health: infant mortality, childrens' height-for-age, and immunisation status.

In contrast to other studies, researchers argue that although there is a strong correlation between maternal education and markers of child health, a causal relationship is far from established. Education acts as a proxy for the socioeconomic status of the family and geographic area of residence. Introducing controls for husband's education and access to piped water and toilet attenuate the impact of maternal education on infant mortality and children's height-for-age. This effect is further reduced by controlling for area of residence through the use of fixed-effects models. In the final model, maternal education has a statistically significant impact on infant mortality and height-forage in only a handful of countries. In contrast, maternal education remains statistically significant for children's immunisation status in about one-half of the countries even after individual-level and community-level controls are introduced (Desai & Alva 1998).

Evaluating teaching performance is a main means to improve teaching quality and can play an important role in strengthening the management of higher education institutions. In this paper, we present a novel framework for teaching performance evaluation based on the combination of fuzzy AHP and fuzzy comprehensive evaluation method. Specifically, after determining the factors and sub-factors, the teaching performance index system was established. In the index system, the factor and sub-factor weights were then estimated by the extent analysis fuzzy AHP method. Employing the fuzzy AHP method in group decision-making can facilitate a consensus of decision-makers and reduce uncertainty. On the basis of the system, the fuzzy comprehensive evaluation method was employed to evaluate teaching performance. A case application was also used to illustrate the proposed framework. The application of this framework can make the evaluation results more scientific, accurate and objective. It is expected that this work may serve as an assistance tool for managers of higher education institutions in improving the educational quality level (Chen, Hsieh, & Do, 2015).

Such observation is extended with health aspects. For instance, while the continuing development of newer and more sophisticated medical techniques for evaluating the functions of kidney diseases, it is expected that patients would have a better survival rate, and consequently a more positive outlook.

However, such is not always the case as some patients have demonstrated poor coping skills. The study aimed to construct a test instrument to assess the stage of acceptance and denial among patients with chronic kidney disease to identify the degree of denial among patients as a basis for intervention (Gagani, Gemao, Relajo, & Pilao, 2016).

The same observation can be noted in European countries such as Portugal. A few years ago, Portugal switched to a 'care in the community' model for the care of its mental health patients; this allowed the ministry to close Portugal specialist mental health units. This paper explored the issues that beset mental health services in Portugal, and the factors that may contribute to mental health problems. Among the predictive factors that were observed are: sociodemographic factors, intercultural contact and psychosocial adjustment variables and current developments in reading (Relajo, dela Rosa, & Pilao, 2016). These were revealed, in the previous studies, to be associated with youth' mental health. Training professionals in a shared care model is arguably not linked with consistent improvements in the recognition or management of mental health problems. In spite of instabilities that the Portuguese context may have contributed to the lack of effects, wider changes in the mental health services may be required to improve training and to encourage reliable changes in behaviour, and more specific and proven models are needed. The current paper also identifies the barriers on access to mental health services (Pinto-Coelho & Relajo, 2017).

In conjunction to this, one particular study (Mathisen & Ledingham, 2018) examined the experience of Indian people living in Australia who have accessed counselling interventions and the counsellors' experience of assisting Indian clients in a counselling setting. This was a qualitative study employing interpretative phenomenological analysis to study the lived experiences of counselling provision for Indian clients in Australia. Semi-structured interviews were conducted to gather the experiences of the counsellors and Indian clients. The analysis of the data revealed four key themes emerged from the Indian client participant group: (1) understanding of counselling; (2) counselling benefits; (3) challenges of counselling; and, (4) therapeutic relationship. Three key themes which emerged from the counsellor participants group

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were: (1) challenges of counselling; (2) therapeutic relationship; and (3) counsellors' knowledge. Overall, the findings suggest that despite some challenges, counselling was useful for Indian immigrants into Australia.

METHODOLOGY

In the framework of our medical-pedagogical project 'Harmony of Intellect and Health', universal practical models of harmonious education of students need to track objective psychophysiological and medical indicators in various educational institutions and at home, so that they can be consciously used as participants. The project done with and other teachers and parents, combined the idea of a harmonious combination of education and children's health. The psychological basis of such a combination is the natural development of the emotional and voluntary self-regulation of the child in the three-component process of education, education and improvement, which in place of the long-used pedagogical term 'educational process' in this case it is worth completing its healing purpose and to name 'educational and health process', such as psychoeducational intervention (Bautista, Relajo, Pilao, Tubon, & Andal, 2018).

