


Article

Use of Maturity Model to Create an Effective Marketing Mix with a Focus on Educational Facilities

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Abstract: The presented article focuses on the acute topics of process management in educational institutions. A maturity model is here proposed in order to develop an effective marketing mix for educational facilities. It is used to assess the current state of each element of the marketing mix and identify areas for improvement. The main contribution is the detailed description of why it is necessary to create a maturity model when creating a marketing mix in the school sector. To achieve this, individual process information programs are analyzed and specifics for the educational sector are given. The article focuses on educational facilities, such as schools, universities, and training centers. By utilizing a maturity model, educational facilities can identify gaps in their marketing strategies and develop a more effective marketing mix to attract and retain students. Furthermore, up-to-date maturity models were analyzed and, as a result of the research, a new, separate model was created with detailed description. Part of the new model is also an analysis of practical use by employees in selected school establishments. The results of this study can provide insights for educational institutions to enhance their marketing strategies and better meet the needs of their target audience.

Keywords: maturity models; educational facilities; marketing mix



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1. Introduction

The aim of this section is to characterize basic problems, research questions, and the introduction to the topic. Later, basic concepts, which relate to the concepts of marketing mix and maturity models, will be defined. Maturity models have been developed over the last 50 years to assist organizations in managing their information systems. These models have been utilized across various industries and sectors, including the education industry. These models are used to evaluate school education institutions based on various dimensions, including management, process management, study programs, course accreditation, e-learning, online courses, and pedagogical strategies. Given the complexity of educational institutions and their numerous processes, effective information systems and tools are required to manage the information processes. Using the guidelines of a systematic literature review methodology, this article identifies selected maturity models.

Marketing is a crucial aspect of any business or organization, including educational facilities, such as schools, universities, and training centers. These institutions need to attract and retain students in order to remain competitive and achieve their objectives. The marketing mix, consisting of product, price, promotion, and place, is a well-established framework used to develop effective marketing strategies. However, creating an effective marketing mix can be challenging, especially for educational facilities that have unique needs and constraints.

This paper aims to propose the use of a maturity model as a tool to create an effective marketing mix for educational facilities. The maturity model approach involves assessing the current state of each element of the marketing mix and identifying areas for

improvement. By using a maturity model, educational facilities can create a more effective marketing mix that addresses their specific needs and constraints.

This paper contributes to the literature on marketing mix and maturity models by proposing a new approach to creating an effective marketing mix for educational facilities. The use of a maturity model can help educational institutions to better understand their marketing strengths and weaknesses and develop a more effective marketing mix to attract and retain students. The marketing of education is a neglected topic in our country and has its own specific issues. In the theoretical part of this research, we will summarize these specifics and distinguish them from ordinary private-sector marketing. The result of the theoretical part of this work will be the need to create a new maturity model for the marketing mix, given the nature of the maturity models developed so far that are used in education. In the practical part of this research, we will propose such a new maturity model, which will be offered for practical use. At the end of this paper, we will identify how we came to the new maturity model, summarize what the new maturity model is about, and assess its usability in practice.

The research question guiding this paper is as follows: how can a maturity model be used to create an effective marketing mix for educational facilities?

The objectives of this research are:

To review the literature on marketing mix and maturity models in the context of educational facilities.

To develop a maturity model framework for assessing the current state of the marketing mix in educational facilities.

To apply the maturity model framework to a case study of an educational facility and identify areas for improvement in their marketing mix.

To provide recommendations for educational facilities on how to use a maturity model to create a more effective marketing mix.

2. Materials and Methods

2.1. *Specialties of Services in Educational Institutions*

An educational service is a planned and organized activity of an educational institution that aims to meet certain educational needs of an individual, a group, or a society. A product in this sense is a service that is an essential element of the marketing mix, a crucial tool for meeting the needs of users in the service industry. Depending on the extent to which a service is provided, it can be classified in terms of tangibility, including the sale of relevant material goods. Educational services, being intangible, are typically characterized by a low level of tangibility, making it challenging for potential users to try them out before making a decision. However, choosing a future career and investing in oneself is a significant decision that involves material costs, time, and energy. Therefore, users must rely on the institution's image to make an informed decision [1]. Since each educational institution provides services uniquely, there are no standardized services in the higher education sector and standardized teaching is unnecessary.

The marketing mix refers to the set of controllable marketing variables that a company can use to influence customer behavior and achieve its marketing goals. These variables include product, price, promotion, and place (also known as distribution).

On the other hand, a maturity model is a framework that describes the stages of development and improvement that an organization goes through in a particular area of activity. Maturity models are often used in business to assess the level of maturity of a company's processes, practices, or capabilities and to identify areas for improvement.

In the context of marketing, a maturity model can be used to assess the maturity of a company's marketing practices and capabilities. The model can be used to evaluate how effectively a company is using its marketing mix to achieve its marketing goals and to identify areas for improvement.

Overall, the marketing mix and the maturity model are closely related, in that the marketing mix can be used as a tool to improve a company's marketing maturity and a maturity model can be used to assess and improve the effectiveness of a company's marketing mix.

2.2. Maturity Models

Maturity models (hereinafter referred to as "MM") have been introduced as guides and references for the management of information systems in organizations in various industries. Maturity models are not only applicable to information system management but are also widely utilized in the education sector to rank higher education institutions across various dimensions, such as ICT, management, process management, study programs, course accreditation, e-learning, online courses, and pedagogical strategies. These models offer organizations a structured approach to addressing problems and challenges, providing a benchmark for assessing capabilities and a roadmap for improvement [2].

MM are established tools that aid in the systematic evaluation and development of measures to enhance the quality of activities, technologies, processes, skills, or any other object present within an organization [3]. While several generic and domain-specific MMs have been introduced in recent years, encompassing a wide range of fields of application, including education, progress in designing these artifacts adapted to specific e-learning domains has been limited and slow, in comparison to other areas [4]. Consequently, the realm of MMs for e-learning remains an underexplored area, resulting in the undervaluation of these artifacts as tools for managing and enhancing quality in the e-learning context. Since 1992, several mature models have been conceived. We will analyze the selected maturity models in the following sub-chapters.

2.3. CMM

CMM (capability maturity model) is a six-step assessment of the maturity of processes in an organization. Originally developed to assess the maturity of SW development for Carnegie Mellon University [5]. The capability maturity model (CMM), which is one of the ISO 9000 series of standards prescribed by the International Organization for Standardization, shares a resemblance to ISO 9001. The ISO 9000 standards provide guidelines for an effective quality system in manufacturing and service industries, whereas ISO 9001 specifically pertains to the development and maintenance of software [6]. However, the primary difference between CMM and ISO 9001 lies in their respective purposes: ISO 9001 sets a minimum acceptable level of quality for software processes, whereas CMM creates a structure for continuous process improvement. Compared to the ISO standard, it defines more clearly the means to be used for this purpose. The development process according to CMM has five levels. They are as follows:

- Initial: At this level, processes are disorganized, ad hoc, and highly dependent on individual effort, resulting in an inconsistent and unpredictable output. Processes are not well-defined, documented, or repeatable.
- Repeatable: At this level, the necessary processes are established, defined, and documented, making it possible to replicate successes in key process areas. Basic project management techniques are in place, and the organization is focused on ensuring that processes are consistent and repeatable.
- Defined: At this level, the organization creates its own standard software development process. These defined processes make it possible to pay more attention to documentation, standardization, and integration, resulting in a more efficient and effective process.
- Managed: At this controlled level, the organization monitors and controls its own processes through data collection and analysis. Processes are quantitatively understood and controlled, allowing for predictable and consistent outcomes.

