Approaches and Tools for Quality Assurance in Distance Learning: State-of-play

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Abstract—In recent years, distance learning has become an increasingly popular mode of education due to its flexibility and accessibility. However, the quality of distance learning programs has been a cause for concern, which has led to the development of various approaches and tools for quality assurance and assessment. This review article aims to provide an in-depth analysis of the current state of play of quality assurance in distance learning. The paper discusses the fundamental requirements to establish quality in distance learning and the challenges associated with ensuring quality in this mode of education. Then it explores the different approaches and tools used for quality assurance and assessment, such as course evaluations, self-assessments, and external reviews. In addition, the paper delves into the development of regulatory documents and manuals for quality assurance, which are essential for ensuring that distance learning programs adhere to established standards. It also discusses in detail the importance of audits and accreditations from assessment organizations in assuring quality in distance learning. As the satisfaction of all stakeholders (including students, faculty, and administrators) is crucial for ensuring the success of distance learning programmes, the paper highlights the various measures HEIs can take to ensure stakeholder satisfaction. Finally, the article discusses the processing of statistical data and performance indicators, which can provide valuable insights into the effectiveness of distance learning programmes.

Keywords—Distance learning; quality assurance; assessment; stakeholder satisfaction; regulatory documents; performance indicators

I. INTRODUCTION

The rapid adoption of distance education in higher education institutions (HEIs) worldwide has brought about demands from scientific and technological developments and some challenges to quality, including technological problems, administration, instructional methods, and student barriers. Quality management in distance learning courses is vital for improving the overall educational experience, yet the indeterminate definitions of quality make it challenging to evaluate effectively [1]. Students and educators face barriers such as low self-organization, lack of effective interaction, and a sense of isolation that can decrease their satisfaction with online learning. While distance learning courses have prevented transfer from theory to design practices, using a quality assurance model for web-based learning and implementing benchmarks[2], e.g. in course development, teaching/learning process, course structure, and faculty support categories, can help. The six dimensions for measuring service quality in distance education are tangibles, reliability, responsiveness, delivery, assurance, and student participation [3].

The shift towards distance learning has also raised concerns about the impact on crucial social learning aspects, particularly for early elementary children and vulnerable student populations. The move to a distanced setting has reduced opportunities for face-to-face interaction, which is essential for promoting collaboration, teamwork, and socialization. However, the use of innovative technology, such as virtual classrooms, online discussion forums, and social media platforms, can provide alternative ways for students to interact and engage with their peers and instructors [4]. Furthermore, the quality of distance learning depends only on the course design and delivery but also on the level of readiness and support provided by the government and educational institutions. There is a significant association between parents' satisfaction with the quality of education, how they assess teachers' competencies and the level of government readiness to switch to a distance learning format [5]. Therefore, it is essential HEIs to ensure adequate resources and infrastructure and that instructors are adequately trained and equipped to deliver quality distance education.

Another concern is while distance learning cannot replace traditional education to a full degree, it can serve as a valuable complement. HEIs can utilize distance learning to enhance the knowledge and skills of students in various areas [6], such as emerging technologies, digital literacy, and educational technology. Moreover, the relationship between teachers and students has been identified as a significant factor in determining students' satisfaction with distance learning courses. A positive teacher-student relationship plays an intermediary role when linking the attitudes and behaviour of teachers with students' overall satisfaction with learning courses [7].

Additionally, distance learning cannot fully substitute traditional learning forms in HEIs, but distance learning can provide valuable enhancements. It is crucial to acknowledge that transitioning to distance learning may limit certain social learning aspects, particularly among younger students and vulnerable populations. However, HEIs can leverage distance learning to reduce costs and attain sustainable advantages [8]. Furthermore, the relationship between the attitudes and behaviour of teachers and students' overall satisfaction with their courses should be examined through mediation,

underscoring the critical success factors within the quality assurance framework.

Although the topic of quality assurance of distance education has been widely studied by researchers for decades, there is a need to systematize all possible ways to ensure the quality of education.

This paper explores the essential components of quality management in distance education. Section II delves into the specific requirements needed to ensure quality in distance learning. It examines the fundamental aspects that must be considered and implemented to maintain high standards in delivering educational content. Section III focuses on the various definitions of quality in the context of distance learning. As reports of the diverse perspectives and interpretations of quality, this section provides clarity and understanding of the concept, laying the foundation for efficient evaluation. The paper then discusses approaches and tools for assuring and assessing quality in distance education. These include the development of normative documents and manuals that serve as guidelines and benchmarks for quality assurance. In addition, the section emphasizes the importance of conducting audits and accreditation by reputable assessment organizations. The paper further highlights the significance of gathering feedback through periodic surveys among stakeholders, including academic staff, students, and external entities. Finally, it explores the utilization of intelligent data analysis tools, enabling deep insights into the effectiveness and quality of distance learning programs. The Conclusion summarizes the contributions and plans for future work.

II. QUALITY OF DISTANCE LEARNING: DEFINITIONS

Researchers and various stakeholders (students, teachers, HEIs leadership, employers, external evaluators, etc.) widely discuss issues related to the quality of distance learning. All emphasize the need for a better understanding of the aspects that contribute to achieving high quality in distance learning programs [9]. There is no universally accepted definition of quality in distance learning. Quality is a multidimensional concept encompassing a wide range of products, services, supplies and philosophies and attempts to meet the needs and expectations of students and various stakeholder groups with different interests [10].

According to Robinson [11], the quality of distance learning can be the result of various factors, both internal and external to the HEI, for example, the skill levels and experience of the staff, the number of resources available, weak or strong leadership, the effectiveness of administrative systems and the communication infrastructure.

