Development of a quality management monitoring system for social and pedagogical educational programs

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Abstract

This paper underscores the pressing need to address educational challenges in Kazakhstan. The government's educational system development policy seeks to comprehensively modernize education across all levels emphasizing innovative teaching methods and tools. A crucial responsibility that necessitates the development of effective procedures and methods is ensuring the efficacy of educational programmes. This research employs both theoretical methods (such as analysis, generalization and classification) and empirical methods (including surveys and mathematical statistics) to investigate this topic. The statistical significance of the results can be determined by applying the student's t-test after the survey data has undergone mathematical processing. This rigorous approach adds credibility to the findings and enhances the reliability of the research. This paper posits that internal monitoring of educational programs yields significant insights into educational quality. This approach evaluates indicators related to student satisfaction and learning outcomes, recognizing that program quality is dynamic and influenced by evolving educational needs, teacher competence and material and technical infrastructure. In a nutshell, educational program monitoring assumes a pivotal role in enhancing the quality of education in Kazakhstan. This monitoring system contributes to continuous efforts to modernize and align the education system with changing demands and standards by evaluating learning results and student satisfaction. This provides valuable information for programme enhancement.

Keywords: Challenges, Educational quality, Indicators, Levels, Monitoring, Program enhancement.

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Transparency: The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.
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1. Introduction

In the early years of the 21st century, education has emerged as a prominent focal point in the pursuit of social development within the Republic of Kazakhstan. The "Kazakhstan-2050" strategy which represents the country's long-term vision identifies the critical need for comprehensive reform at all educational levels from pre-school to higher education. This modernization initiative includes integrating innovative instructional strategies and educational tools into the curriculum [1, 2]. The establishment of efficient mechanisms and approaches assumes paramount importance in ensuring the effectiveness of educational programs to effectively address these multifaceted challenges. The Law of the Republic of Kazakhstan "On Education" which defines these programmes includes a number of essential characteristics such as goals, outcomes, content, how the educational process is organised, how implementation methods are carried out and standards by which educational accomplishments are evaluated [3, 4].

A national system for monitoring and evaluating the quality of education has been put in place within the Republic's borders. This system incorporates elements of independent external evaluation, enabling the state to take on the responsibility of overseeing the educational process through systematic data collection, objective analysis and judicious decision-making aimed at elevating the quality of educational programs and the education system as a whole. The quality of higher education in Kazakhstan is subject to scrutiny through an autonomous accreditation system that aligns with the European Standards and Guidelines (ESG) [5]. The higher education quality framework is protected by this accreditation framework which highlights the important role universities play in providing high-quality services that meet the needs and expectations of stakeholders, students and society [6, 7].

There is a recognized imperative to cultivate high-quality programs in the domain of social and pedagogical education despite the comprehensive scope of the existing monitoring system within educational institutions [8, 9]. This underscores the need for research to explore the feasibility of monitoring such programs and objectively assessing their quality. Academic literature on pedagogical monitoring highlights the demand for this kind of control system from various educational stakeholders underscoring how important it is to improve educational quality.

A vast range of published works exploring different aspects of pedagogical monitoring may be found in the Scopus database. These include research on assessing students' cognitive activity ensuring that educational programmes are excellent in order to discourage substance usage and investigating innovative techniques for tracking pedagogical practices across many academic fields [10-14]. The potential application of monitoring as a crucial element for raising the calibre of educational programmes has piqued the interest of researchers [15, 16]. Furthermore, researchers have studied the use of monitoring instruments in many educational settings including the use of marketing strategies [17, 18].

An examination of research papers authored by individuals from the Republic of Kazakhstan indicates that the monitoring of its educational system is still at an embryonic stage. Scholars have delved into the theoretical, methodological and organizational dimensions of monitoring educational quality [19-27]. Kazakhstani academics have explored topics such as the augmentation of educational quality through the establishment of an external monitoring system [6, 28], the identification of monitoring educational programs as a strategic facet of educational administration [29], an analysis of external monitoring processes and potential enhancements [19], an exploration of issues specific to the national context of monitoring [30, 31] and a study of contemporary approaches to the management of educational quality in Kazakhstani universities coupled with challenges related to information support [32].

An analysis of these academic works and practical initiatives concerning the supervision of educational programmes in Kazakhstan indicates the creation of a model for a monitoring system that is consistent with the best practices of many other countries. The goal of this strategy is to improve the calibre of educational programmes and the higher education sector. Consequently, prior research underscores the significance of monitoring as an integral element within the educational sphere guaranteeing ongoing quality assurance and serving as an autonomous facet of educational administration. It encompasses a multifaceted system that includes the synergy of various monitoring methodologies, data collection and subsequent data processing.