- **Optimization:** At this optimization level, processes are constantly being improved by monitoring process feedback and introducing innovative processes and functions. The organization is focused on continuous process improvement, resulting in a highly effective and efficient process that is adaptable to changing needs.

2.4. P3M3

The P3M3 maturity model provides a systematic way of measuring an organization's ability to deliver portfolios, programs, and projects in a repeatable manner. The more advanced an organization's capability, the more likely it is to deliver consistent and predictable results. The P3M3 approach is based on the development of the U.S. Department of Defense and subsequent improvements made by Carnegie Mellon University, which have been used to assess the maturity of various types of capabilities, including software development, processes, people, and supply management [7].

The P3M3 model consists of five levels of maturity that represent progressively more sophisticated approaches to managing portfolios, programs, and projects. Each level comprises processes, procedures, tools, and behaviors that contribute to the overall strategic goals of the organization. As an organization moves up the maturity levels, it becomes more adept at managing risks, controlling costs, delivering projects on time, and achieving stakeholder satisfaction. The ultimate goal of P3M3 is to help organizations improve their performance by providing a structured framework for measuring and enhancing their project management capabilities.

- **Level 1: Awareness**—an awareness process that consists of defining the strategic intent of an organization. In this context, an organization may apply the methods of GAP analysis or balanced scorecard to identify and delineate long-term strategic objectives spanning a five-year period. These tools are commonly used to facilitate the identification of gaps and the setting of goals for improvement.
- **Level 2: Repeatability**—a recurring process aimed at reinstating the envisioned state of the organization for the upcoming five-year period.
- **Level 3: Defined**—the process of definition in a project refers to the specific and detailed determination of the project's objectives and scope. This level of planning involves not only the refinement and clarification of the long-term goal but also the identification of immediate, short-term objectives that must be accomplished first. By establishing such a clear understanding of the project's goals and priorities, any enterprise undertaking can more effectively address its needs and achieve optimal outcomes.
- **Level 4: Managed**—a management process that refers to the management of all projects. The allocation of tasks and timelines, as well as the identification of supervisory and evaluative responsibilities, are among the fundamental inquiries falling under the purview of the project manager. Additionally, project management entails the comparison of current projects to previous ones to establish a clear sense of prioritization and task sequencing.
- **Level 5: Optimization**—the ultimate stage of maturity within the P3M3 framework is centered on the attainment of optimal results. This necessitates the identification and implementation of necessary corrections and modifications in order to achieve the highest level of success. Through the use of evaluation techniques, the overall process can be appraised with a particular focus on project quality, financial standing, and planning. The vigilant monitoring of progress allows for the continued progress towards the optimal outcome, offering a valuable point of reference for future endeavors and enabling the consideration of various factors.

2.5. ICTE-MM

The ICTE-MM model incorporates information criteria, ICT resources, and leverage domains to support learning processes. However, it falls short in explicitly addressing the documentation and definition of business processes and the ability of information systems to support these processes. While it assesses school development in terms of ICT use, it does not fully consider critical variables, such as software for academic and financial management and the management of teaching and learning processes. Furthermore, it is a general model for school educational processes and is not specifically designed for higher education institutions. To achieve a more comprehensive MM for the use of ICT in schools, additional critical variables must be considered [8].

2.6. CMM-QE

The competence maturity model for quality education (CMM-QE) is designed to assess and improve the quality of education processes in educational institutions. It consists of five levels of maturity and evaluates the educational system from various perspectives, such as academic, infrastructure, administration, and facilities. Key indicators are used to quantify critical factors, enabling institutions to determine their level of maturity. However, the presentation of the proposed model is not clear and lacks a systematic description of the evaluated attributes. This deficiency may affect the reader's ability to fully comprehend the framework and its practical applicability [9].

2.7. OCQMM

The quality maturity model for online courses in evening universities and correspondence education (OCQMM) is a framework that aims to evaluate and improve the quality of online courses in adult learning institutions. The model has four levels of maturity, and it covers key areas that are relevant to the quality of online courses. However, the model lacks important aspects, such as teacher motivation and pedagogical practices. In addition, the description of the six key areas of the process is insufficiently detailed, making it challenging to replicate the authors' experience. Furthermore, the authors do not provide any methodology or analytical methods for determining the level of maturity in individual key process areas. They only provide a way to determine the level of maturity of an online course or the school as a whole. These limitations may hinder the applicability and usefulness of the proposed model in practice [10].

2.8. ICTMMEI-DV

The ICTMMEI-DV model is a maturity model that aims to provide guidance for the planning of information and communication technology (ICT) infrastructure in educational institutions located in developing countries. The primary objective of the model is to establish a reference for the necessary development phases required for the efficient use of ICT resources in achieving student learning outcomes. The model defines the levels of ICT infrastructure resources required to achieve these objectives and aims to show management, teaching, and technical staff, as well as donors, how to maximize learning opportunities for students by making efficient use of ICT resources. However, it should be noted that this model is strictly focused on ICT and does not address other important aspects, such as the management process and other relevant aspects of information systems. The model is designed specifically for educational institutions in developing countries, where resources are limited, and is not suitable for institutions in developed countries. Additionally, the model aims to cover a wide range of educational levels, each with different educational objectives. In our opinion, this model is best suited for basic levels of education and may not be suitable for higher education institutions [11].

2.9. eQETIC of Services in Educational Institutions

The eQETIC model for online learning emphasizes continuous process improvement and supports the life cycle of development and quality of online learning solutions. The model consists of six common units, with each unit containing processes that an organization can implement at a given time. It primarily focuses on the quality of the product development process for distance learning, e-learning, and educational objects, including aspects that impact the success of educational institutions. However, it does not take into account other types of teaching, such as combined teaching and traditional face-to-face teaching, or specific aspects of information systems in higher education institutions, such as student background, administrative support, or other responsibilities of the institution [12].

Various models described in this section have just one purpose. To show that there is basically insufficient or no amount of maturity models for the education sector. There are several reasons why there may be few maturity models in the educational sector:

1. **Complexity:** The educational sector is complex, with many different stakeholders, including students, teachers, administrators, policymakers, and parents. Developing a maturity model that adequately captures this complexity can be challenging.
2. **Diversity:** Educational institutions come in many different shapes and sizes, from primary schools to universities, vocational schools, and more. It can be difficult to develop a maturity model that is applicable to all of these different contexts.
3. **Subjectivity:** Assessing the maturity of an educational institution can be subjective, with different stakeholders having different opinions on what constitutes maturity in a given context.
4. **Lack of consensus:** There may be a lack of consensus on what constitutes maturity in the educational sector, and different stakeholders may have different ideas about what should be included in a maturity model.
5. **Resource constraints:** Developing a maturity model can require significant resources, including time, expertise, and funding. In the educational sector, resources may be limited, and there may be other priorities that take precedence over developing maturity models.