Since the concept of 'learning' includes the content of education as well. Without resorting to the restoration of the long-standing discussion of teachers about how we should understand the concept of 'learning' and 'education', which of these pedagogical concepts

has primary and leading importance, and which (secondary and derivative, we proceed from the fact that any education educates, and education) teaches such as visual working memory arrays (Jenkins, 2018). There are only positive emotions of life-affirmation: joy, benevolence, curiosity, patience, mercy, attentiveness, courtesy, kindness, and the enthusiasm of each of its participants, based on the psychological basis on which the education and health process we have named is.

RESULTS

With the participation of the expert group of the Clinic of Active Therapy of Original Status, in Kyiv, Ukraine under the direction of Professor Yuri Pakin with our participation, a medical-psychophysiological examination of a 12-year-old student of the general school of Vladislav after the completion of his initial education was conducted. Vladislav graduated from elementary school, which taught without the use of the musical and pedagogical technology we named, which became one of the prerequisites for the treatment of special conditions for the treatment of school neurosis, which was accompanied by motor breakdown, unbridled hyperactivity with attention deficit syndrome, and nocturnal urinary incontinence.

The results of the medical-psycho-physiological examination on the apparatus Nexus 10 are presented in the multi-parameter Figure 1.

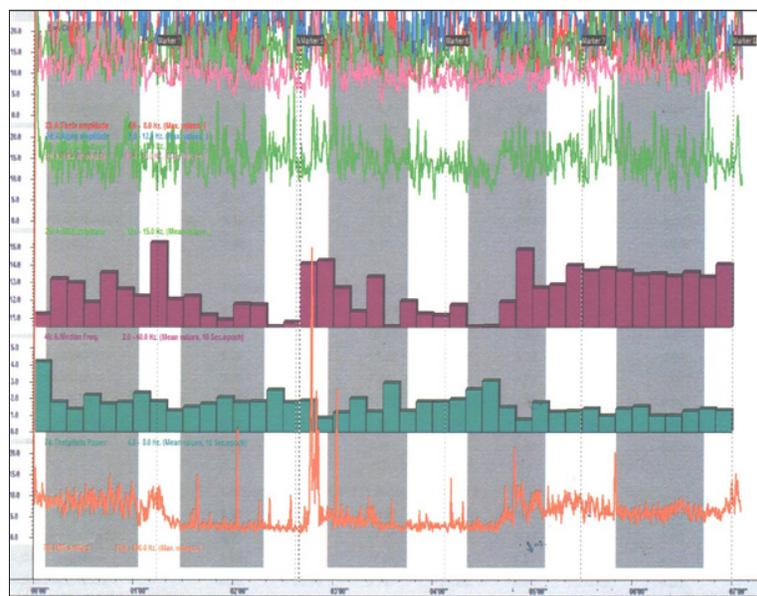


Fig 1. Results of the medical-psycho-physiological examination on the device Nexus 10.

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As can be seen from Figure 1, the medical-psychophysiological examination consists of five laboratory-created mental states, sequentially marked on the image with a grey colour. The general advisory opinion on the psychophysiological state of the student indicates a high level of recovery potential – HF = 1051 ms²; moderate level of mobilisation potential: LF = 930 ms²; moderate level of hormonal modulation of regulatory mechanisms: VLF = 1348 ms²; predominance of the process of restoring energy potential: LF < HF; stress index – 98 units – within the norm; adaptive capacity of the organism above the average level: TP = 1239 ms²; heart rate (HR) = 70 per minute – norm; frequency of respiratory movements (CDR) = 10; 56 per minute: norm; heart respiratory arrhythmia with diaphragmatic breathing (DAS) = 2: norm; skin conductivity (SC) = 3.7 μSm (microsymens, that is, millionths of the semen) is moderately elevated, which indicates the predominance of the tone of the sympathetic nervous system; temperature of fingers (T) = 25.71 °C, corresponding to the norm; amplitude of Alpha-rhythm – 23.8 n/V (nanoworks, that is, billionths of volts); Beta-rhythm: 9.97 n/v; teta-rhythm: 21.095 n/v; dominant frequency:

12.78 hertz; sample with closed eyes is positive; the amplitude-frequency characteristics of the electroencephalogram correspond to the age norm; theta-beta coefficient: 1.82μV (microlout, that is, a millionth of volt) is below the age limit, which may indicate a lack of attention. Thus, an objective survey on the device Nexus 10 revealed the predominance of the tone of the sympathetic nervous system, reducing the adaptive capacity of the body in conjunction with the attention deficit syndrome.