Monitoring is a dual-purpose category with management and educational aspects within the field of education. Its main function is to serve as a part of "managerial control" in the educational domain. It is an information system that is updated and expanded on a regular basis based on continuous observation of the state and change of educational components. This monitoring process relies on well-defined criteria to inform managerial decisions directed at augmenting the quality of educational programs and the broader educational system.

A substantial body of research conducted by scholars from Kazakhstan as well as international experts [15, 23, 33] exemplifies a rich reservoir of experience in monitoring studies encompassing various facets of education quality. Noteworthy examples include investigations into assessments such as the Programme for International Student Assessment (PISA), Trends in Mathematics and Science Study (TIMSS), the Second Information Technology in Education Study (SITES) and evaluations of students' comprehension of topics related to civil rights, freedoms and social harmony (CIVICS).

It is noteworthy that the evaluation of the quality of higher education programs can be guided by a diverse array of external assessment models. These models encompass the assessment of parameters related to education quality management (such as the Context, Input, Process and Product evaluation model known as CIPP), evaluations of effectiveness (using the Office of Evaluation and Oversight (OVE) evaluation model) and assessments of efficiency (following the D. Kirkpatrick model) [34-41]. The Republic of Kazakhstan currently uses external assessment systems run by organizations like the Independent Agency for Accreditation and Rating, the Independent Kazakhstani Agency for Quality Assurance in Education and others to measure the effectiveness of education. Nonetheless, certain authors offer critical assessments of the external assessment system, contending that it contradicts academic autonomy, compromises the

quality of the educational process by neglecting its particularities and limits the autonomy of university faculty in shaping the education system and devising new educational programs [6, 42-49].

It is important to note that the existing body of scholarly literature predominantly concentrates on issues pertaining to external monitoring with limited exploration of internal monitoring systems as a tool for augmenting the quality of educational programs especially within the realm of social and pedagogical programs. Consequently, this study seeks to propose the formulation of a monitoring system specifically designed to target the oversight of the quality of social and pedagogical educational programs.

The present research endeavours to achieve the following objectives:

1. To discern problematic facets within the monitoring system and put forth a hypothesis that elucidates how external environmental factors and internal components of the educational process impact its qualitative characteristics. Consequently, these factors lead to alterations in students' perceptions regarding the quality of the educational program. The study seeks to reveal obstacles and pinpoint opportunities for improving the curriculum by closely examining quality indicators.

2. To construct a mathematical framework capable of facilitating precise evaluations of educational program quality, thereby ensuring the objectivity of the amassed data.

3. To conduct an assessment of the current status of the educational training program titled "Social Pedagogy and Self-Knowledge" at L.N. Gumilyov Eurasian National University. This examination aims to gauge the program's quality within its existing context.

4. To synthesize the research findings and appraise the potential for an impartial assessment of quality parameters in t he context of internal monitoring of the educational program.

The research aims to clarify important features of the monitoring system, develop a strong mathematical framework for evaluating quality, examine the state of a particular programme and provide a comprehensive analysis of how quality criteria are objectively evaluated through internal monitoring by completing these tasks.

2. Research Methodology

The research methodology assumes a position of paramount significance in this study. Given the relatively modest sample size of participants, consisting of 109 individuals, this research aligns with the category of exploratory or preliminary investigations. The study used a combination of related theoretical and empirical approaches to accomplish it s goals. Theoretical methods encompassed activities such as analysis, generalization and classification while empirical methods encompassed surveys and the application of mathematical statistics. The data collected through surveys underwent rigorous mathematical processing and the statistical significance of the resultant findings was ascertained through the application of the student's t-test [50].

The research findings are presented in tabular format offering a lucid depiction of the present condition of the studied educational program's quality. The study draws conclusions on the complex interactions between components of the learning environment and how participants perceive the educational programme through an in-depth evaluation. This comprehension serves as the foundation for the ongoing monitoring of educational program quality.

During the preparatory phase of the research, a set of survey questions was meticulously devised. Subsequently, these prepared inquiries were administered to the survey respondents. The analysis method was subsequently employed to characterize the research subject and specific factors slated for examination throughout the research endeavour were judiciously selected. Leveraging empirical methods, the amassed data was subjected to rigorous processing in alignment with the research's predefined objectives. Finally, the outcomes obtained were judiciously generalized and subjected to thorough analysis and conclusions were accordingly drawn in consonance with the research's overarching objectives.