3. Reasons for Creating a Maturity Model in the Creation of a Marketing Mix in Education

For the purposes of the school as a specific institution providing services, the marketing mix can be adjusted and supplemented to best meet its requirements. The marketing mix is intended to help the school build its image, acquire clients, retain clients, and establish mutually beneficial relationships with them. The reason for using the concept of the maturity model is that this model is an appropriate tool to help schools and school facilities in indicating the current or desired level of development. The graduation model is necessary for an overview of various organizational characteristics. These models can help to see a more objective assessment of the performance of the marketing mix or indicate how possible new levels of preparedness or development can help lead to an overall better performance of the marketing mix. Foreign educational institutions develop diverse functions, some of them are interconnected but also quite different. Universities and polytechnic schools are multifaceted institutions that have numerous functions, including offering degrees and courses, creating a conducive learning environment, promoting research and science, transferring and appreciating knowledge economically, providing training, engaging in community service, facilitating cultural exchange and cooperation with other institutions, contributing to the development of cultural heritage, fostering international cooperation, and producing and disseminating knowledge and culture. These institutions have a unique status and are subject to educational, scientific, cultural, administrative, financial, and disciplinary regulations, which result in diverse institutional structures that are governed by a specific legal framework. Universities and polytechnic schools can comprise independent teaching and research units, research facilities, libraries, museums, and other entities. Any

initiative aimed at enhancing the work processes of these institutions should consider their specific characteristics and the areas in which they operate.

Analysis of Previous Maturity Models

The need to adopt strategies for improving processes is also a global problem in the field of educational institutions. Over the past 10 years, several studies have been carried out with the aim of finding models of maturity in education. The discussion regarding whether the CMMI model is suitable for the information systems curriculum in the United States was initiated through a panel discussion titled “Applicability of CMMI to the IS Curriculum”. The authors [13] presented a proposal that outlines the elements that educational institutions should develop as well as a list of key process areas for each of the five levels of the CMMI maturity model as applied to the curriculum model.

- Level 1—initial,
- Level 2—repeated,
- Level 3—defined,
- Level 4—managed, and
- Level 5—optimization [13].

Distinguished professional organizations in the United States and international professional organizations, including the Association for Information Systems (AIS), the Association for Computing Machinery (ACM), and the Association of Information Technology Professionals (AITP), have advocated for this model. It incorporates a series of didactic units that consist of objectives and a specific content area. Each unit is defined by a set of skills that students must acquire by the end of the course, which is subject to measurement via SI assessments and certification mechanisms. Another maturity model was the online course design maturity model (OCDMM), which was designed to provide a tool for planning and evaluating online courses based on a set of best practices [14]. This proposed model gradually introduces a set of best practices within an institution and provides an integrated system for these practices to achieve maturity. It guides the planner through best practices, learning principles, technologies, goals, and performance standards. Similar to CMMI, OCDMM presents a step-by-step process for transforming face-to-face courses into online courses through five maturity levels, ranging from level 1, where only email and occasionally other online resources are used, to level 5, where best practices are integrated for conducting online courses. Each level comprises five key processes that are common to all levels.

- components (coverage) and appearance;
- individualization and adaptation;
- the use of technology;
- socialization, interactivity, and evaluation [15].

Several models of maturity have been proposed in the field of education. For instance, the learning process maturity model (LPMM) based on CMM was suggested to help students recognize the strengths and weaknesses of their educational activities and select appropriate learning strategies [15]. The LPMM drew parallels between software development and learning processes and defined maturity in the context of learning based on scientific literature. While the LPMM levels are similar to CMM, they focus on skills that students should possess at each level rather than key areas to consider [16]. Additionally, a proposed IT Service Management model for Chinese universities based on ITIL was developed, with authors providing two justifications for adapting the ITIL framework to higher education institutions [17]. As maturity models in education are constantly evolving, each model presents a set of general guidelines and specific procedures within its specific area.

1. The existing model provides only a theoretical platform based on best practices and does not indicate ways to develop services, since it needs to be adapted to the complexity of each organization;
2. These models are oriented towards commercial organizations, as well as models developed by Microsoft or HP, and not higher education institutions, which are different in organization, culture, and technology, as they have different recipients [17].

Differences and discrepancies between the IT systems of commercial organizations and those of higher education institutions have been identified. Based on these differences, the authors propose customized models for organization, process, and technology management to adapt the ITIL platform to IT service management services in Chinese universities. Additionally, Lutteroth et al. developed the computing education maturity model (CEMM), which is a maturity model for computer science teaching inspired by the CMM. The CEMM provides a set of best practices and strategies to improve teaching, but the authors did not follow the CMM in detail, as they believed that creating a maturity model for education solely based on an analogy with the CMM would not be possible. Instead, the CEMM represents five tiers for a computer course in course development, similar to the five stages for software project development in the CMM. The authors argue that, similarly to a software project in CMM, a course is precisely defined, usually with limited costs and small time variations [18]. Dounos and Bohoris put forward a suggestion to enhance processes in higher education institutions by employing the total quality management (TQM) method in combination with key concepts from capability maturity model integration (CMMI). The authors propose that the principles and techniques of TQM, which are commonly used in industry and have proven benefits, can be effectively implemented in higher educational institutions through the adoption of CMMI. The authors advocate for the use of TQM comparison techniques at all five levels put forth in the CMMI model [18]. The e-learning maturity model (EMM) was designed by Marshal and Mitchel and is an adaptation of the capability maturity model (CMM) for improving e-learning processes in higher education institutions. The EMM consists of thirty-five processes that are divided into five categories or process areas: education, development, support, evaluation, and organization. These processes are interconnected through common practices and different perspectives from five dimensions. Each process is further divided into procedures that define how process results can be achieved within an institution. Practices are derived from empirical data resulting from scientific research in the field of e-learning and from expert opinions. These procedures can be assessed in an institutional context to evaluate an institution's ability to support and provide e-learning [19]. It is important to note that evaluating processes in higher education institutions is a complex task that requires a systematic and comprehensive approach. Marshal and Mitchel's method of evaluating processes using a five-step scale is just one approach that can be used to assess the performance of different procedures. However, it is important to consider the specific context of each institution and to tailor the evaluation process accordingly. By mapping their method of assessment into other manuals and standards, Marshal and Mitchel have provided a useful tool for institutions to benchmark their performance against industry standards and best practices. This can help institutions identify areas for improvement and develop strategies to enhance their processes and services [20]. Petri, Garcia, and Giraldo's model for higher education certification is based on CMMI (capability maturity model integration) and aims to improve the capacity of processes in technical and technological institutions, faculties, and students.

The authors' main goal was to create a method that could improve the levels included in engineering degree programs and certification models. It consists of five levels, similar to the CMMI model, and includes an assessment process that measures the maturity of an institution's processes related to education, research, and innovation. The authors argue that the implementation of this model can improve the quality of education and training provided by technical and technological institutions and increase their competitiveness in the global market.

ABET, a U.S.-based organization that certifies undergraduate courses in the fields of applied science, computer science, engineering, and technology, was used as a reference for the engineering education capacity maturity model (EECMM), which employs similar levels as CMMI and outlines the capabilities and procedures required for each level of maturity [21]. Bass created a maturity model for information and communication technologies (ICT) in developing countries' educational institutions to offer guidance on planning ICT infrastructure and establish a reference model that aids efficient resource utilization during development.

This maturity model utilized various international ICT skill benchmarks including:

- The International Computer Driving License (ICDL),
- The European Computer Driving License (ECDL),
- Scripts produced by the IEEE/ACM Joint Working Group on Computing Curriculum for Higher Education, and
- Skills Framework for Information Age (SFIA), which provided a taxonomy comprising 86 ICT skill areas and 290 corresponding tasks.

The proposed model consists of eight maturity levels, each indicating the necessary ICT infrastructure required to achieve institutional objectives and the skills that students should develop at that level. To attain a specific level of maturity, an institution must first accomplish objectives at lower levels. The model does not reference software development in any way.

