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Aspects of Application of Data Analytical Tools for Assessing the Academic Performance of Secondary Education Schools

Dalė DZEMYDIENĖ[1], Sigita TURSKIENĖ[1],
Vaida LIUBERTIENĖ[2]

[1]Institute of Regional Development of Šiauliai Academy of Vilnius University, Vilniaus str. 88, LT-76285 Šiauliai, Lithuania
[2]Salininkų Gymnasium, Vilnius, Lithuania

dale.dzemydiene@sa.vu.lt, sigita.turskiene@sa.vu.lt,
vaida.liubertiene@salininkugimnazija.lt

ORCID 0000-0003-1646-2720, ORCID 0000-0002-2019-6712

Abstract. The aim of this research is to investigate in the assessment process of the quality of activities of secondary education institutions by analyzing realization of digitalization of procedures that provided in the legal acts regulating the assessing the quality of activities. This study explores the application of data analytical tools in assessing the academic performance and institutional quality of Lithuanian secondary education schools. It emphasizes the transition toward data-driven self-assessment and external evaluation processes as defined by the State Education Strategy (2013–2022) and the Ministry of Education's methodological frameworks. The framework for evaluation of data analytical tools was developed and review of features of applied data analytical tools for adequate choosing them in self-assessment procedures of the institution performance was made. From an applied perspective, systems for analyzing data on the activities of educational institutions are examined, and the structure of the activities is revealed. A secondary educational institution was selected for the case study of model implementation and the data is analyzed on the basis of questionnaires for self-assessment.

Keywords: data analytical tools, assessment of the quality of activities, IS for management of secondary education schools, methodology for assessing**.**

1. Introduction

The tools for data analysis became the important component for evaluation of situations, when we have assessment procedures. The progress of educational institutions is related to the implementation of information and communication technologies (ICT) and new management methods. ICT and right evaluation procedures create a new concept of value in school management processes (Dzemydienė et al., 2023; 2024) and can be compared with regional context (Dzemydaitė and Naruševičius, 2023). However, the problems of

evaluation performance of educational institution are also encountered in this assessment process, because we have to choose appropriate tools for data analysis and to develop the assessment. The aim of creating an effective system for assessing the quality of educational institutions' activities is formulated in the Strategic Provisions for the Development of Education in Lithuania (State Education Strategy 2013-2022, 2013) and general education schools are prepared to implement it. A system for (self) assessment of the quality of activities of general education schools is being developed, which provides for monitoring education, (self) assessment of the quality of school activities and making decisions enabling the improvement of school activities. The comprehensive, formal formulation of evaluation criteria for data analytical tools is provided and theoretically grounded, explicitly defined, and justified in terms of their relevance and appropriateness for educational assessment and institutional evaluation.

As the processes of implementing the educational content and the concept of assessing of change of student achievements, the internal audit methodology has been revised several times. In 2009, the "Recommendations for the Self-Assessment of the Quality of Activities of General Education Schools" were approved (Minister, 2009a) and in 2016, the "Methodology for the Self-Assessment of the Quality of Activities of Schools Implementing General Education Programs" was approved (Minister, 2016a). In 2022 The National Education Agency has prepared new "Recommendations for the Application of Self-Assessment Questionnaires for General Education Schools (NEA, 2022).

The description of the procedures for external audit of schools was also improved, the term "external audit" was replaced by "external assessment", and its new versions were legalized in 2016, 2018 and 2021 (Minister, 2016b; Minister, 2018; Minister, 2021).

Systematic amendments to the legal acts regulating the assessment of the quality of activities of general education schools demonstrate their importance for ensuring the quality of education and the aim of responding to progressive development trends in the field of education and oblige the educational community to review the procedures and instruments for assessing the quality of activities. One of the objectives of the State Education Strategy (2013-2022) is to "*introduce a culture of educational quality based on data analysis and self-assessment"*, which instructs external evaluators of the quality of school activities and those carrying out self-assessment of the quality of school activities to pay special attention to substantiating the assessment conclusions based on reliable data, their professional analysis and interpretation. The results of assessment and self-assessment based on data allow us to see and analyze the progress of the school and its trends, to predict and plan a progress strategy.

As an alternative to the former digital platform *iqesonline.lt* the National Education Agency prepared the "Recommendations for the Application of Self-Assessment Questionnaires for General Education Schools" in 2022 (NEA, 2022). Five questionnaires for studying general education school performance indicators on the education were proposed as self-assessment instruments (portal *emokykla.lt*). However, these tools are not technologically efficient, therefore new software tools are being sought to analyze performance assessment processes.

The article discusses the model for assessing the quality of school activities, analyzes the data analytical software designed to measure the current situation of the quality of activities and its change, process the collected data, interpret and make decisions to improve the quality of activities.

This study analyzed the application of data analytical tools in assessing the quality of activities in secondary education institution, focusing on the digitalization of self-assessment and external evaluation processes. Through a comprehensive review of analytical platforms, like as Microsoft Forms, Microsoft Excel, and Microsoft Power BI, and an empirical case study conducted in a Lithuanian secondary school, the research aimed to determine how these tools enhance data-driven decision-making and institutional performance evaluation.