3. Results and Discussion

The establishment of the national education system in the Republic of Kazakhstan driven by state educational policy and the integration of European educational methodologies into universities necessitated substantial reforms [44]. In the contemporary educational landscape, a fundamental requirement and challenge revolve around the quality of education as delineated by the Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG) of 2015. The concept of "education quality" has assumed a central role over the past decade.

Enhancing the quality of higher education and quality management is intricately linked to the enhancement of the system of external oversight over higher education activities. A decade ago, in 2010, government certification was replaced by external assessments conducted by independent quality assurance institutes to gauge the alignment of the national education system with ESG standards. International accreditation which includes external evaluations of educational programmes and institutions to determine their compliance with accreditation authority requirements and claimed status replaced government certification later in 2017.

Despite notable advancements in the development of the external assessment system, it remains imperative to scrutinize the objectivity of its outcomes. Currently, the Republic's universities only evaluate general courses which may not fully reflect the actual status of the country's educational system [51]. This situation presents difficulties in establishing a comprehensive quality management system for social and pedagogical educational programs which should ideally be founded on objective data pertaining to the quality of each specific program.

In this context, it is posited that valuable insights into education quality and educational programs can be collected through the internal monitoring of educational programs. Internal monitoring serves as a foundation for evaluating program quality taking into consideration various factors such as its effectiveness students' satisfaction with various aspects of

program-based learning and their educational accomplishments. The dynamic characteristic of an educational program's quality indicator is its evolution over time as a result of changing student educational requirements, staff members' professional competence levels and updates to or obsolescence of technical and material resources required for programme implementation. The research makes the hypothesis that external environmental influences on the educational process affect its qualitative characteristics which affect how students perceive the quality of the educational programme based on these findings. The research attempts to identify problems and outline possibilities for programme improvement by monitoring quality indicators.

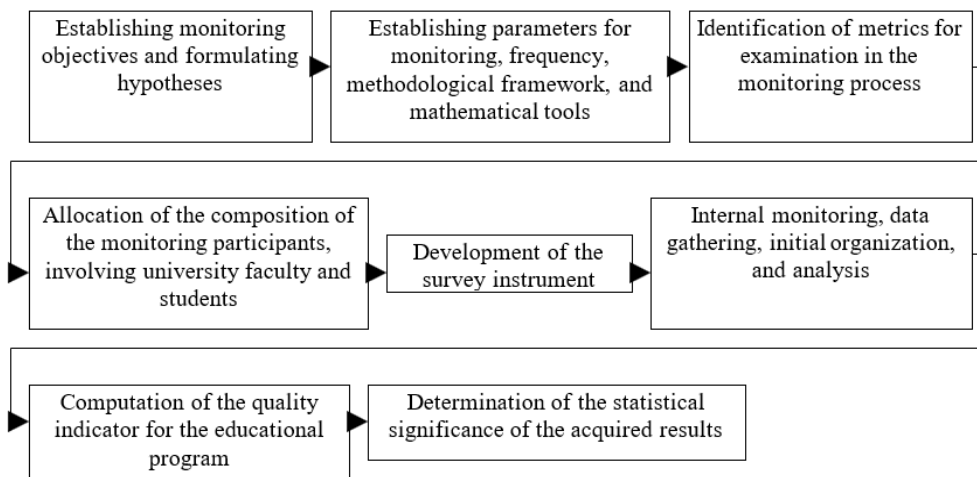Figure 1 represents the process of internal monitoring of educational programs.

Figure 1.
The procedure for author-generated internal monitoring of the educational program.

These phases establish the sequence and content of the monitoring procedures. Therefore, it is imperative to empirically validate the acquired findings and the proposed hypothesis using an appropriate mathematical framework. In this investigation, we have employed the student's t-test methodology for this purpose.

An extensive review of relevant literature was conducted in order to support the hypothesis [52-58] which made it easier to determine the minimum set of parameters that determine the calibre of the educational programme in the field of "Social Pedagogy and Self-Knowledge" at L.N. Gumilyov Eurasian National University. The primary goal of the monitoring procedure is to assess the level of satisfaction with the quality of the educational programme among third - and fourth-year students who are recipients of educational services. This inquiry encompasses a multifaceted evaluation of various parameters within the external and internal educational program environments, including:

- Students' contentment with the program's curriculum within their chosen specialization.
- Students' contentment with the qualifications and competence of their teachers.
- Satisfaction levels concerning the availability of official, reference-bibliographic and specialized periodicals within the library deemed essential for program-related studies.
- Students' contentment with the adequacy of the material and technical resources that facilitate diverse forms of instruction, laboratory work, practical exercises, and student research as stipulated in the study curriculum.
- Levels of satisfaction regarding the practical applicability of acquired knowledge in prospective professional pursuits.
- The distribution of students' academic performance across categories of high, moderate and low grades.