Table 1 provides a comparison of the models of educational maturity described. Most of the models found are based on a CMM or a stepped CMMI display. Although the various designs are intended to facilitate the maturation of processes in different business areas, most of the models proposed have five levels of maturity in common. Each model proposes the characteristics that an organization should exhibit in order to reach each stage. However, unlike the original model, most teaching maturity models do not explicitly identify key process areas. Only the models developed by Dounos and Bohoris and Marshal and Mitchel provide these areas, as well as methodologies and evaluation techniques that fulfill the requirement and effectively rank organizations at a certain level of maturity. Furthermore, the models examined provide insight into the processes of isolated business areas, such as a student, course, online course, or IT resource, and do not encompass practices involving different entities or units, nor do they approximate cross-cutting processes within higher education institutions. While most models present "what to do", none of them, except perhaps the model proposed by Dounos and Bohoris, provide guidance on how an organization can effectively improve its processes to ascend to the top of the proposed maturity ladder.

Table 1. Comparison of existing education maturity models (own processing).

Model	Background	Business Area	Number of Levels	Process Area	Description	Focus
CMMI-ISC (White et al.)	CMMI	IS Curriculum	5	Variable number of levels	Exercises/Features	IS Curriculum
OCDMM (Neuhauser)	CMM	Online course planning and	5	5 commonalities on 5 levels	Exercises/Features	Online courses
LPMM (Thompson)	CMM	Learning	5	-	Skills	Students
ITIL-ITSMM (Wang e Zhang)	ITIL	University IT Services	-	-	-	IT service
CEMM (Lutteroth et al.)	CMM	Teaching computer science	5	-	Exercises/Features	Teaching computer science
CMMI-TQM (Dounos and Bohoris) eMM (Marshall e Mitchel) MRAIES (Petri, Garcia, and Giraldo)	CMMI	Higher education institutions	5	-	Exercises/Features	Higher education institution management
	CMM/CMMI	E-learning	5	5 commonalities in 5 dimensions.	Exercises/Features	Online courses
	CMMI	Higher education institutions	5	-	Exercises/Features	Higher education institution management
Model CMMI-ISC (White et al.)	Background CMMI	Business area IS Curriculum	Number of levels 5	Process area Variable number of levels	Description Exercises/Features	Focus IS Curriculum
OCDMM (Neuhauser)	CMM	Online course planning and	5	5 commonalities on 5 levels	Exercises/Features	Online courses
LPMM (Thompson)	CMM	Learning	5	-	Skills	Students
ITIL-ITSMM (Wang and Zhang)	ITIL	University IT Services	-	-	-	IT service
CEMM (Lutteroth et al.)	CMM	teaching computer science	5	-	Exercises/Features	Teaching computer science
CMMI-TQM (Dounos and Bohoris) eMM (Marshall and Mitchel)	CMMI	Higher education institutions	5	-	Exercises/Features	Higher education institution management
	CMM/CMMI	E-learning	5	5 commonalities in 5 dimensions.	Exercises/Features	Online courses

4. Design of a New Maturity Model

Adopting strategies to improve business processes is currently of interest to most organizations, whether in the public or non-public sector. Finding the benefits of this improvement to optimize resources and respond to organizations has yielded several suggestions to improve methodology processes. The methodologies presented exhibit variations in both their underlying principles and their targeted business areas. The proposals and results of scientific research in the field of process improvement in educational institutions are extremely complex, but there are few in unique organizations [22].

The aim of this section is to propose a new process improvement model for this specific type of organization by conducting a comprehensive analysis of the process areas, objectives, and procedures utilized in various maturity reference models, with the goal of identifying the models that are relevant and applicable to academic institutions. The resulting maturity model will be further verified in practice in Slovak educational institutions.

This research section will develop a maturity model for data quality management, with its main purpose to assess the level of maturity of an organization in terms of its data quality management principles, providing an overview of the current state of the organization. The model will be subject to critical analysis, allowing for a fresh perspective on its effectiveness.

In the current maturity model, schools cannot be directly categorized as a specific level of maturity; therefore, further efforts are needed for categorization within this model. The school that will use this model must discuss certain aspects of each level of maturity with technical staff and then arrange itself accordingly. By creating an easily accessible and straightforward tool that can be utilized by any individual involved in school processes, including teachers, we can help the school “see around corners”, anticipate the future, and create a plan to achieve future goals.

Basic Starting Points

Poppelbuß and Röglinger [23] have developed a checklist that researchers can utilize to design a maturity model for this study. Furthermore, there are several purposes for employing maturity models, including descriptive, prescriptive, and comparative.

- Descriptive use involves using the model to diagnose an organization’s current abilities regarding specific criteria.
- Prescriptive use pertains to utilizing the maturity model to identify desirable maturity levels and provide guidance for improvement.
- Comparative use refers to comparing the maturity levels of similar business units and organizations.

The purpose of using this studied model can be categorized as “descriptive”, since this model serves as a tool to diagnose the current state of the school in terms of data quality management. Poppelbuß and Röglinger defined a number of basic principles that could be used at the design stage of the maturity model. In addition, it is necessary to take into account some principles regarding the purpose of use, which, in this case, is “descriptive”. Nevertheless, Poppelbuß and Röglinger state that not every maturity model is required to comply with all design principles. Instead, this framework functions as a guide to be used during the design of new maturity models, ensuring that the proposed principles are appropriately considered. Table 2 displays the checklist utilized in creating the maturity model for this particular study.

Table 2. Basic principles used in the design phase of the maturity model (checklist).

Basic principles	Basic information	Application area and applicability assumptions
		Purpose of use
		Target audience
		Class of subjects investigated
		Differentiation from related maturity models
	Definition of the main constructs related to maturity and maturation	Design process and empirical verification
		Maturity and dimensions of maturity
		Maturity levels and maturation pathways
		Available levels
		Basic theoretical background to the development of change
Definition of central structures related to the application domain		
Documentation aimed at the target group		
Descriptive	Intersubjectively verifiable criteria for each level	Procedure model
		Advice on the assessment of criteria
		Advice on editing and configuring criteria
		Expertise from the pre-loading application
		Evaluation methodology targeted at the target group

In this study, the design principles for the maturity model are categorized into different groups and applied appropriately. The area of focus for this model is data quality input by teachers and management in education and school facilities, which is of great importance despite not currently being prioritized. The model assumes that the school using it already has trustworthy data and does not allow errors in those data. The purpose of the model is “descriptive”, since it acts as a diagnostic tool for the current state of the organization. The target group is primarily teachers, who have a good understanding of school processes. The model provides a new perspective that is more focused on the marketing mix of education and data management. A unique aspect of this model is its emphasis on the individualities familiar with the business processes of firms, allowing them to fit into a certain level of maturity. The maturity model in this study includes five levels of maturity:

- Level 1—basic level related to a specific person: many data quality management tasks are performed by one person, which causes uncertainty in schools. When the employee is not present, the school loses some of the information. In addition, enterprise systems are not maintained but only used. Therefore, in our model, anyone who is somehow related to the information can dispose of data. In the event that it consists of the insertion of grades into the system, a substitute teacher can also perform the task.
- Level 2—degree of policy, norms, and procedures: the school develops principles, norms, and procedures so that these can be adhered to by individuals in the company. These ensure that the school can repeat the previous success because they are defined and can be followed again.
- Level 3—stable grade: this level of maturity is achieved when the school applies every small change in the structure of the data and reflects that change towards its data model. This creates new school entry opportunities in the system and helps managers work more efficiently. In addition, the school provides training for staff to acquire the necessary knowledge and skills.
- Level 4—degree of management and standards: all data should be standardized. The implementation of standardized metadata allows for the efficient sharing and re-use of data across different systems. By standardizing the data format, it ensures the accuracy, consistency, and integration of information within school systems. This standardized process also enables the easier analysis of the data and increases the reliability of the information.