The findings confirm that the integration of these tools, particularly Microsoft Power BI, facilitates the systematic collection, processing, and visualization of heterogeneous educational data. Power BI provides advanced visualization, interactivity, and comparative reporting capabilities that significantly improve the interpretability and practical application of data insights. In contrast to traditional tools such as Excel and Forms, Power BI enables dynamic dashboards that support evidence-based planning and continuous quality improvement. Furthermore, the inclusion of Microsoft 365 applications ensures accessibility and cost-efficiency, enabling schools with varying resources to effectively engage in digitalized self-assessment processes.

The study's objectives—to identify appropriate analytical instruments for evaluation of their applicability for quality assessment of performance of schools, and propose a conceptual framework for their integration. The results align closely with Lithuania's *State Education Strategy 2013–2022* (2013), which emphasizes the development of a data-informed culture of educational quality. The outcomes also support the objectives outlined in the *Methodology for the Self-Assessment of the Quality of Activities of Schools Implementing General Education Programs* (Minister, 2016a), reinforcing the importance of reliable data, professional analysis, and transparent evaluation procedures in education management.

2. Review of properties of data analytical tools

Here's a comprehensive review of widely used data analytical tools, including their key features, typical use cases, and references for further reading. We would like to review such tools as descriptive statistics and pivot tables and visualization capabilities of Microsoft Excel and Power BI, R statistical programming language, key libraries created on Python and Rapid Miner.

The main features as strengths and limitations are revealed in Table 1. Some of them are created as statistical analysis platforms, i.e., Tableau, SAS, Apache Spark and Google Looker Studio. Microsoft Excel is a foundational tool for data analysis, especially useful for descriptive statistics, pivot tables, and basic data visualizations (Walkenbach, 2013). The tool R is a statistical programming language ideal for statistical modeling and data visualization with extensive package ecosystem (e.g., ggplot2, dplyr, caret), strong statistical capabilities, and is of open-source, as mentioned in (Wickham and Grolemund 2016). Python is a general-purpose language with powerful data analysis libraries as Pandas, NumPy, Matplotlib, Seaborn, Scikit-learn, TensorFlow described by (VanderPlas, 2016). They can be flexible, have possibilities to integrate well with web apps and databases, and are strong for machine learning support.

Table 1. Comparison of properties of data analytical tools

Data analytical tool	Strengths of the tool	Limitation of analysis	Use cases	Author's works
Microsoft Excel (with functions of statistics, pivot tables, and basic visualization tools)	User-friendly, widely adopted, strong community support, rich visualization capabilities	Limited scalability for large datasets, not ideal for complex statistical or machine learning models	Budget forecasting, sales trend analysis	(Walkenbach, 2013)
R (a statistical programming language)	Good statistical modeling and data visualization, extensive package ecosystem (e.g., ggplot2, dplyr, caret), strong statistical capabilities, open-source	Steeper learning curve compared to GUI tools	Hypothesis testing, time series analysis, statistical inference	(Wickham and Grolemund 2016)
Python Key Libraries: Pandas, NumPy, Matplotlib, seaborn, scikit-learn, TensorFlow	Flexible, integrates well with web apps and databases, strong machine learning support.	Slower for some statistical operations compared to R; requires more coding knowledge.	Predictive analytics, text mining, machine learning	(VanderPlas, 2016)
Tableau	Leading data visualization and business intelligence tool Interactive dashboards, user-friendly drag-and-drop interface, integration with various data sources	Expensive licensing, limited statistical modeling	Executive reporting, dashboarding, data storytelling	(Murray, 2016)
Microsoft Power BI	Business analytics tool with deep Excel integration, cost-effective, real-time dashboards, seamless integration with Microsoft ecosystem	Less flexible for non-Microsoft data sources	Corporate KPI dashboards, sales analytics	(Collie and Singh, 2020)

Data analytical tool	Strengths of the tool	Limitation of analysis	Use cases	Author's works
Apache Spark	Big data processing engine designed for speed and ease of use in large-scale data processing tool, scalable, supports multiple languages (Python, R, Scala), strong in-memory processing	Higher infrastructure requirements	Real-time analytics, big data ETL, machine learning pipelines	(Karau and Warren, 2017)
SAS (Statistical Analysis System)	Enterprise-level analytics platform for advanced statistical analysis, has high data security, robust statistical capabilities	Proprietary and expensive.	Preferred in healthcare and banking sectors, trial analysis, risk assessment	(Hall et al., 2010)
Google Looker Studio.	Free tool for creating dashboards and data reports using Google ecosystem (GoogleLooker Studio Documentation), easy integration with Google Analytics, Sheets, Ads; good for collaborative reporting	Limited data manipulation capabilities	Website traffic reporting, marketing campaign analytics	(Google Looker Studio Documentation, 2025).
RapidMiner	Data science platform for machine learning and predictive analytics has good visual workflow designer, supports code-free analytics	Freemium limitations, less flexible than coding-based tools	Customer churn prediction, fraud detection	(Hofmann and Klinkenberg, 2016)

The SQL can be mentioned as standard language for querying and managing relational databases, that have powerful for data extraction and transformation, optimized for structured data. (Fotache and Strimbei, 2015)., We can mention SQL Pocket Guide

provided by O'Reilly Media. The Tableau is a leading data visualization and business intelligence tool (Murray, 2016).