The monitoring process entailed the administration of surveys to the student body. The initial stage of monitoring was carried out in May 2022 followed by a subsequent stage in May 2023. A total of 109 students enrolled in bachelor's and master's degree programs under the "Social Pedagogy and Self-Knowledge" curriculum at L.N. Gumilyov Eurasian National University actively participated in the survey.

The inaugural query of the monitoring process pertained to students' contentment with the curriculum content within their chosen specialization as presented in Table 1.

Table 1.
Student contentment with the educational program's curriculum in their chosen field of study.

Satisfaction level	Grade	2022		2023	
		Survey results (Absolute)	Survey results in scores	Survey results (Absolute)	Survey results in scores
Satisfied	3	84 students	252	78 students	234
Partially satisfied	2	22 students	44	25 students	50
Dissatisfied	1	3 students	3	1 student	1
Average satisfaction level in points	–	–	99.6	–	95.0

No statistically significant distinction is evident in the outcomes observed between May 2022 and May 2023. Approximately 97-99% of the surveyed participants express contentment with their educational experience within their chosen specialization. In cases where a small fraction of respondents indicated dissatisfaction, they were invited to elucidate the grounds for their discontent. Their cited reasons encompassed concerns regarding the quality of educational materials, the readiness of certain instructors for teaching and limitations in the number of instructional sessions. Additionally, there was a perception among some respondents that the selected profession may not offer promising opportunities in the contemporary world. Two respondents did not provide specific reasons for their dissatisfaction. Tables 2-6 present the data derived from the monitoring study encapsulating diverse indicators that delineate the educational program's quality.

Table 2.
Satisfaction of students with the level of teachers' qualifications.

Satisfaction level	Grade	2022		2023	
		Survey results (Absolute)	Survey results in scores	Survey results (Absolute)	Survey results in scores
Satisfied	3	90 students	270	86 students	258
Partially satisfied	2	18 students	36	22 students	44
Dissatisfied	1	1 student	1	1 student	1
Average satisfaction level in points	–	–	102.3	–	101.0

Table 3.
Students' satisfaction with the staffing of the library fund with official, reference-bibliographic and specialized periodicals required for the program studying.

Satisfaction level	Grade	2022		2023	
		Survey results (Absolute)	Survey results in scores	Survey results (Absolute)	Survey results in scores
Satisfied	3	67 students	201	76 students	228
Partially satisfied	2	29 students	58	20 students	40
Dissatisfied	1	13 students	13	13 students	13
Average satisfaction level in points	–	–	90.6	–	93.6

Table 4.
Students' satisfaction with meeting the requirements for the material and technical base that ensures all types of preparation according to the studying program.

Satisfaction level	Grade	2022		2023	
		Survey results (Absolute)	Survey results in scores	Survey results (Absolute)	Survey results in scores
Satisfied	3	70 students	210	76 students	228
Partially satisfied	2	16 students	32	11 students	22
Dissatisfied	1	23 students	23	22 students	22
Average satisfaction level in points	–	–	88.3	–	90.6

Table 5.
Students' satisfaction with the possibility of practical use of the knowledge in future professional activity.

Satisfaction Level	Grade	2022		2023	
		Survey results (Absolute)	Survey results in scores	Survey results (Absolute)	Survey results in scores
Satisfied	3	95 students	285	90 students	270
Partially satisfied	2	11 students	22	18 students	36
Dissatisfied	1	3 students	3	1 student	1
Average satisfaction level in points	–	–	103.3	–	102.3

Table 6.
The percentage of students with high, medium and low academic outcomes.

Outcomes	Grade	2022		2023	
		Survey results (Absolute)	Survey results in scores	Survey results (Absolute)	Survey results in scores
High	3	15 students	45	16 students	48
Average	2	81 students	162	82 students	164
Low	1	13 students	13	11student	11
Moderate level of achievement in scores	–	–	73.3	–	74.3

The gathered data facilitates the determination of the quality level of the educational program through mathematical computations. In this research, the calculation of the highest attainable quality level for the educational program is as follows:

(109 students × 3.0 points) / 3 levels × 6 indicators = 654.0 points.

Conversely, the calculation of the minimum attainable quality level for the educational program is as follows:

(109 students × 1.0 point) / 3 levels × 6 indicators = 218.0 points.

It is possible to establish an interval to differentiate between the three quality levels, high, average, and low assuming that they are divided into these categories: (654.0 points - 218.0 points) / 3 quality levels = 145.0 points.