Some researchers emphasize adherence to standards and procedures [10],that apply to each course and influence course design, course layout and the amount of learning content. Burns [12] defines quality as adherence to a set of standards for content, design, and instruction, and Lassoued, Alhendawi, and Bashitialshaaer [13] - as a set of procedures and guidelines adopted in the educational institution that supports the management of the organization and provision of services. According to Roe [14], significant components for developing quality distance courses are the assurance of rich multimedia,

asynchronous communication, and faculty mentoring. Achieving quality teaching and learning is a complex endeavour involving multiple dimensions [15], including curriculum design and course content, learning contexts, use of feedback, assessment of learning outcomes, learning environment, and student support services.

Other researchers emphasize the design and delivery of training. To achieve a high quality of training, the academic staff must have experience in developing educational content for distance learning [16], skills in using technology, and applying modern pedagogical approaches to teaching and guiding students in the learning process [17-24]. In addition, educators should implement forms of communication and interaction that are student-centred and encourage their active participation in the learning process [25], provide support to students [26], and use forms of assessment consistent with individual or group distance learning approaches and stimulating critical thinking [16]. Elias [27] presents eight instructional design principles for the quality of distance learning courses - Equitable Use, Flexible Use, Simple and Intuitive, Perceptible Information, Tolerance for Error, Low Physical and Technical Effort, Community of Learners and Support, and Instructional climate. According to McClary [28], high-quality distance courses are those in which the learning content is up-to-date, each module contributes to a specific course objective, the instructor provides the necessary support to students, and there is an effective support system. Lee and Dziuban [29] believe that the success of e-learning largely depends on strategies for evaluating the quality of the distance learning program. Grutzner, Weibelzahl, and Waterson propose four dimensions for assessing the quality of e-courses [30]: the content of learning materials, presentation of learning materials, teaching style, and overall course functioning. According to them, HEIs must consider these dimensions simultaneously and continuously throughout the life cycle of learning e-courses to ensure a high-quality product. Clayton Wright sets out criteria for evaluating the quality of e-courses [31], including general course information, information accessibility, course organization, language, layout, goals and objectives, course content, learning strategies, practice opportunities, learning resources, and assessment.

A third group of researchers emphasize student outcomes [12] and argue that the quality of distance learning can be spoken of when there is evidence that students leave with relevant knowledge and skills for post-graduation employment and employer satisfaction. A significant factor in improving desired learning outcomes and student satisfaction is students' engagement during learning [32-33]. According to Markova, Glazkova, and Zaborova [1], student satisfaction is influenced directly by the skills of teachers to use active learning techniques effectively, integrating high-level interaction and collaboration in instructional design, and ensuring high-quality and timely support and resources for learners.

Another group of researchers defines more components for the quality of the learning process in distance learning. According to Zaman, Ghosh, Datta and Basu [34], the quality of e-learning depends on the quality of the learning content, the quality of the learning management system from a technological point of view (ease of use, reliability, etc.) and

the quality of services (support of e-learning participants). Montedoro and Infante indicate three dimensions of the quality of learning management systems [35]: Technology, Content and Services. Lanzilotti, Ardito and Costabile [36] define the quality of the learning management system as the extent to which the technology, interaction, content, and services offered match the expectations of teachers and learners and enable them to teach/learn with pleasure.

Opponents of distance learning outline issues related to the quality and effectiveness of distance education compared to conventional educational models caused by several reasons. The main one is the ever-increasing demand for informed human resources to participate effectively in the global market [37]. Proponents of distance learning [25], [38-39] argue that distance learning should be as effective as face-to-face learning. HEIs can prove this by demonstrating that the quality of content, delivery, assessment, and outcomes in distance learning is equal to or better than traditional forms of education [9].

E-learning and distance learning are growing in popularity during the COVID-19 pandemic. The imposed restrictions catalyzed the digital transformation and modernization of all educational processes [10], [40-43], including in universities without previous experience in organizing and conducting distance learning. The forced transition to online learning presents HEIs with the challenge of fully transitioning to online learning while maintaining the quality of the education provided [44]. It also increases the interest of researchers in developing tools for assessing the quality of the functioning of educational software in HEIs [10], [43] and identifying elements that influence student satisfaction and allowing HEIs to develop strategies to ensure the quality of digital transformation [42].

According to Robinson [11], an aspect that is receiving increasing attention is how HEIs manage their quality regardless of their structure, context, or circumstances. Quality assurance is an approach to quality management that focuses on process management and aims to demonstrate and improve the quality of educational products and outcomes, to enable systematic management and monitoring of performance against set objectives [11]. Implementing a quality assurance system in higher education requires a share of responsibilities between the managers and all stakeholders [45-49]. It implies solving challenging tasks to address multiple dimensions, aspects, and meanings of quality from different perspectives and interests [10]. The quality assurance system may include a well-defined set of principles and procedures for achieving the overall goals of the institution, standards of achievement, established ways of responding to problems and clear accountability for results, a plan for training and development of staff, monitoring procedures of performance [10-11], [38]. Because HEIs must make continuous efforts to exceed the expectations of students and stakeholders, a good quality assurance system must be focused on student satisfaction [10] and periodically updated. As a result of implementing a systematic and consistent quality assurance system, HEI receives greater public trust, improves its reputation and image, and students are more satisfied and more inclined to recommend the institution.

Whatever approach to quality management is adopted, higher education management needs resources and tools to manage ongoing processes effectively. According to Robinson [11], quality management can be supported by information from core functional areas (finance, student records, etc.) and data from monitoring, evaluation, and satisfaction surveys. Researchers argue that quality can be monitored by looking at the impact of higher education in terms of evidence of high-quality student performance, including wages, employer satisfaction, and success in further study. For monitoring purposes, HEI may also collect personal data.