- Level 5—stage for improvement: the last stage of maturity is focused on continuous improvement. The strengths and weaknesses are known at this stage and can be identified. The main objective of this level is to reduce the error rate.

These maturity levels can be covered by relevant maturity processes. These processes can provide some relevance to achieving the next level of maturity. The progression from level 1 to level 2 is characterized as a disciplined process that requires the school to refine and optimize its methods of operation. Attaining maturity level 2 does not mandate that tasks be separated from individuals. The transition from level 2 to level 3 is referred to as the standard consistent process because regulations, standards, and protocols are established, ensuring uniformity across the school as an entity. The path from level 3 to level 4 is also known as a predictable process, as measurements are taken and predictions regarding future trends can be made. The process is stable and at the same time measurable, which ensures that managers can take measures to correct a situation where necessary. From level 4 to level 5, the path is defined as a constantly improving process, since schools that follow this process should always strive for improvement. Schools can identify their strengths and weaknesses in order to prevent mistakes. In addition, level 5 teams focus on identifying the causes of events and evaluating them to prevent the recurrence of mistakes in the future. The definition of central structures related to an application domain is the area in which the maturity model would be applied. It is mainly schools and educational institutions that deal with a large amount of data within the marketing mix, and these data are crucial in the daily processes of schools. The accuracy and reliability of data is crucial for schools and educational facilities, making it imperative to ensure that data quality meets a certain standard. To aid in this endeavor, the maturity model proposed in this study can be utilized to assess the current state of data quality and provide a framework for improvement. Key constructs applicable to this domain include data quality, usability, and organizational performance. Intersubjectively verifiable criteria for each level of maturity and level are criteria that are defined for each level of maturity and are based on the description of each level in order to achieve consistency between the two levels. Table 3 shows the criteria defined for each level of maturity. It would probably be possible to define other criteria; however, during the analysis of the theory, only these criteria were included.

Table 3. Criteria for each level of maturity (self-processing).

Maturity Level	Criteria
Level 1	dependence, maintenance, competence
Level 2	repeatability, discipline
Level 3	efficiency, education, consistency
Level 4	repetition, reusability, measured, predictable
Level 5	improving, reducing waste

The following paragraph presents the maturity model developed for this study, along with the procedure and recommendations for assessing the criteria. The maturity model offers a concise summary of the individual maturity levels and their respective criteria. Each level of maturity is presented in a separate column, which includes descriptive summaries of each level. The arrows displayed under each maturity level represent the paths towards achieving the respective level of maturity. The criteria for each level of maturity are also listed. Table 4 provides an illustration of the maturity model developed for this study.

The maturity model provides a good overview of each level of maturity [24]. Schools can utilize this model as a reference point to evaluate their current or desired state in managing the marketing mix. It is essential to note that each level serves as a foundation for the next one. Each level of maturity acknowledges the significance of marketing mix data quality to some extent. For instance, in level 2, schools have some defined policies, standards, and procedures, but they do not reflect changes in the structure towards their data model. This omission results in a loss of new inputs and capabilities, and hence, the quality property of completeness of data is compromised. Some datasets may be incomplete

or missing. However, the maturity model does not offer a prescriptive indication of the level of maturity to be achieved. It expects schools to contemplate individual levels of maturity and assess themselves based on their reflections and perspectives. Thus, in addition to the maturity model, a scoreboard is also devised to present an overview of each level of maturity. For the scoreboard, the factors of the level of maturity are determined on the basis of the descriptions and criteria of the different levels of maturity. Table 5 presents the supporting scoreboard that is used to evaluate each factor on a Likert scale appropriate for the incremental maturity levels. The higher the level, the better the school should perform. It is important to note that the scoreboard and the maturity model are created separately to avoid confusion and to serve as complementary tools. The scoreboard serves as a support tool for the maturity model and not as a replacement for it.

All factors on the scoreboard have the same impact on the final result (current maturity) of the scoreboard. Each factor is elaborated on in more detail in Table 6. Use is recommended as follows:

1. For each factor it is necessary to use the scale that is closest to the reality of the enterprise to mark, preferably with a yellow mark.
2. The level of maturity that has been most marked is considered to be the current level of maturity of the school. In order to achieve a higher level of maturity in the future, for example, if a school scores level 3 on most factors, but scores level 2 on one or two factors, they should prioritize improving those factors to reach level 3 across all areas. It is important to note that the maturity model and scoreboard are not one-time assessments but should be regularly reviewed and updated as the school's marketing mix data management evolves. This allows the school to continuously improve and optimize their processes to achieve higher levels of maturity over time.
3. In addition to the above factors, other factors can also influence the level of maturity and the management of data quality in school. These factors are currently unknown and are therefore not included on the scoreboard. The choice of ten factors is related to the fact that some of them are unknown and, based on the descriptions of the different levels of maturity, were considered sufficient to determine the current state of maturity.
4. Factors influence the quality of a school's data include, for example, when procedures are defined, the data reached the right systems and are stored correctly. This will ensure that the correct analysis can be carried out.

Table 4. Maturity model for determining the level of data quality management (self-processing).

Maturity Level 1	Maturity Level 2	Maturity Level 3	Maturity Level 4	Maturity Level 5
Dependence on a person Focus is on individuals; therefore, tasks depend on the person Information is not available when an individual is available	Policies, standards, and procedures Policies, standards, and procedures are defined and updated Previous achievements can be repeated because they are defined accordingly	Optimization data model Changes in a school's data structure are reflected in the data model The school educates staff so that they can acquire new knowledge and skills	Managed and standardized The data within the school are standardized. This ensures sharing and re-use The school sets quantitative goals for both products and processes with well-defined measurements	Continued improvement The school is continuously improving The school can identify its strengths and weaknesses
Systems at school are not maintained regularly	Disciplined process -> Standard consistent process -> Predictable process -> Continuous improvement			The main focus of the school is to reduce the number of mistakes and wrong decisions
Affiliation, possession, competence	The actionability of the discipline	Activity, laving, consistency	Repeating usage, measuring the unpredictable	Improving and reducing waste

Table 5. Evaluation table to determine the current state of maturity (own processing).

Factors	Maturity Level 1	Maturity Level 2	Maturity Level 3	Maturity Level 4	Maturity Level 5
The maintenance of the application depends on the person.	none or 1 person	2–3 persons	team	division/school department	school
The data provided by the system are mainly provided by employees. The data provided to the systems are mainly used by employees.	1 person	2–3 persons	team	team and school	school and school system
Data in apps are managed through updates.	update not needed	annual update	monthly update	weekly update	update always
Norms and procedures are defined in schools, which can be repeated in the future.	no need to define	define in the range of 25%	define in the range of 50%	define in the range of 75%	define all
New data collected are stored within the school system to avoid incomplete data.	not stored	25% is saved	50% is stored	75% is stored	always saved
The school data model is updated when new metadata emerge.	never update	annually update	monthly update	weekly update	always update
School data are standardized	non-standardized	standardized 25%	standardized 50%	standardized 75%	all data updated
The goal of the school is continuous improvement.	no need for improvement	rare improvement	frequent improvement	very common improvement	improvement always occurs
The school can identify its strengths and weaknesses when it comes to data management.	unidentified	1–2 identifications	2–5 identifications	5 or more identifications	all identified
The main goal of the school is to reduce the number of mistakes and wrong decisions.	unidentified	rarely focused	monthly focused	weekly focused	always focused on identification

Table 6. Evaluation table to determine the current state of maturity (own processing).