The Power BI is Microsoft's business analytics tool with deep Excel integration (Collie and Singh, 2020) cost-effective, real-time dashboards, seamless integration with Microsoft ecosystem. The Apache Spark is a big data processing engine designed for speed and ease of use in large-scale data processing tool (Karau and Warren, 2017).

The statistical analysis systems can be helpful as well. For example, the SAS (Statistical Analysis System) is enterprise-level analytics platform for advanced statistical analysis (Cody, 2010), Google Looker Studio is free tool for creating dashboards and data reports using Google ecosystem with easy integration with Google Analytics, Sheets, Ads. The tool as RapidMiner is data science platform for machine learning and predictive analytics (Hofmann and Klinkenberg, 2016).

The evaluation criteria for data analytical tools are explicitly grounded in theoretical frameworks of educational assessment, data-driven decision-making, and evaluation of information system evaluation (Dzemydiene et al., 2022). The evaluation criteria can be backgrounded on models such as:

- Technology Acceptance Model (TAM) – emphasizing usability and perceived usefulness.
- Information Systems Success Model (Jeyaraj, 2020) – focusing on system quality, information quality, and impact on decision-making.
- Data-Based Decision-Making (DBDM) Frameworks in education (Mandinach and Gummer, 2016) – stressing the value of accuracy, accessibility, and interpretation of data for pedagogical improvement.
- Quality Assurance Frameworks in education (Lithuanian Methodology for Self-Assessment of School Activities, 2016) – highlighting transparency, evidence-based evaluation, and continuous improvement.

These frameworks justify the multidimensional nature of a criteria: technical performance, analytical robustness, user accessibility, educational relevance (Table 2).

Table 2. Evaluation criteria of data visualization tools

Criterion	**Definition**	**Rationale & Theoretical Basis**
1. Analytical Capability	The extent to which the tool supports descriptive, diagnostic, predictive, and prescriptive analytics.	Grounded in data analytics maturity models (Gartner, 2020); ensures tools can move from simple reporting to insight generation for educational decision-making.
2. Data Integration and Compatibility	Ability to connect with various data sources (e.g., e-diaries, survey platforms, learning management systems) and handle structured/unstructured data.	Based on DeLone and McLean's (2003) *System Quality* dimension; critical for holistic institutional analysis.
3. Visualization and Interpretability	Quality, interactivity, and clarity of data visualization supporting stakeholder interpretation.	Supported by DBDM frameworks (Mandinach and Gummer, 2016); facilitates understanding among educators, administrators, and policymakers.

Criterion	Definition	Rationale & Theoretical Basis
4. Usability and Accessibility	Degree of user-friendliness, intuitive design, and accessibility for non-technical users (teachers, administrators).	Drawn from the Technology Acceptance Model; enhances adoption and effective use in educational environments.
5. Reliability and Accuracy	Consistency and precision of data outputs, including error minimization and reproducibility of results.	Rooted in principles of *data quality management* (ISO/IEC 25012); essential for credible educational assessment.
6. Adaptability and Scalability	Capacity to accommodate institutional growth, new indicators, or evolving assessment frameworks.	Supported by system lifecycle and sustainability theories; ensures long-term applicability in dynamic educational contexts.
7. Cost-effectiveness and Accessibility	Balance between tool functionality, licensing, and availability for educational institutions.	Justified through resource efficiency models (OECD, 2013; Okoye et al., 2025); promotes equity in digital transformation of schools.
8. Compliance and Security	Adherence to data protection, ethical, and legal standards (e.g., GDPR, national education data regulations).	Derived from ICT governance and ethical data use frameworks; guarantees institutional accountability and trust
9. Educational Relevance	Alignment of the tool's analytical functions with educational quality domains (leadership, learning outcomes, environment, and management).	Based on Lithuania's *Methodology for Self-Assessment of School Activities* (2016); ensures contextual fit and meaningful use in school evaluation.

Each criterion reflects the dual nature of data analytics in education—as both a technological and pedagogical instrument. The rationale for adopting these criteria is threefold:

- *Theoretical coherence* represents the criteria which are consistent with global and national theoretical frameworks that define effective data use and system quality in education.
- *Contextual relevance* represents the criteria which respond to the identified needs of Lithuanian schools transitioning to data-based management, as highlighted by the National Education Agency (NEA, 2022) and State Education Strategy 2013–2022.
- *Practical applicability* criteria provide measurable, actionable dimensions for evaluating, comparing, and selecting data analytical tools suited to institutional self-assessment and quality assurance.