An effective quality assurance system includes continuous quality assessment [10]. While the internal evaluation is the basis for improvement, external evaluation serves as a benchmark, ensures public trust, and conforms to generally accept good practices for organizing and conducting distance learning.

The hardships in defining the meaning of quality pose challenges in developing quality assessment models and tools [50]. Researchers believe that distance learning programs, in addition to specific criteria [51], should be assessed according to the evaluation criteria of full-time programs [52]. Quality can be measured by student engagement and satisfaction [28], [53-54] and their attitude towards distance learning. In addition to evaluating the quality of the training, HEI can use the student feedback to develop and promote courses and programs for teachers' professional development and take results into account during the attestation of the teachers and when making decisions about their promotion.

III. RESULTS: APPROACHES AND TOOLS FOR QUALITY ASSURANCE AND EVALUATION

The known approaches to ensuring and assessing the quality of distance learning can be divided into five main groups:

- Development of normative documents and manuals for quality assurance.

- Conducting audits and accreditation by evaluation organizations.

- Conducting periodic surveys among stakeholders (academic staff, students, external stakeholders).

- Processing of statistical data and performance indicators, including by using intelligent data analysis tools.

In most cases, these approaches are applied mixed to provide a comprehensive set of data allowing the evaluation of the quality of distance learning and taking measures to improve it.

A. Normative Documents and Manuals

To ensure quality, some universities worldwide develop, adopt and implement internal regulatory documents written following current national and regional regulations and laws. An example of such regulatory documents created for the needs of organizing and conducting distance learning in Bulgaria is presented in the book "Quality and Assessment of

e-learning (with good university practices)" [55]. The proposed package of documents includes a Strategy for the development of distance learning, Regulations for organizing and conducting distance learning, a Student Support System, a Handbook on the rights and obligations of students, Methodology for preparation, organization, and conduct of distance learning, Testing, and evaluation system, Guidelines and standards for development and acceptance of learning documentation, Procedures, and regulations for actions in case of complaints, Procedures for punishing and preventing plagiarism attempts, Directory for organizing access to electronic resources, Regulations for technical and techno-logical provision of training, Document for accounting for the specifics of workload, Measures, and procedures for restoring the infrastructure in case of damage or breakdown.

Many independent organizations worldwide promote and support quality improvement, develop and publish quality assurance guidelines and frameworks, disseminate information on good practices for the organization and delivery of distance learning, and encourage the creation of practitioner networks [56] which can contribute significantly to quality assurance. Examples of such organizations are the European Association of Distance Learning Universities (EADTU), the British Open Learning Association, the Canadian Distance Learning Association, the Norwegian Distance Learning Association, and the International Council for Open and Distance Learning (ICDE). The European Commission for Standardization CEN develops frameworks, specifications, and guidelines to improve the quality and transparency of organizations, products, processes, and services for e-learning. There are currently four published documents: CWA 15555:2006 Guidelines and Support for Building application profiles in E-learning; CWA 15660:2007 Providing good practice for E-Learning Quality Approaches; CWA 15661:2007 Providing E-Learning supplies transparency profiles; CWA 16655-1:2013 In LOC – Part 1: Information Model for Learning Outcomes and Competences.

The Higher Learning Commission [57] developed Assessment Guidelines setting out nine hallmarks of distance learning quality and providing suggestions for sample evidence documents for each. The European Association of Distance Learning (EADL) aims to increase the quality of distance learning and provide student benefits. EADL organizes for its members a forum for open discussions on all matters related to distance learning and for the sharing of ideas and good practices. All association members must meet the quality standards and abide by the code. Minimum quality standards include requirements for pre-enrolment, counseling, examinations, face-to-face training, enrollment and contract, management, instruction, and technology-based learning. Across Europe, EADL membership is seen as a mark of quality. The International Council for Open and Distance Education (ICDE) published a comprehensive global review of quality models in online learning [58], which concluded that a systematic quality assurance process is needed to design distance programs. In the strategic plan for the 2021-2024 period, ICDE sets as its goals the advocacy of distance learning worldwide, the promotion of membership in the organization,

promoting quality in digital, open and flexible learning, and ensuring sustainability.

The Australasian Council on Open, Distance, and e-Learning (ACODE) [59] is developing criteria for using technology in higher education. The ACODE proposes 65 performance indicators covering eight thematic areas (Institution-wide policy and governance for technology-enhanced learning; Planning for institution-wide quality improvement of technology-enhanced learning; Information technology systems, services and support for technology-enhanced learning; The application of technology-enhanced learning services; Staff professional development; Staff support for the use of technology-enhanced learning; Student training for the effective use of technology-enhanced learning; Student support for the use of technology-enhanced learning). Each indicator includes scoping statements, good practice statements, a set of performance indicators, and performance measures for each indicator using a five-point rating scale. Each indicator can be used as an independent indicator, or all indicators to be used together for an overall evaluation.

The Asian Association of Open Universities (AAOU, https://aaou.ouhk.edu.hk/) develops Quality Assurance Framework for open and distance learning. It contains 107 statements of good practice for achieving quality, divided into ten categories: Policy and Planning; Internal Management; Learners and Learners 'profiles; Infrastructure, Media and Learning resources; Learner assessment and evaluation; Research and Community Services; Human Resources; Leaners Support; Program Design and Curriculum Development; Course Design and Development.

B. Audits and Accreditation by Evaluation Organizations

Sound quality assurance practices combine self-assessment with external quality assessment by quality assurance and assessment organizations. Accreditation by external accreditation ensures that HEI complies with accepted quality standards and can conduct distance education. Accreditation takes place every few years, depending on the accrediting agency. The accreditation process usually includes the following steps:

- Self-assessment.