Factors	Development
Application maintenance depends on a person.	The school has designated a person who is in charge of maintenance and only this person has knowledge
The data provided to the systems are mainly carried out by employees.	This is focused on how automated the tasks in the school are carried out compared to the manual tasks.
Data in apps are managed through updates.	This factor relates to the timeliness of the data and how complete the available data are.
Norms and procedures are defined in the company, which can be repeated in the future.	If this succeeds, the employees can access documents in which it is indicated how they should perform a certain task. These documents should always be available.
New data collected are stored within the school's systems to avoid incomplete data	New information found is directly stored in systems and is not documented somewhere where it is not accessible to others.
The school data model is updated as new metadata appear.	Previously unavailable data are made available for inclusion in the future.
Company data at a school are standardized	Standardization of data increases the accuracy and integration of information within systems.
The goal of the school is to constantly improve.	This factor is aimed at eliminating repetitive tasks through, for example, improving procedures.
A business can identify its strengths and weaknesses when it comes to data management.	The school is aware of errors in its processes and knows how it can solve them. The school also knows its strengths and knows how to capitalize on them.
The main goal of the school is to reduce the number of errors.	The emphasis is on removing redundant data and keeping the data usable.

5. Methodology

The aim of this study is to add a new perspective on the management of the marketing mix within the subject of maturity models and thus introduce new knowledge to this topic, which can be classified as exploratory research [25]. In addition, in terms of the frameworks of each study, we will discuss whether they are qualitative or quantitative, and therefore, both forms of methodology will be briefly discussed [26]. Quantitative research is an approach to testing goals (theories) through the study of relationships between different variables. Quantitative research is typically characterized by the use of statistical procedures to test a researcher-defined hypothesis with fixed variables [27,28]. It follows a deductive approach, starting from one or more statements to reach a conclusion. This type of research is often suitable for large samples. Structured interviews conducted through surveys are commonly used in quantitative research. On the other hand, qualitative research aims to explore and understand the significance of individuals in relation to a specific problem. The researcher develops questions and procedures to obtain additional information for the study. Qualitative research employs an inductive approach, using evidence to support the proposed conclusion and the generalized observations made. Within the framework of qualitative research, semi-structured and unstructured interviews are mostly used. These types of interviews are characterized by an increasing level of flexibility and a lack of structuring. Qualitative research is considered to be subjective because it is based on the personal opinions or experiences of individuals and is not considered objective because it is not based on facts. Within the framework of qualitative research, the aim is to understand and examine certain cases and contexts. [29] Since the aim of this study is to complement the quality management of the marketing mix in education within the theme of maturity models, it brings new knowledge to this topic and can be classified as exploratory research. As part of this study, a qualitative research design was used, in which knowledge of the topic of data quality management research was present. For the current study, conducting interviews appeared to be the most suitable method, since it allowed for open-ended questions to be asked to a small sample, enabling the researchers to gain insight into individual experiences and knowledge. Qualitative research typically employs two types of interviews, namely semi-structured and unstructured. Compared to quantitative research, conversations in qualitative research are less rigid and offer more flexibility, enabling the researcher to deviate from a plan and obtain detailed answers. Given the flexibility of semi-structured interviews, this method appeared to be the most appropriate for the current study, as it allows for in-depth questioning by the interviewer [30]. Moreover, the flexibility of this research method allows the researcher to ask follow-up questions to obtain comprehensive answers. In contrast, structured interviews might limit the researcher from

exploring certain topics in depth. Furthermore, the questions within the interview guide could be asked in any order that was deemed suitable for the particular situation.

The primary method of data collection for this study was through semi-structured interviews. This approach is preferred as it enabled the researcher to ask open-ended questions to a small sample of individuals, allowing for the in-depth exploration of their experiences and knowledge. In addition to interviews, surveys and questionnaires were also used to supplement data collection, providing a unified platform of questions to gather additional insights. The sample population for this study consisted of two groups: individuals from a company's own employees (including those from the elementary art school, kindergarten, and leisure center) and individuals from external sources with relevant experience, such as partner schools.

No questions were neglected without good reason. Sometimes it was necessary to ask explanatory questions whenever it was deemed necessary in order to verify that the respondent understood the questions and that their answer correctly corresponded to the question. In order to improve the original maturity model and the scoreboard developed in the 'basic background' section, five respondents were interviewed. In Table 7, respondents are listed under letters of the alphabet in the order in which the interviews were conducted. In the course of these interviews, information was provided regarding marketing mix quality data, and a maturity model and a case study scoreboard were used as a form of testing. Each respondent, if they wanted to, applied the maturity model to their organization. This ensured that the researcher was able to gain practical knowledge regarding the applicability of the model.

Table 7. Interview with respondents (own processing).

Respondent	Position	Company
A	Assistant Director	Primary school
B	Director	Kindergarten
C	Director	Kindergarten
D	Assistant Director	High school
E	Teacher	Private higher education institution

6. Results

This section focuses on the quality of data in practice, and the data gathered from the interviews will be translated into the maturity of the model and the scoreboard. The improved maturity model and scoreboard are here presented and discussed in more detail. This section outlines the steps that schools are taking in practice and the possible steps they could be taking in order to improve data quality. For example, the assistant director of the educational institution "A" stated that "we have no principles or standards defined. Our employees use only common sense when carrying out their daily work processes". This statement was repeated in other interviews, which in turn may have been the cause of the lack of data quality. Company "C" stated that "our employees did not pay as much attention to the quality of the data". This became apparent when we analyzed their data and found that some data were being reported in duplicate. This company subsequently changed the steps in providing information on the curriculum so that duplication no longer occurred. This was carried out in such a way that, although any teacher could fill in the data, they could select information from a pre-filled drop-down list that no longer contained the same curriculum data. Such measures could also improve the quality of data in other educational institutions. Company B stated that "We have no quality procedures, just responsibility for what needs to be done. Internally, our school does not pay additional attention to data quality management." The researchers' initial hypothesis, that schools may not place a significant emphasis on data management, is confirmed by the study's findings. Many schools tend to focus on completing tasks without dedicating adequate attention to data governance. This lack of focus is often due to the perception that data management is not essential unless it is proven to be useful. However, this approach

may result in negative consequences in the long run. Notably, this does not imply that all educational institutions ignore data quality management. Some schools are increasingly recognizing the advantages of good data quality management and are implementing more techniques and software to manage their data. Company D, for instance, reported that they are gradually increasing their focus on data quality management to prevent errors in their data. The reason for data collection may be, for example, the provision of input data to management, the creation of “annual” reports, assistance in making decisions, and monitoring the marketing mix of the institution. If users do not collect data, then systems mostly provide insights for specific software. However, in most cases, schools have to organize these data and provide input data for different types of software. With high-quality data management, educational institutions can properly organize data and present them while taking into account their own standards. However, when a school needs to rearrange data sources, then it may experience some difficulties; as Company B puts it: “We have difficulty combining multiple source information because the data is different in each system”. Many schools still work with manual data logging because it is easily accessible. For example, company “A” stated that they rely on manual input and do not make any effort to automate. Additionally, company “D” stated that “Employees do not take any steps to improve, they just repeat their work over and over again because they’re used to it.” Instead, they could also use the widely available EXCEL, for example, because it is easily accessible and working with it is not complicated. Instead, school staff show little initiative, and this may perhaps be one of the causes of poor data quality management. When comparing the findings of practice with those of theory, it can be concluded that they are closely related to each other. This is due to the fact that data quality challenges coincide with practice; for example, integrating data with different systems is cited as a challenge. The problem that additional time is needed to reconcile the data due to poor data quality was also noted by interviewees. According to them, it follows that the theory of data quality management and reality are closely related to each other, and perhaps educational institutions should start thinking about these theories. Furthermore, the applicability of the maturity model and the scoreboard needs to be examined.