In the course of the medical-psychophysiological examination of the student at the device Nexus 10, the modeling of five laboratory-created mental states was carried out in the clinic: (1) the calm condition of a student who relaxes without any cognitive tasks; (2) student reading the verse by heart from the school programme; (3) solving the cognitive task, which is a distinction and classification of seven images by colour and form (stress test); (4) singing the song verse; and (5) singing a couplet song with a positive visual and acoustic accompaniment of the educational audio guide of the series ‘The Songwriting’, which was aimed at creating the necessary external emotional background.

Table 1. *Mental state of relaxed calm without presenting any cognitive tasks*

Channels	Values of statistical indicators				
	Minimum	Maximum	Average	Variability	Standard deviation
Theta amplitude	3.69	57.81	21.09	85.33	9.24
Alpha amplitude	3.04	70.10	23.80	161.39	12.70
Sensor rhythm	0.69	30.14	11.38	34.67	5.89
Beta amplitude	0.28	41.78	9.97	26.22	5.12
Cerebral frequency	4.00	21.00	12.78	8.40	2.90
Theta-beta power	0.23	6.49	1.82	1.39	1.18
Muscle artefacts	1.28	17.11	6.96	4.53	2.13

Table 1 shows the highest of all five sample variability. Theta and alpha rhythms, respectively, 85.33 and 161.39, indicating excessive internal tension, inability to relax, transition to an intermediate state between cheerfulness and sleep, which slows down in the range of brain waves from 4 to 8Hz at a time, as the average value of the theta rhythm indicator exceeds this norm. By transferring this individual state from a clinical laboratory to a maladaptive class, one can safely predict that the apparatus’s internal stress of a student will probably be outside of excessive excitement, and if the underlying indicators are

acquired, the ability to focus and, consequently, incomplete comprehension of actions, its behaviour will lead to misunderstandings with classmates and teachers: conflict situations, the cause of which may be precisely his psychophysiological predetermined features of age development. Certain improvement of the psychophysiological state of the student is associated with a change in the external orientation of this internal stress – he is given individual attention and proposed to read aloud poem from the school curriculum.

Table 2. *Student reading a poem from a school curriculum*

Channels	Values of statistical indicators				
	Minimum	Maximum	Average	Variability	Standard deviation
Theta amplitude	2.72	42.25	16.88	52.21	7.23
Alpha amplitude	1.26	58.72	20.24	121.98	11.04
Sensor rhythm	1.58	35.75	12.12	37.12	6.09
Beta amplitude	0.28	26.07	7.64	16.98	4.12
Cerebral frequency	7.00	18.00	11.52	2.76	1.66
Theta-beta power	0.31	7.01	1.80	1.36	1.17
Muscle artefacts	0.66	26.08	2.38	2.60	1.61

As can be seen from Table 2, the activity proposed in which, in our opinion, the poetic rhythm-melodicum read has a certain influence, substantially changes the indicators of the psycho-physiological state: the decrease in the variability of most of the rhythms of the brain indicates a certain harmonisation of the state of psychophysiological functioning of the child. In particular, Theta amplitude variability decreased from 85.33 to 52.21, or 32% whereby the alpha amplitude is at 39.41 or 24%; beta amplitude on 9.24 or 35%; median frequency: 5.64 or 67%; the ratio between the slow wave and fast-acting brain activity (theta-beta

power) as a marker for concentration of attention: 0.03 or 2 %, the SMR amplitude slightly increased, which reflects the level of sensory motor tension needed to read the poem aloud, by 2.45 or 7%, and muscle artifacts, by 3.14 or 43% as reading a poem aloud is a muscular action. The notion of a certain specificity of figurative and logical thinking that emerged in the pedagogical environment, in psychophysiological measurement, does not have meaningful differences. In this case, the transition to a logical way of thinking does not favor, but on the contrary, whereby it reduces the internal situational tension.