- An on-site visit by the expert group, which determines the extent to which the HEI fulfills, the accreditation standards based on a review of supporting documents, conducting interviews with staff and students, and observing distance learning activities.

- Development of a written evaluation report describing strengths and recommendations for improvement in terms of accreditation standards.

- Preparing annual reports on the implementation of the recommendations made.

Kirkpatrick believes that accreditation and assessment are valuable for three reasons [38] - it allows governing bodies to identify challenges and take measures to improve curricula, it catalyzes processes to improve the individual capacity and

qualifications of teachers, it gives a sign of quality and excellence in distance learning programs.

The International Organization for Standardization (ISO) develops the ISO/IEC 1976 series of standards, harmonizing the international concept of e-learning quality by describing the processes influencing the achievement and maintenance of e-learning quality [60]. These processes include content and tool creation, service delivery, training and education, monitoring, evaluation, and all life phases from needs analysis to optimization.

The international organization Quality Matters Program (Quality Matters, https://www.qualitymatters.org/) develops a series of rubrics that meet the specific needs of different educational sectors. The quality rubric contains eight core standards (Course Overview and Introduction, Learning Objectives, Assessment and Measurement, Instructional Materials, Learning Activities and Learner Interaction, Course Technology, Learner Support, Accessibility, and Usability) and 41 specific standards for evaluating the quality of online and blended courses, explanations on the application of the standards and the relationship between them, a scoring system and a set of tools that facilitate the assessment process. Three certified reviewers review each course and make specific recommendations for course improvement, the implementation of which will contribute to compliance with quality standards. To be certified learning course must receive at least 85% of the possible points. Certified courses receive a stamp with the year of certification valid for 3-5 years.

The European Foundation for Quality in eLearning (EFQUEL, http://efquel.org/) seeks to promote good practice and innovation to achieve high-quality learning worldwide. The primary mission of EFQUEL is to increase the quality of e-learning in European countries by providing services and support to all interested parties. According to EFQUEL, the European Quality Assurance System will strengthen the trust in the quality of e-learning and serve as a reference point worldwide. The Foundation believes that classical approaches to quality assessment (such as defining and documenting minimum requirements for infrastructure, staff competence, administrative services, and technical standards are inadequate if the goal of the quality assurance process is to encourage innovation in e-learning. EFQUEL presents a list of elements divided into five parts (Design principles, Agreement to monitor the quality of teaching practice as a whole, General focus on innovation and transformation of the organization and commitment to the competent customer, Principles for conducting negotiations and when it is possible consensus among partners, Agreement on five steps necessary to obtain accreditation), which can serve as a starting point for creating an alternative approach to quality assurance. EFQUEL develops three quality assessment tools – ECBCheck, UNIQUe and Sevaq+.

ECBCheck (ECBCheck, http://www.ecb-check.org/) is a certification framework for e-courses and programs developed by EFQUEL. The quality of e-learning courses and programs is assessed in seven areas (information about the organization of the e-learning program, target group orientation, content quality, program/course de- sign, media design, technology,

evaluation and review) with 51 quality criteria, some of which are mandatory. The educational institution is awarded a quality label after evaluating 51 quality criteria divided into four areas (education and training, organizational strategies and innovations, organizational processes, technologies, equipment and infrastructure), some of which the evaluated institution must fulfill. At the first stage of the assessment, the reviewers check the extent to which the institution met all mandatory criteria. The institution passes to the second stage if it fulfils these mandatory criteria. In the following evaluation stage, reviewers assess the optional quality criteria on a four-point scale (0 – not implemented, one – partially implemented, two – adequately implemented, three – excellent implemented). The final result of the evaluation is the percentage ratio of the sum of the optional criteria and the maximum possible points.

UNIQUe [61] is a quality label awarded to a university for the quality use of information and communication technologies. The evaluation focuses on using information and communication technologies to enhance educational provision and learning support throughout the entire breadth of activity of HEIs. The HEIs who apply must meet the standards for program objectives, program structure, content, resources and learning processes. The assessment process takes place in 6 steps – Application. HEI Eligibility check, HEI Self-Assessment, Peer review by a three-person review team, Decision making for Certification by Awarding Body, and Continuous monitoring of ICT policies in line with the recommendations.

The self-assessment model of e-learning quality SEVAQ [61] was developed based on the Kirkpatrick and EFQM models. The model includes a set of criteria and sub-criteria that cover all aspects of the organization. Internal evaluators assess the quality of training and fill out a questionnaire expressing their agreement level with formulated statements. SEVAQ+ is an extension of SEVAQ [66] developed to allow managers and teachers to participate in the self-assessment process in addition to students. The model covers two main aspects: management of the learning process and resources and management of people. The tool offers both a core of questions and opportunities for a personalized assessment. Assessment results are available in real-time and in different formats, from radial graphs that provide a snapshot to raw data that can be imported into other tools. By identifying areas for improvement, the tool enables institutions to track progress from one semester to the next and compare teaching and learning across institutions. Among the main advantages of Sevaq+ is the combination of a robust assessment framework with the flexibility needed to cover a wide range of institutional and individual contexts.

The Open and Distance Learning Quality Council (ODLQC, http://odlqc.org.uk/) contributes to ensuring the quality of education, protecting student interests, and developing standards for quality assurance in education. The proposed standards for quality assurance in open and distance learning are divided into six sections: results, resources, support, sales, suppliers, and collaboration.