In the section on the practical aspects, we listed the reasons why it is necessary to create a maturity model when creating a marketing mix in education. The analysis revealed that there are no comparable maturity models in the education of the Slovak Republic. Therefore, this work consists mainly of the comparison and knowledge of foreign literature. Since the need to create a new maturity model for the marketing mix in education was justified, we analyzed the maturity models already established globally. The maturity models to date have mostly been related to the IT sector and online learning. During COVID-19, we became convinced that public education in Slovakia could also attain quality online education. In this research, we revealed that most maturity models are based on CMM or on a stepped CMMI display. All the maturity models compared were built on five levels of maturity. Since this method was applied and justified in practice, we also applied five levels of maturity in our proposed model. When comparing the currently valid maturity models, we further found that most models do not determine any key process areas. The exceptions were the models developed by Dounos and Bohoris and the second model developed by Marshal and Mitchel. These two maturity models provided areas, methodologies, and assessment techniques that met market demand and effectively placed organizations at a certain level of maturity.

Educational institutions have unique characteristics and goals, which is why maturity models for these institutions take into account their specific nature. There may be a perception that developing maturity models for educational institutions is more challenging due to the diversity of educational contexts and objectives. Additionally, developing a maturity model requires significant resources, time, and expertise, which may limit the number of models available.

However, creating a new maturity model for educational institutions can be a valuable exercise to help improve educational practices and outcomes. To create a new model, it is

important to identify the specific needs and objectives of the educational institution or the system being targeted. The model should be tailored to the unique context of the institution, taking into account factors such as its missions, goals, student population, and resources.

Overall, creating a new maturity model for educational institutions can help drive continuous improvement and advance educational practices, and should be approached with careful consideration and collaboration with the stakeholders involved. This was also the main purpose of writing this article and, in the future, the model will be tested and improved. Table 8 represents Practical experiences of model application.

Table 8. Practical experience of model application (own processing).

Company	Practical Experience of Model Application
Primary school	No principles or standards defined. Our employees use only common sense when carrying out their daily work processes
Kindergarten	No quality procedures, only responsibility for what needs to be done. Our school does not pay additional attention to data quality management internally
Kindergarten	Our employees do not pay much attention to data quality. This became apparent when we performed an analysis of the data and found that some of the data were duplicated.
High school	Employees do not take any steps to improve, they just repeat their work over and over again, because they are used to it.
Private college	Institutions should not only begin to reflect on these theories, but also urgently work on creating and implementing their own tailor-made solutions.

7. Conclusions

In this article, the marketing mix of educational institutions was theoretically characterized. In particular, the specifics of the services, the specifics of the nature of pricing, the distribution of services in education, and the specifics of promotion were discussed. Education as a nonpublic sector is different from the usual marketing mix for companies in the private sector. After analyzing these specific differences, we looked at general maturity models. The maturity models presented at the beginning are basic maturity models on which the maturity models applicable in the field of education have been based.

Therefore, when creating our own maturity model, we based our system on the analysis carried out. We included the results that were detected in our analysis. The basic starting point of our model was the theoretical properties that a maturity model should contain. Therefore, we used a descriptive model, which was used to determine how to identify desirable levels of maturity and provide guidance for improvement. In determining the new maturity model in education, we followed the checklist compiled by Poppelbuß and Röglingerg. They divided the principles of the model into two categories, namely basic and descriptive. Both of these principles of the maturity model were further disassembled to reveal more specific requirements that a maturity model must contain. Thus, we assembled the new maturity model according to these principles. The main area that our maturity model deals with is the quality of the data collected. So far, no one has compiled a mature model for this issue. We see this issue as crucial in terms of comparison with other maturity models, since the collection of data can help the quality of education, both for teachers, principals, and students themselves, and the marketing mix was thus further specified. Based on the collected data, it was possible to better create a product, i.e., the content of teaching; to refine the disciplines taught; and to better set the price for teaching, since it will be possible to better examine pricing based on data, and this will also help us in terms of promotion. The target group in the new maturity model is mostly teachers, who have a good overview of the school processes. As we mentioned previously, we built the new model on five levels, which are:

- Level 1—basic level related to a specific person,
- Level 2—degree of policy, standards, and procedures,
- Level 3—degree of stability,
- Level 4—level of management and standards,

- Level 5—degree of improvement.

We described each level in detail in this study and added basic definitional criteria. Next, we provided levels of maturity to the maturity model. We clearly named the maturity levels and illustrated the paths of maturity for each degree. The new maturity model developed is thus designed for individual educational institutions as a model for reflecting on the current state of affairs and comparing it with the desired state of the marketing mix. Part of the new maturity model is also a scoreboard, which contains an overview of each level of maturity. The scoreboard was compiled from individual factors that may occur and a proposed assessment for all five levels. The maturity model was also communicated with the staff of real educational institutions, from primary schools to colleges. It was found that a mature model for data quality was a necessary tool to manage the marketing mix in schools. It is clear from some statements that many teachers do not even record information in electronic form. The maturity model provided much information to schools. At the beginning, the representatives of educational institutions did not even know what to focus on in regard to the maturity model or how to understand it. In addition, the text within the different maturity levels was not easily understood, so the decision was taken to optimize the text presented in the model. As part of the development of the new maturity model, some simple additions were also made, such as the date of use of the maturity model, which proved useful for testing in case studies.

There may be a perception that developing maturity models for educational institutions is more challenging due to the diversity of educational contexts and objectives. Additionally, developing a maturity model requires significant resources, time, and expertise, which may limit the number of models available. The development of the model should involve collaboration with experts in the field of education and input from a diverse group of stakeholders, including educators, administrators, and students. The model should also be designed to be flexible and adaptable, with the ability to evolve as the educational landscape changes. Overall, implementing a maturity model can help education institutions improve their marketing mix by providing a structured approach to identifying gaps and areas for improvement and developing a targeted action plan. It is important to involve key stakeholders in the process and continuously monitor and adjust the plan to ensure its effectiveness.

The schools that will use this model should analyze the maturity model and define the desired state of maturity. First of all, users should record the date of use so that in the future a comparison can be made with the different models of maturity used. Secondly, when a school has defined the level of maturity, they should indicate the required level of maturity using the rings indicated in the upper left corner of each level of maturity. Finally, the school should record all the points requiring attention that were uncovered when analyzing the institution through the maturity model. These remarks could help decision making for scoring factors on the scoreboard used to define the current state of maturity. During the practical introduction of the maturity model, we assumed there would be many comments regarding the structure of individual factors, as they may sometimes not be clear to users or a question may not be correctly formulated. Therefore, some of the questions may need to be changed to be better suited to determine the level of maturity. In terms of practical use, future recommended models of data quality maturity should also take into account the size of the school. Regardless of its size, a school should be able to reach its preferred levels of maturity, and no score should prevent it from achieving its required level of maturity. Any observations made regarding the maturity model should be taken into account and used in the evaluation of individual factors. In conclusion, we demonstrated that a new mature model for assessing data quality for a marketing mix in educational institutions is necessary in practice. This study can be used as a basis for future investigations.

