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MODERN METHODS OF IDENTIFYING AND MONITORING STUDENTS' INTELLECTUAL POTENTIAL

Orinbaev Mirbek Bauetdin uli
Asia International University, Bukhara, Uzbekistan
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Abstract. This article examines contemporary approaches to identifying and tracking the intellectual potential of school students. It contrasts traditional psychometric testing with multidimensional models of intelligence, dynamic assessment, computerised adaptive testing, learning analytics and portfolio-based observation. The author argues that reliable identification requires combining several sources of evidence collected over time rather than relying on a single test score, and proposes a monitoring cycle suitable for general secondary schools.
Keywords: intellectual potential, giftedness, dynamic assessment, adaptive testing, learning analytics, formative assessment, monitoring, educational psychology.

Introduction

The quality of a national education system is increasingly judged not only by how much knowledge pupils accumulate but by how well schools recognise and cultivate each learner's capacity to think, reason and create. In Uzbekistan this priority is reflected in the Law "On Education", which places emphasis on supporting gifted and talented young people[1]. Yet teachers frequently lack practical, evidence-based tools for determining which pupils possess high intellectual potential and how that potential changes across the years of schooling.

In this article, intellectual potential is understood as a learner's latent capacity for acquiring, transforming and applying knowledge, which may or may not be visible in current academic results. Distinguishing between achievement and potential is essential: a pupil with modest grades may possess strong reasoning abilities that remain hidden because of language barriers, low motivation or an unsupportive environment. The purpose of the article is to analyse modern methods that help educators uncover such abilities and observe their development systematically.

From a Single IQ Score to Multidimensional Models

For much of the twentieth century, intellectual ability was equated with performance on standardised intelligence scales such as the Stanford–Binet and the Wechsler tests. These instruments remain valuable because of their norms and reliability, but they compress a complex phenomenon into one number and are sensitive to the cultural and linguistic background of the test-taker.

Howard Gardner challenged this view by describing several relatively independent intelligences – linguistic, logical-mathematical, spatial, musical, bodily-kinaesthetic, interpersonal, intrapersonal and, later, naturalistic[2]. Robert Sternberg's triarchic theory similarly separated the analytical, creative and practical aspects of intelligence[3]. For school practice, the most important

[1] Law of the Republic of Uzbekistan "On Education" No. ZRU-637 of 23 September 2020 // National Database of Legislation of the Republic of Uzbekistan (lex.uz).
[2] Gardner H. Frames of Mind: The Theory of Multiple Intelligences. – New York: Basic Books, 1983; Gardner H. Intelligence Reframed: Multiple Intelligences for the 21st Century. – New York: Basic Books, 1999.
[3] Sternberg R.J. Beyond IQ: A Triarchic Theory of Human Intelligence. – Cambridge: Cambridge University Press, 1985.

consequence of these models is methodological: if intelligence has several facets, then assessment must also draw on several kinds of tasks.

Joseph Renzulli's three-ring conception further reminds educators that outstanding accomplishment emerges from the interaction of above-average ability, task commitment and creativity[4]. Consequently, a modern diagnostic programme looks beyond cognitive tests to motivation, creative output and the learner's persistence on demanding tasks. Recent reviews of gifted education reinforce this developmental perspective, describing talent as something that unfolds through opportunity and deliberate effort rather than a fixed trait detected once and for all[5].

Dynamic Assessment

Static tests record what a pupil can do independently at one particular moment. Dynamic assessment, rooted in L.S. Vygotsky's notion of the zone of proximal development[6], measures instead how much a learner gains when given structured help. Its typical "test–teach–retest" format reveals the pupil's responsiveness to instruction, which is often a better indicator of potential than an initial score.

Practical guides by H.C. Haywood and C.S. Lidz show that mediated tasks can be adapted to ordinary classroom subjects: a pupil may be asked to solve a series of analogies, receive graded hints after errors, and the teacher then records the number and type of prompts needed[7]. Children from disadvantaged or bilingual backgrounds frequently show substantial gains under such conditions, which helps teachers avoid underestimating them. The main limitation of the method is that it demands time and trained staff, so it is usually reserved for pupils whose static results appear inconsistent with classroom observations.

Computerised Adaptive Testing and Non-Verbal Instruments

Digital technology has changed the way cognitive abilities are measured. In computerised adaptive testing (CAT), each subsequent item is selected according to the pupil's previous responses, so that difficulty constantly matches the estimated ability of the test-taker[8]. Grounded in item response theory, this approach shortens testing time, reduces fatigue and yields precise estimates at both the lower and the upper ends of the ability range – precisely where conventional class tests suffer from a "ceiling effect" and fail to differentiate highly capable pupils.

Non-verbal reasoning tests, such as Raven's Progressive Matrices, are another widely used option because they depend less on vocabulary and reading fluency[9]. Combining a non-verbal measure with verbal and quantitative subtests produces a more balanced cognitive profile and lowers the risk that pupils who study in a second language will be overlooked.

Learning Analytics and Stealth Assessment

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[4] Renzulli J.S. What Makes Giftedness? Reexamining a Definition // Phi Delta Kappan. – 1978. – Vol. 60, No. 3. – P. 180–184.

[5] Subotnik R.F., Olszewski-Kubilius P., Worrell F.C. Rethinking Giftedness and Gifted Education: A Proposed Direction Forward Based on Psychological Science // Psychological Science in the Public Interest. – 2011. – Vol. 12, No. 1. – P. 3–54.