After analyzing European policies and projects, the good practices of nine national HE evaluation agencies, and studies

in the field, the Swedish National Agency for Higher Education developed the ELQ model [62-63]. The ELQ model contains ten aspects for evaluating the quality of e-learning in higher education - Material/content; Structure/Virtual Environment; Communication, cooperation, and interactivity; Student assessment; Flexibility and adaptability; Support (students and staff); Vision and institutional leadership; Staff qualification and experience; Resources allocation; Holistic and process aspect. For each of these aspects, the authors develop quality criteria in the form of recommendations for taking specific measures to address problems and issues at the institutional level.

The Distance Education Accrediting Commission (DEAC) produces a handbook detailing accreditation standards, policies and procedures. The accreditation handbook sets out expectations for academic quality, educational services, continuous improvement and ethical business practices for institutions proposing distance learning. This handbook contains 57 main components distributed in twelve quality standards covering all aspects and policies of distance education [64]: Institutional Mission; Institution Effectiveness and Strategic Planning; Program Outcomes, Curricula and Materials; Educational and Student Support Services; Student Achievement and Satisfaction; Academic Leadership and Faculty Qualifications; Advertising, Promotional Literature and Recruitment Personnel; Admission Practice and Enrollment Agreements; Financial Disclosures, Cancellations and Refund Policies; Institution Governance; Financial Responsibility; Facilities, Equipment, Supplies, Record Protection and Retention. The accreditation process assesses an institution's ability to meet all accreditation requirements. DEAC expects institutions to provide evidence of compliance with all specified requirements. Feedback on the institution's performance against these standards can help the institution improve the quality of instruction. DEAC approval is seen as a recognition of quality standards.

The European Association of Distance Learning Universities [65] is developing a Quality assessment for e-learning: a benchmarking approach manual [66]. The organization awards an Excellence award to institutions that ensure the high quality of distance learning. The Quality Assurance Agency for Higher Education (QAA) highlighted the importance of considering student workload carefully in module design and ensuring these expectations are consistent and explicit [67].

Governments refer to published quality assurance frameworks as a reference for establishing their national higher education quality assurance systems [68]. From the beginning of the 1990s, they began to promote the adoption of policies and the creation of national or regional quality assurance agencies and to link public funding of education to quality. The assessment, accreditation, and quality control of distance learning in Bulgarian universities and scientific organizations is carried out by the National Agency for Assessment and Accreditation based on relevant criteria systems and procedures for quality assessment and accreditation. The evaluation is going on in two stages (NAOA, 2017) - I. Evaluation of the organization and environment for conducting and maintaining distance learning, II. Evaluation of a concrete distance learning program. In the self (assessment) report for the organization and the environment for conducting distance education, HEI must provide evidence of compliance with seven criteria related to educational documentation, internal quality system, procedures for developing and updating doc-augmentation, methodological standards for documentation, internal normative documents, policy for the development of the scientific and teaching staff, material-technical and information base. In the report on the (self) assessment of a distance learning program, HEI must provide evidence of compliance with three criteria for implementing the procedures for developing and updating study documentation, rules and activities to stimulate student motivation and financial, material-technical and information base.

C. Periodic Surveys among Stakeholders

Research for ensuring the quality of distance learning dates back to decades ago, resulting in several models and approaches proposed for evaluating and assuring the quality of distance learning by various stakeholders.

The E-Learning Maturity Model (eMM) [69] is a capability assessment model for e-learning processes based on the CMMI and SPICE models. Version 2.3 of the model allows the evaluation of 35 e-learning processes divided into five groups giving an idea of the e-learning maturity degree: Learning, Development, Support, Evaluation and Organization. The authors indicate five e-learning maturity levels: Optimization (continuous improvement of e-learning processes in all aspects); Management (ensuring the quality of resources and student outcomes at the exit); Definition (defining eLearning development and maintenance processes); Planning (clear and measurable goals of eLearning projects), Delivery (creating and delivering process outputs).

Ehlers [70] proposes the requirements for the quality of e-learning from learners' perspective structured into seven groups which include 30 dimensions (a set of criteria from the preferences of learners, grouped based on empirical evidence): Tutor Support; Collaboration; Technology; Cost-Expectations-Benefits; Information Transparency of Provider/Course; Course Structure/Presence Courses, and Didactics.

The SEEQUEL quality framework contains an integrated set of criteria for evaluating the quality of e-learning. The framework proposes three main quality criteria (Learning Processes, Learning Resources, and Learning Context) and 137 sub-criteria [70]. Quality criteria that apply to e-learning can be weighted by different users (people or HEI) using a table with two columns. The first column contains a list of criteria (objective dimensions) for determining quality, and in the second column, stakeholders can put a quantitative assessment of the quality criteria, determining its importance for determining the quality of the object (2 – basic criteria, 1 – important criteria, 0 – minor criteria).

The HELEN model [71] allows the evaluation of the quality of the SE based on 46 criteria divided into six dimensions (Supportive Issues, Learner Perspective, Instructor Attitudes, Technical Quality, Information Quality, and Service Quality). The model allows the learning management system to be evaluated only from the student's point of view. Ozkan and

Koseler emphasize the possibility of its expansion to assess the quality of the learning management system also by other stakeholders - developers, administrators, teachers, designers, external experts, etc.

iQTool [72] is a tool for evaluating the quality of teaching in e-learning curricula and the quality of learning materials. The tool allows creating questionnaires, using the questionnaires for quality assessment and has statistical analysis capabilities to improve the quality of learning materials and teaching. The software tool supports four roles – Assessor, QA Manager, Publisher, and Administrator. The repository for evaluation components offers possibilities for storing and retrieving user profiles and evaluated objects, given within the framework of evaluation procedures answers, definition, and calculation of statistical indicators based on the given answers. The build-on repository is based on IMS Digital Repositories Interoperability. HEIs can integrate the tool with learning management systems. The evaluation module acts as an intermediary between the learning management system and the evaluation component and allows retrieving appropriate questionnaires from the repository according to the object type. The tool records the evaluation result in the repository as a document in IMS QTI Results Reporting format with the user's identification numbers, the resource, and the questionnaire used.

