

PSYCHO-PHYSIOLOGICAL REQUIREMENTS FOR FORMING LEARNING INDEPENDENCE IN PRIMARY SCHOOL STUDENTS

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Abstract

This article examines the psycho-physiological requirements underlying the formation of learning independence in primary school students. Learning independence is treated as an integrative personal quality that enables a child to set educational goals, select ways of achieving them and monitor the results with progressively less external help. The paper analyses the age-related maturation of the central nervous system, the development of voluntary attention, memory and thinking, and the emerging capacity for self-regulation during the primary school years. On this basis, a set of psycho-physiological requirements is proposed — accounting for the child's working capacity and fatigue, the transition from involuntary to voluntary regulation, the sensitive period of primary schooling, and the individual dynamics of higher nervous activity. The findings show that the effective formation of learning independence is possible only when pedagogical demands are matched to the physiological maturity and psychological readiness of the learner.

Keywords: learning independence, primary school student, psycho-physiological requirements, higher nervous activity, voluntary attention, self-regulation, sensitive period, working capacity, developmental education, zone of proximal development.

Introduction

The modernisation of general education places the formation of independent, self-directed learners among its central aims. Contemporary education is expected to produce not a passive recipient of ready-made knowledge but an active subject of the learning process who is able to acquire, apply and renew knowledge throughout life. In this context, learning independence — the ability of a student to master educational content with minimal external guidance — becomes a key characteristic of educational quality. The primary school stage is

decisive for the formation of this quality, because it is precisely at the ages of six to eleven that the child first enters systematic learning activity and the psychological foundations of the personality are laid.

At the same time, learning independence cannot be formed by pedagogical means alone. It rests upon a definite level of maturity of the child's nervous system and psychical functions. A first-grader who is physiologically not yet ready for prolonged voluntary effort cannot be made independent simply by increasing the volume of tasks. For this reason the question of the psycho-physiological requirements for forming learning independence — that is, the physiological and psychological conditions that make the appearance of independence possible — is of both theoretical and practical importance.

Literature review

The problem of independence in learning has deep roots in psychological and pedagogical science. L. S. Vygotsky's theory of the zone of proximal development established that the child's independent performance is preceded by activity carried out together with an adult; what a child can do today with help, tomorrow the child will do alone. This proposition directly links the growth of independence to the ripening of higher psychical functions.

J. Piaget characterised the primary school age as the period of concrete operational thinking, when the child becomes capable of logical operations with concrete material but still depends on visual and practical support. D. B. Elkonin and V. V. Davydov, in their theory of developmental education, showed that learning activity itself, when properly organised, becomes the source of the child's mental development and of the formation of the ability to learn independently. A. N. Leontiev's activity theory and P. Ya. Galperin's theory of the stage-by-stage formation of mental actions explained how external, jointly performed actions are gradually interiorised and transformed into independent internal ones.

The physiological foundation of these processes was disclosed by I. P. Pavlov's doctrine of higher nervous activity and of the two signal systems, which explains the mechanisms of voluntary regulation and of the word as a regulator of behaviour. In Uzbek psychological and pedagogical scholarship, questions of the primary school student's psychology and of the teacher's role in developing the ability to learn have been treated by M. G. Davletshin, E. G'oziyev and

others. The analysis of this body of work shows that independence is regarded as a systemic quality with a clear psycho-physiological basis.

Analysis and results

The primary school age is marked by intensive maturation of the cerebral cortex, above all of its frontal regions, which are responsible for the programming, regulation and control of activity. The excitatory and inhibitory processes of the nervous system become more balanced, yet excitation still tends to predominate; the child tires quickly and needs frequent changes of activity. Any system of requirements for the formation of learning independence must therefore take into account the child's working capacity and the dynamics of fatigue, alternating intensive mental work with rest and movement.

A central feature of this age is the transition from involuntary to voluntary regulation. Attention, memory and behaviour in the six- to seven-year-old are still largely involuntary, controlled by external, vivid stimuli. The gradual development of voluntary attention and of the arbitrariness of psychical processes is the physiological precondition of independence: only a child who can deliberately direct and hold attention on a task, and resist distraction, is able to work without constant supervision. Consequently, the first psycho-physiological requirement is the systematic exercise of voluntary attention and self-control through age-appropriate tasks.

The second requirement concerns memory and thinking. In the primary grades, mechanical and involuntary memory gives way to meaningful and voluntary memorisation; concrete-visual thinking gradually acquires elements of verbal-logical thinking. Independence in mastering knowledge presupposes that the child understands rather than merely reproduces material. Pedagogical demands should therefore rely on comprehension, on the establishment of connections between facts, and on the child's own reasoning, rather than on rote repetition beyond the physiological capacity of the age.

The third requirement follows from the sensitive nature of the primary school period. These years are a sensitive period for the formation of the ability to learn and of educational motivation; the corresponding qualities, if not cultivated in time, are formed later with much greater difficulty. This imposes on the teacher the requirement of timeliness — of building the foundations of independence precisely at this stage, while the nervous system is especially plastic.

The fourth requirement is the account of individual differences in higher nervous activity. Children differ in the strength, balance and mobility of their nervous processes, that is, in their type of nervous system and temperament. A task and a pace of work comfortable for one child may exceed the physiological resources of another. Learning independence is formed successfully only when the load, the tempo and the measure of help are individualised in accordance with these differences, so that the demands remain within the child's zone of proximal development.

Taken together, these findings show that the formation of learning independence is a process of gradual interiorisation, supported by the maturation of the nervous system and the development of voluntary self-regulation. Pedagogical requirements produce the intended effect only when they are congruent with the physiological maturity and psychological readiness of the primary school student.

Conclusions and recommendations

The study allows the following conclusions. First, learning independence in primary school students has a definite psycho-physiological basis connected with the maturation of the cerebral cortex, the balancing of nervous processes and the development of voluntary regulation. Second, the leading psycho-physiological requirements for its formation are: consideration of the child's working capacity and fatigue; the systematic development of voluntary attention and self-control; reliance on meaningful memory and comprehension; timeliness, in view of the sensitive character of the period; and individualisation of the load in accordance with the type of higher nervous activity.

In practical terms it is recommended that teachers dose the volume and difficulty of independent tasks in line with age norms of working capacity, alternate forms of activity, gradually reduce the measure of direct help as the child's voluntary regulation matures, and rely on diagnostics of the child's psychophysiological readiness when designing independent work. Observance of these requirements makes it possible to form learning independence without overloading the child and while preserving physical and psychological health.

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