The modern data analytics tool Microsoft Power BI combines Excel and Pivot functions. It allows easily and effectively analyze, visualize and present data, create reports, connect data sources, and create interactive graphs. In the "magic" quarter compiled by Gartner, a company that conducts research on technological innovations worldwide, Microsoft's software is indicated as a leader (Figure 1), it surpasses such leaders in performance analytics as Tableau and Qlik.

Figure 1. Comparison visualization of Gartner Business Analytics Products
Source: (Preidys, 2023; Gartner, Inc, 2020)

We are taking the preference for Microsoft Power BI as business analytical tool with deep Excel integration for performance of self-assessment procedures in secondary education schools.

3. Model for assessing the quality of activities of secondary educational institutions

The latest version of the description of the procedures for organizing and implementing the external evaluation of the activities of general education schools was approved by the Minister of Education, Science and Sports of the Republic of Lithuania in 2021 June 21, (Minister, 2021).

The description specifies the system for assessing the quality of school activities, which consists of school self-assessment and external assessment. Self-assessment of the quality of school activities is an integral part of external assessment, its results are included in the set of data analyzed during external assessment. External assessment is organized by the National Education Agency and the institution implementing the rights and obligations of the owner. A 5-level assessment scale is used to assess the quality of school activities (Table 3).

Table 3. Levels of assessment of the quality of activities of schools implementing general education programs

Quality level	Descriptive performance quality assessments	Percentage value of level
4 level	Very good: effective, exceptional, focused, unique, creative	90 percent or more of activities were positively evaluated
3 level	Good: above average, appropriate, effective, potential, flexible	60–89 percent or more of activities were positively evaluated
2 level	Satisfactory: average, not bad, unsystematic, not exceptional	31–59 percent or more of activities were positively evaluated
1 level	Poor: unsatisfactory, ineffective, inappropriate, non-specific	11–30 percent of activities were positively evaluated
N level	Very poor: unacceptable	Until 10 percent of activities were positively evaluated

One of the tasks of external evaluation is to "help make decisions based on reliable data regarding assistance to schools" provided by the description of the procedure for the organization and implementation of the external evaluation of schools implementing General Education Programs (2021). For each type of external evaluation, performance evaluation indicators have been approved, which determine what school data should be collected, analyzed, summarized and used to formulate conclusions.

One part of the data required for external evaluation is collected by evaluators by observing lessons and educational activities at school, analyzing documents prepared by the school, school data provided by the reporting in educational information systems, etc. The other part of the data must be provided to the evaluators by the school itself. Regardless of the type of external evaluation, the head of the school participating in the evaluation provides the evaluators with:

• a weekly schedule of lessons, non-formal education, class hours and other events,
• the latest information on self-evaluation and self-evaluation conclusions,
• the school's strategic plan, school activity plans for the last two years,
• summarized information on the achievements, progress and student achievement research data of the school for the last two years,
• the school's educational plan for the current academic year,
• contextual and other information about the school's activities according to the provided questionnaire.

The school data provided to the evaluators, which can be collected, processed and analyzed using digital means, thus facilitating the task of data analytics and its automation. The self-evaluation model of the quality of school activities consists of assessment areas, which are detailed in topics, which are divided into indicators. Four areas of school activity are assessed, which are related by causal relationships, i.e., leadership and management, education and student experiences, environment of education and results.

The following groups were selected as respondents:

- conduct surveys of students, their parents and teachers about the quality of school activities in other online survey systems, for example, Microsoft Office 365 Forms, Google Forms, *apklausa.lt, manoapklausa.lt,* etc.;

- use IQES online Lithuania questionnaires to collect quantitative data, which are published on the educational portal *Emokykla.lt*;

We are applying qualitative data collection methods, for example, focus group discussions, interviews, etc. The themes identified in each area define the school's quality directions and indicators that define the dimensions of school quality. The school head initiates the self-assessment of the quality of school activities, and the School Council selects the areas of self-assessment and the methodology for it.

Self-evaluation can be carried out in 3 ways:

1. Broad (or overall) self-evaluation. During it, the school community evaluates all areas, topics and indicators;

2. Thematic self-evaluation. During it, a narrower aspect of the activity is selected for a more in-depth study of the quality of the current situation;

3. Analysis of the problem that has arisen at the school. During it, the aim is to collect data that reveals the causes of the problematic situation and, based on them, present a solution to the problem.

It is recommended to implement the self-evaluation of the quality of school activities in five stages:

1. The preparation stage. An agreement is made on the aspect of the school's activities to be assessed and the assessment method;

2. The stage of preparing the self-evaluation plan. The goals of the school's self-evaluation, participants, data sources, data interpretation criteria are determined, and an assessment process plan is prepared;

3. The stage of preparing self-evaluation instruments. Self-evaluation instruments are selected and applied;

4. The stage of carrying out the self-evaluation. Reliable data and information are collected. The data obtained are analyzed, interpreted, and conclusions are formulated;

5. The reporting and information stage. A self-assessment report on the quality of school activities is prepared, which presents the summarized data of the self-assessment, their analysis, conclusions and recommendations for improving the quality of school activities.