Within the framework of the Excellence project, two tools for assessing the quality of e-learning have been developed - QuickScan (for quick orientation) and FullAssessment (for full assessment) [73] with 33 indicators divided into six areas: Strategic management, Curriculum design, Course design, Course delivery, Staff support, Student support. The QuickScan tool provides a quick insight into the strengths of the eLearning delivered and possible areas for improvement. The questionnaire should be completed by a small team, including representatives of different stakeholders: managers, e-course authors, teachers, and students. The team members can also determine how appropriate the indicators are for evaluating quality in the institution. To prove that the answers are based on facts, it is mandatory to accompany them with supporting documents. FullAssessment makes it possible to determine the effectiveness of e-learning programs and the requirements for improvement by having e-learning experts review the supporting documents and, after a site visit, prepare a report on the overall process and recommendations for improvement. Within the Excellence Next project, some of the indicators for evaluating the quality of e-learning have been updated. The number of indicators for quality assessment is 151.

PDPP is an e-course quality assessment model developed based on the CIPP assessment model [74]. The model allows the evaluation of four phases of the e-learning life cycle: Planning (marketing, applicability, target group, course objectives, funding); Development (design, learning materials design, course web page design, flexibility, student interaction, faculty support, technical support, evaluation); Process (technical support, website usage, interaction, evaluation and support during learning, flexibility); Product (student satisfaction, teaching effectiveness, learning effectiveness, and sustainability).

The e-learning self-assessment tool e-Lsa [75] allows evaluation of the quality of organizations offering e-learning through a set of main criteria and sub-criteria covering aspects related to the organization of learning. For each sub-criterion, the authors define a set of measurable indicators. These indicators are formulated as statements, and the quality is measured through self-assessment by various stakeholders. The self-assessment model is divided into two parts. The first part contains 41 indicators for self-evaluation of the course and the learning process by students at the end of the e-course. The second part includes nine indicators for self-evaluation of learning management (by managers and teachers). A corresponding questionnaire has been developed for each of the two parts. At the end of the assessment, the system analyzes the answers and generates a report that allows the manager to identify the strong and weak criteria and identify the reason for the poor results.

The integrated system for evaluation and improvement of the quality of e-learning [33] allows the assessing the quality of the learning management system in a university consortium based on factors divided into five main groups: Learning objects (quality, validity, media, presentation, copyright), Learning Object Design (concept identification, pedagogical style, media enhancements, interactivity, tests and feedback, interaction, content portability standards, content aggregation), Learner Services (identification, portfolio, records for student activity), Program Presentation (design of graphic elements, colour scheme, font, navigation, interface) and Technology Infrastructure (network frequency, end-user system configuration, server configuration, browser, DB connection, technology, operational compatibility). Based on the above five categories, a questionnaire was developed in which the experts had to rate the characteristics and sub-characteristics. When new course content is added, a message is sent to the experts who must evaluate the content, design, and course presentation and suggest changes. In the proposed evaluation framework, student activity (last login, time, course content read during the session, etc.) is monitored, and feedback and suggestions for improvements are sent based on student performance.

The model proposed by Giorgetti, Romero and Vera [76] for evaluating the quality of distance learning is based on the model for accreditation of distance learning programs of the National Commission of University Evaluation and Accreditation for Evaluation and Accreditation of Universities in Argentina CONEAU and Lorenzo Garcia Aretio's integrated distance university evaluation model. The model assesses three dimensions of the conducted distance learning courses: Professional learning (evaluates students' activity during the training), University Management and Administration (measuring the fit between the university's mission, vision, and goals set for continuous improvement), and Student Support (assessing the ability to allocate material and human resources and their management as part of the learning process). The authors suggest that the quality assessment indicators be divided into six main categories (Functionality, Effectiveness, Efficiency, Availability, Information, and Innovation) and arranged in a table. The frequency with which each indicator must be measured is also defined, and a formula is introduced to calculate the indicator value.

Messo [9] offers an approach for assessing the quality of open and distance learning programs from the students' perspective based on qualitative and quantitative methods. Messo proposes to evaluate indicators in seven areas - registration procedures, access to course instructors, administrative processes, course materials, instructional methods, clarity of syllabus, and exam processes. The collected primary data are analyzed using IBM-Statistical Package for Social Sciences (SPSS version 19) by calculating the mean and distribution frequencies and presenting the results in tables, charts and other statistical presentations. The proposed approach was experimented with evaluate the quality of programs at the Open University of Tanzania by 305 students.

Markova, Glazkova, and Zaborova [1] propose a tool for evaluating the distance learning environment from students' perspective and identifying areas where university administrators, teachers, and technicians can improve their work, to ensure high-quality distance learning. Students rate quality indicators in five domains (interaction and collaboration, instructional design and delivery, assessment, student support services, and e-course design) on a five-point Likert scale. With the proposed tool, quality assessment experiments were conducted among 830 students.

Stracke [77] proposes the Open Ed Quality Framework, which conceptualizes the development of quality at three levels (micro, meso, and macro) and in three dimensions (goals, implementations, and achievements). In this framework, learning designers and learning designs are seen as crucial stakeholders and entities that occupy a meso-level role in the implementation dimension and play a significant role in the quality assurance and evaluation process.

Beskrovnaya, Freidkina, and Vinogradova [78] propose an approach to design tools for monitoring learning outcomes that allow the assessment of shaping competencies most demanded by the labour market. The empirical basis of the study is the results of the analysis of normative and legal documents on distance learning, information published on the Internet about the educational activity of universities using distance learning technologies in the educational process, scientific research on distance learning, materials of personnel selection agencies, means of learning control (Interactive elements in the lecture, Use of materials created based on the theory of the test to test knowledge, Project implementation).