According to this interval, the low level of educational program quality corresponds to the range between 218.0 points and 363.0 points, the average level corresponds to the range between 364.0 points and 508.0 points and the high level corresponds to the range between 509.0 points and 654.0 points.

The following outcomes were observed within this study:

• In the year 2022, the indicator for educational program quality was computed as 99.6 + 102.3 + 90.6 + 88.3 + 103.3 + 73.3 = 557.4 points.

• In the year 2023, the indicator for educational program quality was computed as 95.0 + 101.0 + 93.6 + 90.6 + 102.3 + 74.3 = 556.8 points.

Consequently, a slight improvement in the quality of the educational program was detected with an increase of 4.0 points or 0.8% resulting in an overall high level of quality.

It is noteworthy that the verification or dismissal of the proposed hypothesis necessitates statistical validation. Consequently, this study employs the student's t-test to confirm the hypothesis as illustrated in Table 7.

Table 7.
Initial data to calculate the student's t-test.

Question no.	Results X (2022)	Results Y (2023)	y^2	x^2
1	99.6	95.0	9920.1	9025
2	102.3	101.0	10465.2	10201
3	90.6	93.6	8208.3	8760.9
4	88.3	90.6	7796.8	8208.3
5	103.3	102.3	10670.8	10465.2
6	73.3	74.3	5372.8	5520.4
Amount	557.4	556.8	52434	52180.8
Arithmetic mean	92.9	92.8	–	–
Standard deviation	$52434/6 - 92.9^2 = 108.5$	$52180.8/6 - 92.8^2 = 81.2$	–	–
Number of studied parameters	6	6	–	–

We proceed to compute the empirical value using the formula corresponding to the student's test for unpaired samples employing the gathered data.

$$t = \frac{(92.9 - 92.8)}{\sqrt{(108.5 \div 6) + (81.2 \div 6)}} = 0.01$$

Given that the degrees of freedom in this scenario total 10.0 (computed as 6.0 + 6.0 - 2.0), the determination of the significance level necessitates consulting the critical values table for the student's t-test which is accessible at https://www.scribbr.com/statistics/students-t-table/. Our analysis reveals that the computed value of 0.01 is lower than the tabulated value of 3.473. Consequently, the significance level falls within the range greater than 0.001 but less than 0.05. Consequently, we can infer the existence of disparities between the two phases of the study. In essence, we can assert that external environmental factors and the internal content of the educational process exert an influence on its qualitative attributes thereby eliciting alterations in students' perceptions of the educational program's quality. Furthermore, this monitoring of quality indicators serves as a means to pinpoint challenges and delineate pathways for enhancing the educational program.

4. Conclusion

The results derived from the internal monitoring of the educational program underscore the significance of this practice as an integral component of managerial oversight within the realm of education. It functions as an information system characterized by continual updates and enhancements based on the ongoing scrutiny of educational process components within higher education institutions (HEIs). Its fundamental objective is the use of specific criteria to inform managerial decision-making aimed at augmenting the quality of educational programs and the broader education system.

The outcomes obtained through internal monitoring provide a foundational basis for elevating the quality management of social and pedagogical educational programs. This is achieved by acquiring essential information and identifying areas in need of enhancement. This study serves as an example of how "educational programme quality" refers to a comprehensive control element that includes performance measures and assessments that measure students' satisfaction with different aspects of the programme.

The application of mathematical and statistical tools is considered indispensable for the analysis of internal monitoring outcomes. These tools validate the objectivity of the collected data and facilitate the formulation of conclusions based on research findings. This inquiry underscores the necessity of enhancing the practical orientation of the studied social and pedagogical educational program, expanding library resources, improving information support for program implementation, and advancing material and technical infrastructure.

The results of the study make it clear that when it comes to addressing the problem of improving the quality of educational programmes, internal monitoring presents clear benefits over external assessment. Firstly, the internal monitoring system can address issues that might escape external assessment due to inherent limitations. Secondly, it has the flexibility to encompass elements of the educational program that are of immediate concern to the HEI's dean's office and teaching faculty thereby showcasing its adaptability as a notable asset over external independent assessment. Thirdly, this system can be implemented at varying intervals, tailored to the specific requirements of the educational institution thus serving as an indispensable component of quality control within the educational process.

In a nutshell, continuous internal monitoring of educational program quality assumes paramount importance in modern universities and the application of objective (mathematical and statistical) assessment methods is pivotal in substantiating the conclusions derived during the monitoring endeavour. Future research endeavours are planned to explore the viewpoints of the teaching faculty concerning educational program quality allowing for a comparison of the gathered data with research results and subsequent adjustments to the educational program.

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