One of the objectives of the self-assessment of the quality of school activities specified in (Minister, 2016a) is “to develop a culture of data-based management at school”. It is important to collect reliable data for the self-assessment of the quality of school activities. In addition to the data collected directly during the self-assessment, secondary data sources are also used:

- quantitative school monitoring data,
- data on student progress and learning achievements,
- data on self-assessment and certification of teachers and managers,
- data from surveys and research conducted at the school, etc.

4. Results of application of data analytical tools for assessment of the quality of activities in secondary education school

The National Education Agency has prepared the “Recommendations for the Application of Self-Assessment Questionnaires for General Education Schools ” (NEA, 2022) as a presentation of quantitative and qualitative self-assessment instruments (questionnaires)

for the quality of school activities. The questionnaires were prepared during the implementation of the activities of the project No. 09.2.1-ESFA-V-706-03-0001 "Improvement and Development of Non-Formal Children's Education, Pre-School, Pre-Primary and General Education Assessment, Self-Assessment" and tested in 22 Lithuanian general education schools. As an alternative to the previous self-assessment system, the National Education Agency proposed the following assessment instruments:

• Conduct surveys of students, their parents and teachers about the quality of school activities in other online survey systems, such as Microsoft Office 365 Forms, Google Forms, *apklausa.lt, manoapklausa.lt,* etc.;

• Use IQES online Lithuania questionnaires to collect quantitative data, which are published on the education portal *Emokykla.lt*.

• Apply qualitative data collection methods, such as focus group discussions, interviews, etc.

The following questionnaires for general education schools are published on *Emokykla.lt*:

• Broad self-assessment questionnaire;

• Thematic questionnaires for individual areas of activity:
  - Results,
  - Education and student experiences,
  - Educational environments,
  - Leadership and management;

• Nine feedback questionnaires for the quality of lessons.

Since January 2022, the National Education Agency has started organizing training for school communities on the application of new and recommended self-assessment tools of Microsoft Forms, Microsoft Excel, for data analysis and visualization apply Microsoft Excel Pivot Add-in.

4.1. Case study of assessment of quality of activities in education institution

In order to clarify the capabilities of the data analytics tool Power BI, a case study was conducted in a specific school. During the study, two school quality assessment processes were selected for analysis, the results of which are presented during the external school evaluation, regardless of the type of external evaluation (Table 5).

Based on the Description of the Procedure for Organizing and Conducting External Evaluation of Activities of Schools Implementing General Education Programs (2021), the school principal must provide external evaluators with:

• new information on self-assessment and self-assessment conclusions (for thematic evaluation – over the past 2-3 years),

• summarized information on the school's student achievements, progress and student achievement research data for the past two years.

School X uses Microsoft Office 365 A1, the software package of which includes Word, Excel, Power Point, One Drive, One Note, Outlook programs. Such packages allow to use the distance learning tool - the Microsoft Teams platform (*office365mokykloms.lt*). School X uses an *e-diary*, the digital learning environment *EDUKA class* and environment Moodle, the virtual libraries *ELVIS* and *Vyturys*, and the following systems:

• *Avilys* - a document management system.

• *Paskata* is a personnel management and payroll calculation system, which consists of three integrated modules: 1) personnel management; 2) working time accounting; 3) payroll calculation (*cgi.com/lietuviskai/lt/paskata*).

Table 5. Data on the activities and analysis of School X selected for the research

	Activity	**Corresponding persons**	**Duration of analyzed data**	**Data sources**	**Applied digital tools**
1.	Preparation of summarized information on the achievements, progress and student achievement research data of the school for the last two years	Coordination working group, led by the Deputy Director for Education	2022-2024. 2021-2022	E-diary archive, Folder "School Achievements and Progress Academic Year", stored on the cloud	Tools for E-Diary, Microsoft Excel Workbooks, Microsoft Power Point
2.	Preparation of new information on self-assessment and self-assessment conclusions (for thematic assessment – over the last 2-3 years) Coordination working group, led by the Deputy Director for Education	Coordination working group, led by the Deputy Director for Education	2022-2024 2021-2022 2020-2021	Microsoft Forms archive, apklausa.lt archive Folder "School self-evaluation academic year", stored on the cloud	E-diary, Microsoft Excel Work book, Microsoft Power Point, Microsoft Forms, apklausa.lt,

School X has following information systems installed as:

• Student Register (MR) - a nationwide information system that collects important information about each person's education (*mokiniuregistras.prisijungti.lt*).

• Pedagogical Register (PER) (*nsa.smm.lt/registrai/pedagogu-registras*/).

• Education Management Information System (ŠVIS) – a nationwide information system that provides data necessary for educational entities to analyze and assess the state of education in various aspects, to predict educational change, to make data-based decisions and to implement management that guarantees the quality of education (*nsa.smm.lt/svietimo-sistemos/svis-informacine-sistema*/).

• National Examinations Centralized Information System (NECIS regulations, 2022)

• *E-delivery* – an information system for e-delivery of notifications and documents to individuals and legal entities (*epristatymas.lt*/).