A team from Plovdiv University is developing a range of tools for evaluating the quality of e-courses and digital resources from the perspective of students and experts in distance learning [79]. The questionnaire for students includes 49 questions divided into 11 areas: learning documentation and educational objectives, distance learning provision team, infrastructure, distance learning preparation and delivery, information support, learning materials and activities, communication, assessment, support, design, and recommendations. The questionnaire developed for experts allows them to evaluate the quality of an e-course regarding content (including basic information), positioning (by composition and type), and design (including model, interactivity, multimedia, communicability, performance, ergonomics and functionality in a hardware and software

environment). Each course and digital resource should be evaluated by at least three experts. The questionnaire for experts contains 50 questions from ten areas: learning documentation and educational objectives, distance learning provision team, distance learning implementation infrastructure, training preparation and delivery, learning information support, learning materials and activities, communication, evaluation, support, and design. The questions require a response on a 5-point Likert scale. With the proposed set of tools, 3350 students evaluated the quality of e-learning in 101 e-courses. By providing automated means for synthesis and analysis of the results for all e-courses, the quality of the e-courses has been assessed by professional directions and areas of higher education. Developed software tools for monitoring student activity in conducted surveys and for subsequent analysis of survey results allowing authorized users to generate summary reports, monitor ongoing surveys, and analyze interim data in real-time.

Firdoussi and colleagues [80] conducted a study to evaluate distance learning in Morocco during the COVID-19 pandemic among 3037 students and 231 teachers. The study explores the limitations of e-learning platforms and how public and private universities conduct these activities. Teachers evaluate distance learning in nine areas - Previous Experience with Distance Learning, Distance Learning Platforms, Use of Platforms, Materials Used, Platforms Assessment, Evaluation during the Confinement Period, Distance Learning in the Future the Workload during the Confinement Period, Expectations of E-learning Platforms. Students rate the quality of distance learning in terms of Previous Experience with Distance Education, Internet Connection Quality, Involvement of Teachers, Use of Materials Produced by Professors, Teaching Methods Preferred by Students, Distance Evaluation, Work Timetable, Preferred Type of Education, Resources Used to Better Understand the Course, Devices Used to Follow the Studies from a Distance, Expectations of Distance Education. The survey results are processed using three methods: descriptive analysis, regression analysis, and qualitative response analysis. Microsoft Power BI is used As a data analysis tool to analyze data, visualize it and draw insights.

Lassoued, Alhendawi, and Bashitialshaaer [13] conducted a large-scale study to uncover barriers to achieving quality distance learning during the COVID-19 pandemic among 400 professors and 600 students from universities in the Arab world (Algeria, Egypt, Palestine, and Iraq). For this purpose, a questionnaire was developed, which evaluates 14 obstacles in four categories: Personal obstacles, Pedagogical obstacles, Technical obstacles, and Financial and organizational obstacles. The researchers analyze the results to explore the challenges and opportunities to limit them from the perspectives of faculty and students, classify the barriers and identify differences in identified issues to quality in distance learning during the pandemic by faculty and students, and present suggestions for overcoming these obstacles.

As a result of their studies, Jiménez-Bucarey and his colleagues [42] proposed a model that measures student satisfaction in three dimensions: teachers, technical service, and service. The impact of each dimension on student satisfaction is assessed using a Partial Least Squares Structural

Equation Model (PLS-SEM). An Importance and Performance Map Analysis (IPMA) is performed to identify improvements that need to be done to increase student satisfaction. The model is tested among 1430 students.

Olney, Li and Luo [81] surveyed 220 employees to identify the necessary skills and staff competencies on which HEIs should focus their professional development activities to improve the quality of distance learning. They use a content analysis methodology to analyze the text responses and compare them to the Competency Framework for Instructional Design proposed by the International Board for Teaching, Performance and Learning Standards (IBSTPI). According to the results of the study, the main competencies identified by the participants were designing training interventions, keeping up with design theories, and communicating to manage stakeholders, teams, and projects.

Toubasi et al. [82] developed a tool to assess the quality of distance learning during the COVID pandemic for the needs of universities in Jordan. The questionnaire consists of 58 questions divided into four sections – student demographic characteristics, student attitudes during the distance learning period, student perceptions of distance learning, and quality evaluation using the DELES tool. DELES include 34 indicators that assess the quality of learning in six areas - instructor support, student interaction and collaboration, personal relevance, authentic learning, active learning, and student autonomy. Each indicator is assessed using a 5-point Likert scale. The questionnaire was presented in Google Forms and shared with students through social networks. Results were analyzed with IBM SPSS.

Sarmiento and Callo [53] surveyed to determine the effect of distance learning factors on the quality of learning during the COVID-19 pandemic among 764 students and 57 faculty members. The questionnaire developed contains questions in three parts - profile of respondents, factors and quality learning. Respondents must rate 18 factors that play a crucial role in quality distance learning, divided into three categories (instructional design, support system, implementation), and define purposeful and meaningful distance learning based on engagement, satisfaction, quality teaching, and quality education. The results show that the factors determining the quality of training during the pandemic are instructional design, support system, and implementation.

D. Processing of Statistical Data and Performance Indicators

When conducting distance learning, a lot of data is accumulated about the training, e.g. logs in the e-learning system, data on learning materials read, data on submitted homework assignments, grades from exams, etc. This fact has stimulated research into using data to gain insights into the quality of distance education delivered and support management decisions to retain students and increase student achievement.