Table 3. *Solving the cognitive task*

Channels	Values of statistical indicators				
	Minimum	Maximum	Average	Variability	Standard deviation
Theta amplitude	2.22	42.26	16.85	42.08	6.93
Alpha amplitude	1.87	69.76	20.53	109.66	10.47
Sensor rhythm	0.98	49.97	11.89	44.43	6.87
Beta amplitude	0.65	27.69	7.71	18.26	4.27
Cerebral frequency	6.00	23.00	12.03	5.95	2.44
Theta-beta power	0.12	6.58	1.72	1.56	1.25
Muscle artefacts	0.65	35.35	3.10	5.33	2.31

As can be seen from the indicators of psycho physiological status, presented in Table 3, the solving of the cognitive task led to a further decrease in the variability of brain functioning as a process of harmonising the state of psychophysiological functioning of the child. Thus, Theta amplitude variability decreased compared to Table. 3 from 52.21 to 42.08 or 20%, whereby the alpha amplitude changed from 121.98 to 109.66 or 10% with a

natural increase in sensory motor rhythm (SMR amplitude) required from 37.12 to 44.43 or 16%, and the prevailing brain frequency from 2.76 to 5.95 or 54%. The rest of the metrics did not undergo any significant changes, although the ratio between the slow wave and fast-acting brain activity (theta-beta power) as a marker of concentration ability indicated a tendency to increase from 1.36 to 1.56 or 13%.

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Table 4. *Singing the song couplet*

Channels	Values of statistical indicators					
	Minimum	Maximum	Average	Variability		Standard deviation
Theta amplitude	2.49	41.22	16.52	52.88	7.27	2.49
Alpha amplitude	2.45	57.71	19.29	97.26	9.86	2.45
Sensor rhythm	1.29	27.84	10.86	28.35	5.32	1.29
Beta amplitude	0.56	21.99	7.54	13.94	3.73	0.56
Cerebral frequency	7.00	22.00	12.13	7.22	2.69	7.00
Theta-beta power	0.11	11.07	1.86	2.34	1.53	0.11
Muscle artefacts	0.62	21.56	4.46	8.87	2.98	0.62

Table 5 shows that the indicator of harmonisation of the state of psychophysiological functioning of the child is the reduction of the variability of most of the rhythms of the brain during singing. Increasing theta amplitude from 42.08 to 52.88, or 20%, is an indicator of calm vivacity, a free associative thinking, insights and new ideas that modifies the prevailing cerebral frequency whereby there is a change from 5.95 to 7.22, or by 18%, as well as the ratio between the slow wave and fast-acting brain activity; the theta-beta power as a marker for concentration changed from 1.56 to 2.34, or 34%. At the same time, Alpha amplitude ranges from 109.66 to 97.26 or 11%, SMR amplitude from 44.43

to 28.35 or 36%; beta amplitude, the fastest waves, the frequency ranging from 14 up to 42Hz, connected with vigour and concentration, changed from 18.26 to 13.94, or 24%. It is the singing that determines the mood and consciousness of people for whom alcohol is superfluous and only interferes with the joy of singing and the good sound caused by singing. The psychophysiological data given in Table 5 confirms this. In order to test the effect, a psychophysiological examination of a student who sang a song verse with positive visual and acoustic accompaniment was conducted.

Table 6. *Singing the song couplet with positive visual and acoustic accompaniment*

Channels	Values of statistical indicators					
	Minimum	Maximum	Average	Variability		Standard deviation
Theta amplitude	2.26	41.45	15.96	41.14	6.41	2.26
Alpha amplitude	2.01	54.67	17.98	87.20	9.34	2.01
Sensor rhythm	1.88	37.32	11.69	34.46	5.87	1.88
Beta amplitude	0.39	26.13	9.19	21.49	4.64	0.39
Cerebral frequency	7.00	22.00	13.46	5.17	2.27	7.00
Theta-beta power	0.13	7.98	1.24	0.84	0.92	0.13
Muscle artefacts	1.41	11.20	5.10	1.99	1.41	1.41

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From Table 6 it can be seen that singing a song with a positive visual and acoustic accompaniment is optimal for harmonising the psychophysiological state of the student, since the slightest variability of the indicators is noted, and thus the feeling of comfort is the most stable. Thus, the lowest level of theta amplitude (theta amplitude), in particular, from 52.88 to 41.14, or 22%, indicates its transition to the rhythm of calm reflection, concentration. Reduction of alpha amplitude from 97.26 to 87.20, or 10%, predominant brain frequency from 7.22 to 5.17, or 28%, the ratio between the slow wave and fast-acting brain (theta-beta power) from 2.34 to 0.84, or 64% fixes the relaxation of the whole body, a pleasant harmony of well-being, a pronounced ability to focus attention. The realisation of the focus of attention on the perception of positive visual and acoustic accompaniment with the simultaneous singing of the couplet reflected in the increase in the activity of the fastest waves of the brain, the beta rhythm (beta amplitude) increased from 13.94 to 21.49, or 35%, the sensory motor rhythm (SMR amplitude) from 28.35 to 34.46, or by 18%.