In general education schools, large amounts of data are accumulated in various systems. However, the collected data by themselves do not guarantee changes. Only analyzed, summarized data, and their purposeful interpretation become a starting point for improving school activities. For a comprehensive school to be a successful organization, it must adapt to changing circumstances and challenges, remaining functionality and efficiency. To achieve this, changes are needed in the products and services it provides and uses. Changes, improvements, and possibly new implementations are necessary in the IT infrastructure of the performance quality assessment process. Therefore, the application of the capabilities of the data analytics system Power BI in a comprehensive school was chosen for the experimental study.

4.2. Results of visualization of assessment data

The data collected during the performance of quality of self-assessment of "School Networking" conducted by School X was selected for the study. The data obtained by the survey method, applying questionnaires prepared by the National Education Agency and using the Microsoft Forms survey system. The data obtained during the study are loaded into the data analytics tool "Microsoft Power BI Desktop" and based on them, reports on the results of the surveys of School X and the school's achievements and progress are formed (Figure 2).

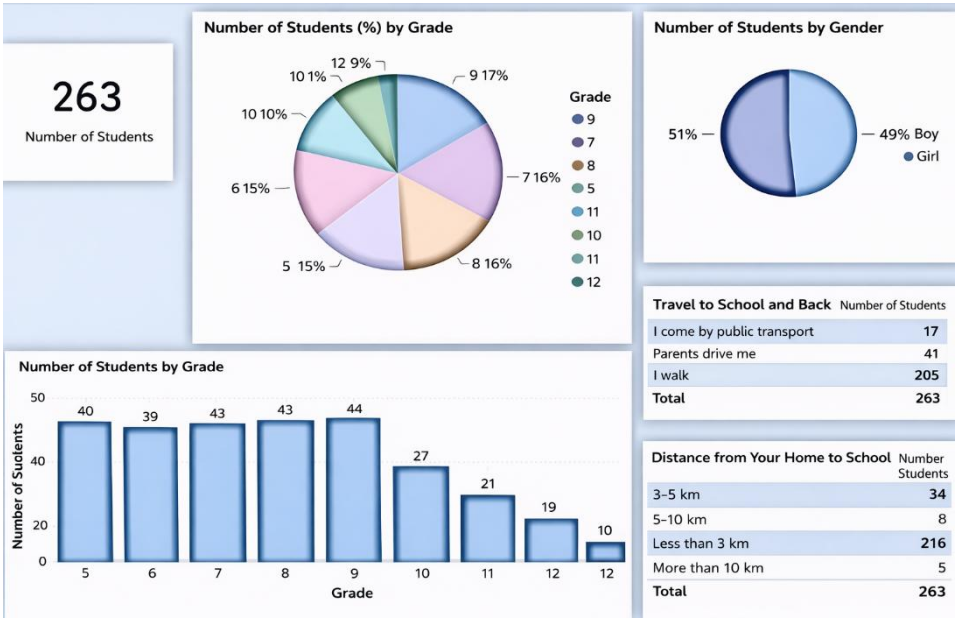

Figure 2. Illustration of report of summarized information about students who participated in the survey

Figure 2 presents general data on the number of students participated in the survey, their distribution by class and percentage of the total number of students, distribution by gender, distance of residence from school, method of arrival at school. This process includes four stages:

- loading data from the data sources;
- creating a data model;
- creating relationships between data;
- data visualization, report creation, applying selected data filters.

The last stage of the research is the generalization of the research results and the formulation of conclusions about the performance of institution. When assessing the relevance of the school website, a report was first compiled summarizing the information of a certain group of respondents, for example, students.