Processing such data for the training can provide valuable insights into key performance indicators (e.g. average weekly usage, modules completed, course completion rate, dropout rate, activity completion rate, average attention rate, etc.), highlighting the effectiveness of courses and curricula. By

analyzing retention rates, pass rates, and student satisfaction, institutions can evaluate which learning courses are performing well and which may require improvement [83]. Utilizing big data analytics allows HEIs leadership to do a more sophisticated analysis than simple summary statistics, enabling the identification of courses with pass rates that exceed expectations based on previous student achievements. Through comparative analysis of course designs, HEIs leadership can identify features that lead to successful learning outcomes [84]. They can utilize this knowledge to stimulate teachers to design more efficient courses. In addition, teachers can monitor their learning courses to identify pinch points, such as areas where student engagement drops sharply. They can then take appropriate action, such as providing additional teaching or rewriting course material for the next cohort. Tutors can also use statistical data and performance indicators to monitor their students and identify those who may benefit from timely interventions. By targeting these students, tutors can increase their chances of passing the course and achieving their learning objectives. Students can also use these data to monitor their performance and learning behaviours' [85]. By comparing their progress over time or against other students in their cohort, they can identify areas where they may need to improve and take action as self-regulated learners. Furthermore, teachers can use automated systems to suggest alternative resources or behaviours' to students who exhibit patterns associated with poor results [86]. These suggestions can help students identify areas for improvement and take action to achieve better learning outcomes.

Design, development, and implementation of intelligent data analysis tools can contribute to distance learning quality assurance [87-89]. Automated evaluation of the quality of distance learning requires the collection, analysis, and interpretation of a huge amount of data reflecting the attitude of students and experts to the training courses, the software tools used, etc.

In connection with the external evaluation by accrediting institutions, several studies have been conducted for the automated extraction and analysis of data for distance learning quality evaluation, including data on the used learning materials, infrastructure, e-learning environment, means of communication and collaboration, student evaluation system, flexibility and adaptability of the learning process, student support, team qualification, etc. Doneva and Gaftandzhieva [90] explore the possibilities for automated data extraction for evaluating the criteria from the criteria system of NAOA for evaluating distance learning programmes were analyzed. This analysis aims to determine which data can be extracted from university systems (e-learning environment, learning process management system, academic staff development system, etc.) to support distance learning quality assessment. Based on the analysis, some experimental web services are developed for extracting data from the Moodle e-learning environment for automated evaluation of the quality of distance learning. The following work [79] proposes the automation of related processes based on an approach for integrating heterogeneous software systems (Service Oriented Integration) and discusses its application to automated data extraction in evaluating the quality of e-learning. Some reports with extracted data from

the learning management system are generated through the developed tools and presented to an expert group during program accreditation of a distance learning program in 2016. Among them are the reports for Activity in communication tools, Study schedule control, Student and teacher workload, Student success, and Educational activities and resources.

As a result of studies in the field and after analysis of the databases of the university information systems, in which data about the training are stored, Gaftandzhieva and Doneva [91] propose a model with a set of indicators, allowing the tracking of training results for the needs of various interested parties (students, teachers, program managers, faculty leadership, university leadership, and quality experts). Based on the indicators from the proposed model, four tools for intelligent data analysis to improve learning outcomes have been designed and developed. The mobile application Mobile LAP [92] allows students to track the values of indicators (for student activity, control of the study schedule, and student success) that can help them achieve their goals in study time and improve their success. As use Mobile LAP, students can track their activity and progress and compare it to the results of other students, as well as monitor whether they are following the study schedule. LATeach application [93] allows teachers to track student activity in learning activities, compare the results of a selected student with those of other students in the course and with the results of students who received excellent grades in previous years, monitor student compliance with the study schedule, track student progress in learning activities and learning outcomes and student success during the learning process, identify at-risk students and self-assess the quality of learning resources based on the students'' activity and their results. LATch tool [94] allows the governing bodies in HEIs to generate reports with aggregated data on the students' activity and success rate in selected study programs, which allows them to track the results of students and compare them with those of students from previous years, to identify programs in which students are not performing satisfactorily, to track trends in student success by comparing students' GPA at the end of each academic year, to track student success at graduation, to track student dropout rates, etc. The generated reports for each indicator enable university management at different levels to make informed decisions to improve the quality of education and the results achieved. The LAqe tool [95] allows quality experts to generate dynamic reports for monitoring and evaluating the quality of conducted education for the needs of accreditation procedures. They can use the tool to generate evidence documents and significantly support the preparation of self-assessment reports for internal and external evaluation of the quality of the training provided.

IV. CONCLUSION

This review paper provided a comprehensive analysis of the current state of play of quality assurance in distance learning. The paper has highlighted the challenges associated with ensuring quality in distance learning programs and has discussed various approaches and tools for quality assurance and assessment, including regulatory documents and manuals, audits, and stakeholder satisfaction. Using statistical data and monitoring key performance indicators, HEIs can identify areas for improvement and take appropriate action to enhance

the quality of their distance learning programs. As distance learning continues to grow in popularity, institutions must prioritize quality assurance to ensure that their programs meet established standards and provide students with a high-quality education. Subsequently, this paper serves as a valuable resource for educators, administrators, and policymakers interested in improving the quality of distance learning programs. By implementing the recommendations outlined in this paper, HEIs can enhance the quality of their distance learning programs and provide students with a more rewarding and fulfilling learning experience.

This study was conducted as part of a project to implement software tools to help ensure the quality of educational and administrative services at the university and support management decision-making to ensure high quality of services. In the next part of the research, tools will be designed and developed to track the values of key performance indicators for the needs of different stakeholders (teachers, distance learning centres, dean's and rectors' leaderships).

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