DISCUSSION

Comparison of the obtained indicators of variability of the three psychophysiological states that the speaking versus silence on the 7th indices of the theta rhythm variability (32%), alpha rhythm (24%), beta rhythm (35%), prevalent cerebral frequency (67%), the ratio between slow wave and fast-acting activity brain (2%), sensorimotor rhythm (7%), artifacts of muscle tension (43%), improves the psychophysiological state of the child by an average of 30% or a third; singing with positive visual and acoustic accompaniment comparing with speech reduces theta amplitude from 52.21 to 41.14, or 21%, alpha amplitude from 121.98 to 87.20, or 29%, sensory motor rhythm (SMR amplitude) from 37.12 to 34.46 or 7%, the ratio between the slow wave and fast-acting brain activity (theta-beta power) as a marker for focusing attention from 1.36 to 0.84, or 38%, artefacts of muscle tension from 2.60 to 1.99, or 23%, with an increase in beta rhythm activity from 16.98 to 21.49, or 21%, and a predominant cerebral frequency; of 2.76 to 5.17, or 47%. In these same seven indicators, the variability, which indicates improvement in the psycho-physiological state, is 20% or one-fifth of the previous state of activity, well-being and mood. The medical and psychological data obtained in the course of the tests conducted

indicate the need for harmonious combination of three components of psychophysiological functioning in the students' education, which include the modes of silence, speech and singing.

CONCLUSION

The disharmonious development of children, increasing the number of children and adolescent suicides, and related mental disorders is a problem not only for Ukraine. However, the formation of a syndrome of mental dependence (obsessive compulsion) and a syndrome of physical dependence (loss of control over oneself) has a pronounced genesis in the age of prechool and school-age children.

General psychological peculiarities of persons suffering from various types of addictions have been formed already at the age of childhood, in particular, it is a reduced ability to overcome the difficulties of everyday life, fears of persistent and prolonged interpersonal relationships, falsehood, habits to blame their failures and avoid liability for their decisions or their absence and actions. In fact, only the personal qualities of a child, adolescent or young person are important, which is a common psychological basis for the emergence of a future addiction. The ability to self-regulation, which we pay attention to, is to create vocational skills to independently change their mental states, based on their own psychophysiological resources.

Undergraduate research can provide transformative educational experiences and profoundly impact the teaching of communication. It is often difficult, however, to integrate undergraduate research into the communication curriculum. In this paper, we discuss the benefits of undergraduate research experiences and the challenges of teaching research methods in communication. We present a structure for incorporating a capstone undergraduate research experience into the communication curriculum. The value of the capstone experience stems from providing experiences that culminate in inquiry and knowledge creation. These experiences help students find relevance and ownership during the research process (Rodrick & Dickmeyer, 2002). In relation to this Stacey (2003) explored the assumptions that are being made when we talk about organisations or groups that learn, or about individuals learning in groups or organisations. It suggests an alternative to thinking

in these ways, namely, that learning is an activity of interdependent people. Moreover, Barrett and Cox (2005) reports the results of a study which investigated whether there is a common understanding of the terms plagiarism and collusion between students and staff. Participants made judgements on scenarios describing student behaviour in assessments. The results suggest that although plagiarism is well understood, the same can not be said of collusion. Both staff and students feel that collusion is much more acceptable than plagiarism because some learning is taking place. It appears that there is no consensus on the boundary between collaborative behaviour and collusion.

Individual thinking of children takes place in a much greater variety of manifestations than is required by the education system, which is programmed on the basis of self-sufficient needs of adults: their known ideas about the world, the amount of money and hours required for teachers' load, the use of children for mutual verification of their own self-efficacy in standardised forms of psychogenic tests pedagogical capacity. That is why it is important to create, develop and introduce learning methods of learning, acceptable and comfortable for all children, regardless of the organisation of their higher nervous activity, the degree of manifestation of psychophysiological capacities, health to harmonise their relationships, improve their well-being and increase their own self-esteem and the level of lifelong allegations. The basic psychophysiological bases of harmonious functioning are the ability to use psychological mechanisms of self-regulation, which include silence, speaking and singing.

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