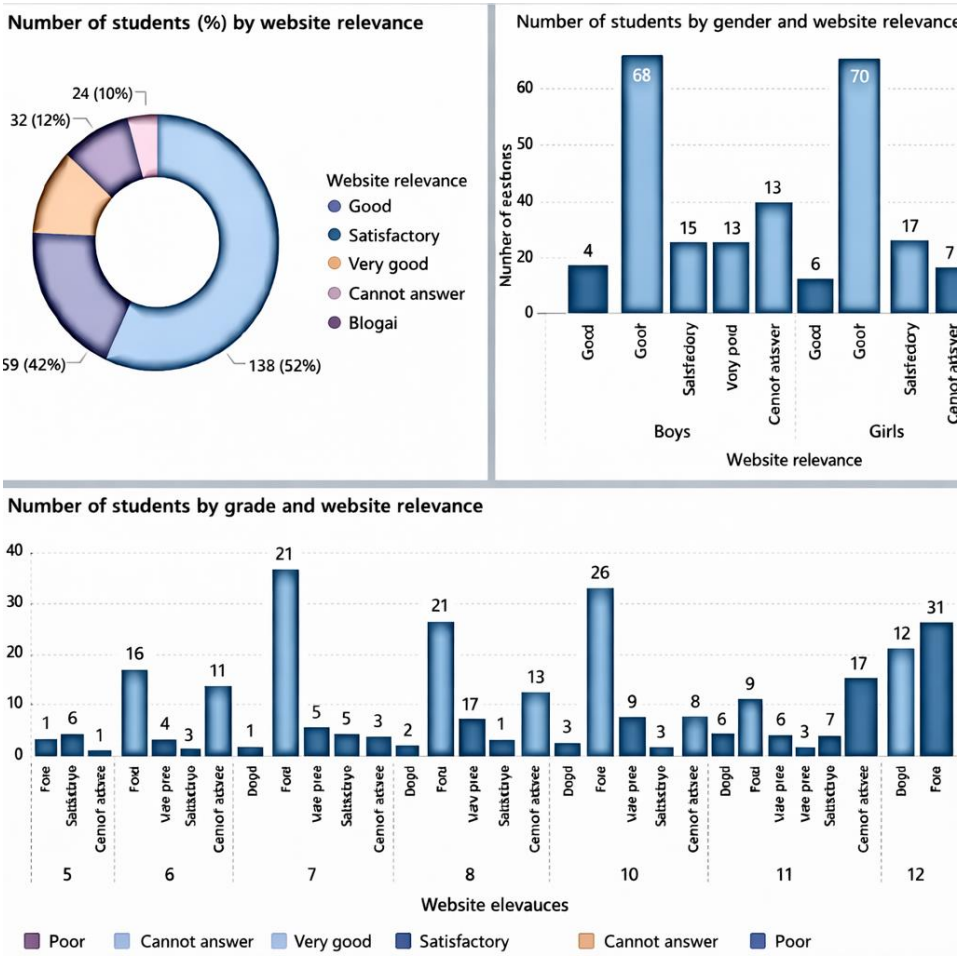

Figure 3. Illustration of report of responses of students to the school website relevance assessment

The results of the answers to each question in the survey are analyzed below. For example, when assessing students' attitudes towards the quality of the school website, the 4 aspects indicated in the survey (relevance, convenience, informativeness, attractiveness), it is possible to provide an assessment of one aspect or combine the assessment of all four aspects in the report, thus creating the possibility of comparative analysis. Figure 3 illustrates how students assess the school website in terms of relevance. The general attitude of students is presented, indicating the number of those who chose one of the possible answers (very good, good, satisfactory, bad) and the percentage of the total number of students.

Figure 4 presents student attitudes towards all four aspects of the website, indicating the number of those who chose one of the possible answers and the percentage of the total number of students. If necessary, evaluators can isolate the assessment of students in a specific class and compare differences in student attitudes by age category.

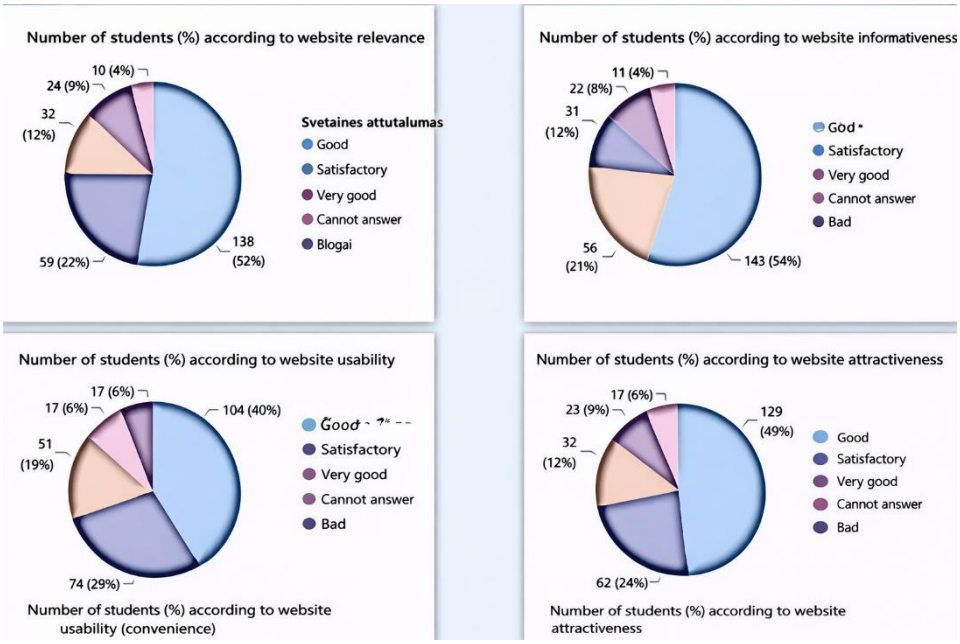

Figure 4. Illiustration of data of School website assessment according to student response results

The same principle is used to form reports on the results of surveys of other respondent groups (teachers and parents). Then, it is possible to conduct a comparative analysis of the views of all three respondent groups on the selected aspect. The results of the application of the data analytics system Power BI during the self-assessment of the quality of school activities enable the conclusions of the experimental study:

• Provides the ability to perform in-depth data processing, including filtering and data transformation before visualization.

• Power BI provides much wider possibilities for creating visualizations than Microsoft Forms, since the diagrams presented in the generated report cannot be selected.

Power BI Desktop allows you to create detailed and interactive reports using various types of diagrams. The diagrams used in the study: column, pie, ring, card, table forms.