[6] Vygotsky L.S. Mind in Society: The Development of Higher Psychological Processes. – Cambridge, MA: Harvard University Press, 1978. – P. 79–91.

[7] Haywood H.C., Lidz C.S. Dynamic Assessment in Practice: Clinical and Educational Applications. – Cambridge: Cambridge University Press, 2007.

[8] Wainer H. (Ed.) Computerized Adaptive Testing: A Primer. – 2nd ed. – Mahwah, NJ: Lawrence Erlbaum Associates, 2000.

[9] Raven J. The Raven's Progressive Matrices: Change and Stability over Culture and Time // Cognitive Psychology. – 2000. – Vol. 41, No. 1. – P. 1–48.

The spread of learning management systems and educational platforms has created a new source of evidence: the digital traces pupils leave while studying. Learning analytics deals with measuring, collecting, analysing and reporting data about learners and their contexts in order to understand and optimise learning[10]. Indicators such as the speed with which a pupil masters new topics, the strategies chosen when solving open problems, or the number of voluntary attempts at difficult tasks can point to high potential long before it is confirmed by formal results.

Valerie Shute's concept of stealth assessment goes a step further: assessment is woven into games and simulations so seamlessly that pupils are not aware of being tested[11]. Evidence models built into the environment continuously update estimates of competencies such as problem solving or systems thinking, and because examination pressure is removed, the data tend to reflect authentic behaviour. At the same time, analytics raise questions of data privacy, algorithmic bias and over-reliance on automated judgements; schools therefore need clear rules on consent, data storage and the role of the teacher in interpreting dashboards[12].

Formative Assessment, Portfolios and Observation

Quantitative instruments must be complemented by qualitative evidence gathered in everyday teaching. The influential review by P. Black and D. Wiliam demonstrated that regular formative feedback not only raises achievement but also provides teachers with richer information about how pupils think[13]. Structured observation checklists, open-ended "low floor, high ceiling" tasks, research projects and subject olympiads allow teachers to notice originality, depth of questioning and the ability to transfer ideas from one context to another.

An electronic portfolio accumulates these artefacts over several years and makes growth visible to the pupil, the parents and subsequent teachers. Rating scales completed by several informants – teachers, parents and the pupils themselves – add further perspectives[14]. When results from such sources agree with test data, confidence in the identification increases; when they diverge, the discrepancy itself becomes a signal for closer study.

A Model of Continuous Monitoring

The analysis above suggests that identification should be treated not as a one-off selection event but as a recurring cycle. We propose a four-stage monitoring model for general secondary schools.

At the first stage, universal screening, all pupils of a given grade complete a short adaptive or non-verbal reasoning test together with a teacher rating scale. Universal rather than referral-based screening is important, since reliance on referrals alone tends to miss capable pupils from less advantaged families[15].

At the second stage, in-depth diagnosis, pupils whose scores or ratings fall in the upper range, as well as those with contradictory results, take part in dynamic assessment sessions, creative tasks and interviews with the school psychologist.

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[10] Siemens G., Long P. Penetrating the Fog: Analytics in Learning and Education // EDUCAUSE Review. – 2011. – Vol. 46, No. 5. – P. 30–40.

[11] Shute V.J. Stealth Assessment in Computer-Based Games to Support Learning // Computer Games and Instruction / Ed. by S. Tobias, J.D. Fletcher. – Charlotte, NC: Information Age Publishing, 2011. – P. 503–524.

[12] Slade S., Prinsloo P. Learning Analytics: Ethical Issues and Dilemmas // American Behavioral Scientist. – 2013. – Vol. 57, No. 10. – P. 1510–1529.

[13] Black P., Wiliam D. Assessment and Classroom Learning // Assessment in Education: Principles, Policy & Practice. – 1998. – Vol. 5, No. 1. – P. 7–74.

[14] Pfeiffer S.I. Essentials of Gifted Assessment. – Hoboken, NJ: John Wiley & Sons, 2015.

[15] Card D., Giuliano L. Universal Screening Increases the Representation of Low-Income and Minority Students in Gifted Education // Proceedings of the National Academy of Sciences. – 2016. – Vol. 113, No. 48. – P. 13678–13683.

At the third stage, individual support, a development plan is drawn up that may include enrichment classes, subject acceleration, mentoring or project work. Particular attention is paid to motivation and a growth-oriented attitude to effort, because pupils' beliefs about whether ability can be developed shape how they respond to challenge[16].

At the fourth stage, dynamic monitoring, each pupil's progress is reviewed at least twice a year using portfolio evidence, platform analytics and repeated measures. The results feed back into the first stage, so that pupils who were not identified initially can enter the programme later, while support is adjusted for those already in it.

Conclusion

Modern methods of identifying intellectual potential share a common shift: from a single static measurement towards multiple, repeated and context-sensitive sources of evidence. Multidimensional theories of intelligence define what should be assessed; dynamic assessment reveals readiness to learn; adaptive and non-verbal tests provide precise and fairer measurement; learning analytics captures behaviour in authentic digital environments; and formative assessment with portfolios preserves the teacher's professional judgement. No single tool is sufficient on its own. Their combination within a continuous monitoring cycle allows schools to discover hidden abilities, reduce bias and design support that keeps pace with each pupil's growth. Further research should focus on validating such combined models in Uzbek schools and on preparing teachers to interpret diagnostic data responsibly.

[16] Dweck C.S. Mindset: The New Psychology of Success. – New York: Random House, 2006.