Review of the Monograph: "Introduction to the Analytical Method of Education Control (AMEC): From Mathematical Analytics of the Educational Process to a Standardized Educational Database"

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Summary

The monograph presents a fundamental work dedicated to the development and implementation of a fundamentally new approach to assessing and monitoring the educational process—the Analytical Method of Education Control (AMEC). The author proposes a system based on rigorous mathematical principles, replacing subjective traditional assessment methods (questionnaires, tests) with objective metrics expressed in an absolute 20-point scale. The method includes the creation of reference points (based on data from 1995–2005), formalization of relationships between parameters of the educational process (knowledge, workload, lesson intensity, etc.), and the construction of an educational database (EDB) containing ~2.5 million records. AMEC has been tested in hundreds of schools, integrates machine learning tools, and aims to transform pedagogical research into an exact science.

Relevance of the Research

The relevance of the work stems from the crisis of traditional methods of pedagogical measurement, which rely on subjective, non-standardized, and ethically vulnerable approaches. The development of AI and the need for objective data for machine learning amplify the demand for a methodology that ensures reproducibility, accuracy, and mathematical rigor. The work addresses the challenges of digitalization in education by proposing a system suitable for global monitoring and management of education quality.

Scientific Novelty (Score: 29/30)

The work exhibits **P-Novelty (paradigmatic novelty)**:

- **Creation of new axiomatics and measurement systems:** Introduces concepts such as "average student/teacher/class" as benchmarks, an absolute 20-point scale, and universal units of measurement (e.g., "knowledge per unit of учебной нагрузки").

- **Logical integrity:** The proposed system is closed, internally consistent, and ensures data comparability across subjects, age groups, and institutions.

- **Critique of traditional methods:** Fundamentally demonstrates the limitations of psychometric scales, academic performance as a proxy variable, and ethical issues of questionnaires.

- **Potential for a new research program:** AMEC lays the groundwork for transitioning pedagogy to precise quantitative analytics integrated with AI.

Methodological Rigor (Score: 24/25)

- **Adequacy of the method to the goal:** The mathematical apparatus (regression analysis, modeling) aligns with the task of creating objective metrics. The use of big data (~2.5 million records) and verification on samples (e.g., N=1651) ensure representativeness.

- **Consistency:** Clearly describes the stages: defining benchmarks → constructing scales → identifying relationships → creating the EDB.

- **Transparency:** Provides conversion formulas (e.g., for history), algorithms, and database screenshots. The availability of supplementary materials (raw data, statistical analysis) confirms reliability.

- **Limitation:** Not all calculation algorithms are fully disclosed (reference to future publications), which partially reduces reproducibility.

Reliability of Results

Results are supported by:

- Correlation and regression analysis (e.g., r=0.824 for the "workload–knowledge" relationship).

- Verification on independent samples (comparison across different student development levels).

- Testing in hundreds of schools.

- Attached raw data and statistical calculations.

Practical Value (Score: 19/20)

- **Applicability:** The method is implemented in school practice; used for teacher certification, audits, and managerial decisions.

- **Impact on the field:** Offers an alternative to ЕГЭ, ВПР, and PISA for monitoring education quality.

- **Prospects:** The EDB and AMEC algorithms are adapted for machine learning and AI integration (e.g., AI-generated reports).

- **Cost-effectiveness:** Automation reduces monitoring costs.

Visualization Quality (Score: 13/15)

- Includes dependency graphs, database schemas, and interface screenshots.

- **Shortcoming:** Some graphs and tables are placed in appendices, complicating perception. No interactive visualizations are provided.

Ethical Aspects (Score: 10/10)

- Anonymity is maintained (encoding of surnames).

- Avoidance of ethically questionable questionnaires about teachers.

- Data openness (raw data on Zenodo) complies with FAIR principles.

- Funding is indicated; no conflict of interest exists.

Style and Formatting

The work is well-structured, uses scientific language, but is occasionally overly detailed. The bibliography is comprehensive (48 sources), including domestic and international works.

Conclusion

- **Document type:** Fundamental work (Category A).

- **Final score:** 95/100.

- **Interpretation:** Highest standard. The work offers a paradigmatically new, methodologically rigorous, and practically significant system for educational analytics.

- **Recommended journal level:** Q1 (interdisciplinary research, education, data science).

- **Recommendation:** Accept (90–100 points).

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