• Provides the ability to change colors, fonts, formats, etc., so that the visualization meets the needs of its compilers. There is an opportunity to use visualizations created by third parties, thus further expanding the range of visualizations.

• Visualizations are interactive. You can define interactions between different visualizations in a report.

• Allows you to connect different data sets, allowing you to obtain more detailed insights.

The Power BI Desktop tool has a fairly intuitive and user-friendly interface that makes it easy to upload data, create basic charts and reports. Microsoft Forms is a suitable tool for conducting quick surveys and creating simple charts, while Power BI Desktop is a much more powerful tool for data analysis and visualization, especially when more detailed data analysis, more complex visualizations or the need to integrate and analyze data from various sources are required. Power BI Desktop allows you to reveal deeper insights and provide opportunities to customize reports for specific school needs.

4.3. Definitive statement and recommendations

The study systematically analyzed the application of data analytical tools, specifically Microsoft Forms, Excel, and Power BI, in assessing the quality of activities within Lithuanian secondary education institutions. The analysis focused on the digitalization of assessment procedures, the integration of data-driven self-assessment practices, and the effectiveness of analytical systems in supporting evidence-based decision-making in schools.

The objectives of the research - namely, to identify appropriate analytical tools, evaluate their suitability for educational self-assessment, and propose an adaptable framework for performance evaluation - have been successfully achieved. The findings demonstrate that the adoption of Microsoft Power BI, supported by Microsoft Forms and Excel, provides a scalable and intuitive environment for the collection, processing, and visualization of heterogeneous school performance data. This integration enhances institutional capacity for self-assessment, aligns with the Lithuanian State Education Strategy (2013–2022), and supports the national goal of developing a culture of educational quality based on data analysis.

The key findings are formulated:

- Data-driven self-assessment is increasingly central to quality assurance in Lithuanian education, supported by updated legal and methodological frameworks.
- Microsoft Power BI offers superior analytical and visualization capabilities compared to traditional tools (e.g., Excel or Forms alone), enabling comparative analysis among stakeholders (students, teachers, parents).
- Accessibility and interoperability of Microsoft Office 365 tools ensure cost-effective and widespread implementation potential across schools.
- The integration of qualitative and quantitative methods (survey data, interviews, focus groups) strengthens the validity of self-assessment outcomes.

We would like to recommend for other schools:

- Adopt Power BI within national and municipal education agencies as the primary platform for school-level data analysis and reporting.
- Provide targeted training programs to enhance school administrators' data literacy and ensure consistent application.
- Strengthen theoretical and methodological consistency.
- Align analytical criteria and evaluation indicators with internationally recognized educational quality frameworks (e.g., OECD Education Indicators, EU Education and Training 2030 objectives) while maintaining relevance to the Lithuanian context.
- Promote Data Ethics and Governance Standards.
- Ensure compliance with GDPR and national data protection laws by developing clear guidelines for the ethical use, sharing, and storage of educational data.
- Encourage Continuous Improvement through Feedback Loops.
- Use self-assessment data not only for accountability but also for formative improvement, but for linking analytical insights directly to strategic school development plans.

5. Discussion and conclusions

The theoretical grounded the comprehensive framework of assessment of secondary school performance was developed. The set of evaluation criteria of data analytical tools was proposed. Realized means help to define the framework for assessing the suitability and effectiveness of data analytical tools and implement them in the educational sector. These criteria ensure that tool selection is not merely technical but strategically aligned with national goals of quality education, evidence-based governance, and sustainable digital transformation.

The unified data management framework for assessment of performance of secondary educational institutions have to be created. Such framework has to integrate school-level data sources (e-diary, national registers, survey systems) into a centralized analytics platform to improve data accessibility, comparability, and longitudinal tracking.

The huge data and data heterogeneity forms some problems for analysis of academic performance through data obtained from the self-assessment of secondary educational institutions. The choosing of right analytical tools helps in self-assessment of academical activities of institutions. Proper self-assessment of the quality of activities of education institutions is very important in the process of improving the quality of education. Self-assessment and external assessment of the quality of school activities are regulated by legal acts that establish clear procedures and assessment criteria for the assessment of the quality of activities. The collection of reliable data and their use for formulating of conclusions about course and direction of activities.

The possibilities of providing right data analytical tools for making adaptable self-assessment of the quality of school activities helps in developed of framework of using software tools which implemented and helped in collection, analyze and visualization of heterogeneous data. Microsoft products, such as Microsoft Forms, Microsoft Excel, Microsoft Excel Pivot and Microsoft Power BI, as main tools are recommended for the self-assessment of the quality of school activities due to their accessibility and functionality. The Microsoft Power BI tool is distinguished as the main data analysis and

visualization tool due to its advanced functions and capabilities, which are adapted not only to business, but also to education institutions.

The study demonstrates that the stated objectives have been fully met, confirming the feasibility, effectiveness, and relevance of integrating modern data analytical tools into Lithuania's secondary education quality assessment process. The approach not only modernizes institutional evaluation processes but also builds a sustainable foundation for data-informed governance and educational improvement.

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