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References

- Chen, Y.C. A study of the interrelationships among service recovery, relationship quality, and brand image in higher education industries. *Asia Pac. Educ. Res.* **2015**, *24*, 81–89. [CrossRef]
- Caralli, R.; Knight, M.; Montgomery, A. *Maturity Models 101: A Primer for Applying Maturity Models to Smart Grid Security, Resilience, and Interoperability*; Technical Report; Carnegie-Mellon University, Software Engineering Institute: Pittsburg, PA, USA, 2012.
- Blondiau, A.; Mettler, T.; Winter, R. Designing and implementing maturity models in hospitals: An experience report from 5 years of research. *Health Inform. J.* **2016**, *22*, 758–767. [CrossRef] [PubMed]
- Wendler, R. The maturity of maturity model research: A systematic mapping study. *Inf. Softw. Technol.* **2012**, *54*, 1317–1339. [CrossRef]
- Paulk, M.; Curtis, B.; Chrissis, M.; Weber, C. *The Capability Maturity Model for Software*; Version 1. 1 (No. CMU/SEI-93-TR-24); Software Engineering Institute: Pittsburgh, PA, USA, 1993.
- Zoubek, M.; Poor, P.; Broum, T.; Basl, J.; Simon, M. Industry 4.0 maturity model assessing environmental attributes of manufacturing company. *Appl. Sci.* **2021**, *11*, 5151. [CrossRef]
- P3M3, 2006 as P3M3-OGC. Portfolio, Programme & Project Management Maturity Model (P3M3). Version 1.0. p. 3. 2006. Available online: <https://www.projectsmart.co.uk/project-portfolio-management/portfolio-programme-and-project-management-maturity-model.php> (accessed on 14 February 2023).
- Lutteroth, C.; Luxton-Reilly, A.; Dobbie, G.; Hamer, J. A maturity model for computing education. In Proceedings of the Ninth Australasian Conference on Computing Education, Ballarat, VI, Australia, 30 January–2 February 2007; pp. 107–114.
- Manjula, R.; Vaideeswaran, J. A new CMM-Quality Education (CMM-QE) framework using SEI-CMM approach and calibrating for its process quality and maturity using structural equation modeling-PLS approach. *Int. J. Softw. Eng. Appl.* **2012**, *6*, 117–130.
- Gu, D.; Chen, J.; Pu, W. Online course quality maturity model based on evening university and correspondence education (OCQMM). In Proceedings of the 2011 IEEE 3rd International Conference on Communication Software and Networks, Xi'an, China, 27–29 May 2011; pp. 5–9.
- Bass, J. An early-stage ICT maturity model derived from Ethiopian education institutions. *Int. J. Educ. Dev. Using ICT* **2011**, *7*, 5–25.
- Rossi, R.; Mustaro, P.N. eQETIC: A maturity model for online education. *arXiv* **2022**, arXiv:2201.11621.
- White, B.; Longenecker, H.E.; Leidig, P.M.; Yarbrough, D. Applicability of CMMI to the IS curriculum: A panel discussion. In Proceedings of the Information Systems Education Conference (ISECON 2003), San Diego, CA, USA, 6–9 November 2003; pp. 1–5.
- Neuhauser, C. A maturity model: Does it provide a path for online course design. *J. Interact. Online Learn.* **2004**, *3*, 1–17.
- Thompson, E. Using a subject area model as a learning improvement model. In Proceedings of the 8th Australasian Conference on Computing Education, Hobart, TS, Australia, 16–19 January 2006; Volume 52, pp. 197–203.
- Thompson, E. Towards a learning process maturity model. PhD Workshop. 2004. Available online: https://www.researchgate.net/profile/Errol-Thompson/publication/228600045_Towards_a_learning_process_maturity_model/links/0912f50ed78d94c800000000/Towards-a-learning-process-maturity-model.pdf (accessed on 15 February 2023).
- Zhen, W.; Xin-yu, Z. An ITIL-based IT service management model for chinese universities. In Proceedings of the 5th ACIS International Conference on Software Engineering Research, Management & Applications (SERA 2007), Busan, South Korea, 20–22 August 2007; pp. 493–497.
- Dounos, P.K.; Bohoris, G.A. Exploring the interconnection of known TQM process improvement initiatives in Higher education with key CMMI concepts. In Proceedings of the the 10th QMOD Conference, Helsingborg, Sweden, 18–20 June 2007.
- Marshall, S. *E-Learning Maturity Model Version Two: New Zealand Tertiary Institution E-Learning Architectural Change and Development*; Project report; University of Victoria: Wellington, New Zealand, 2006.
- Marshall, S.; Mitchell, G. An e-learning maturity model. In Proceedings of the 19th Annual Conference of the Australian Society for Computers in Learning in Tertiary Education, Auckland, New Zealand, 8–11 December 2002; pp. 8–11.

21. Petrie, M.; García, V.; Giraldo, G. Modelo de Registro y Acreditación de Instituciones de Educación Superior basado en el Modelo CMMI. In Proceedings of the Seventh LACCEI Latin American and Caribbean Conference for Engineering and Technology (LACCEI'2009), San Cristobal, Venezuela, 2–5 June 2009.
22. Bass, J.M. *A New ICT Maturity Model for Education Institutions in Developing Countries*; Center for Development Informatics Institute for Development Policy and Management, SED: Manchester, UK, 2010.
23. Pöppelbuß, J.; Röglinger, M. What makes a useful maturity model? A framework of general design principles for maturity models and its demonstration in business process management. 2011. Available online: <https://aisel.aisnet.org/ecis2011/28/> (accessed on 2 February 2023).
24. Zoubek, M.; Poór, P.; Šimon, M. A maturity model for evaluating and increasing the readiness of the company within the concept of Industry 4.0 with a focus on internal logistics processes. 2020. Available online: <http://hdl.handle.net/11025/42469> (accessed on 5 February 2023).
25. Crossman, A. The purposes of research: Exploration, description, and explanation. 2014. Available online: <http://sociology.about.com/od/Research/a/Purposes-Of-Research.htm> (accessed on 2 February 2023).
26. Zoubek, M.; Šimon, M. The Framework for Logistics 4.0 Maturity Model with a Specification for Internal Logistics. 2021. Available online: <http://hdl.handle.net/11025/46966> (accessed on 14 February 2023).
27. Silverman, D. *Doing Qualitative Research. Doing Qualitative Research*; SAGE: Newbury Park, CA, USA, 2021; pp. 1–100.
28. Edwards, R.; Holland, J. What Forms Can Qualitative Interviews Take? In *What Is Qualitative Interviewing*; Bloomsbury: London, UK, 2013; pp. 29–42.
29. Bryman, A. *Social Research Methods*; Oxford University Press: Oxford, UK, 2016.
30. Miles, J.; Gilbert, P. *A Handbook of Research Methods for Clinical and Health Psychology*; Oxford University Press on Demand: Oxford, UK, 2005.

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