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Conceptual Foundations of a New Approach to Pedagogical Model Development

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Abtract

This article offers a contemporary reconceptualization of the pedagogical model, developed through the analysis and synthesis of foundational ideas articulated in the scholarly work of leading researchers in the field. Furthermore, drawing on a critical examination of existing approaches to pedagogical modelling – as well as the recurrent errors and conceptual inconsistencies frequently observed in open-source materials on the development of pedagogical models – the study proposes a new, systematic, and integrative framework for understanding the concept of a pedagogical model.

The article advances a minimum set of essential components that should be incorporated into any pedagogical model, and it provides a coherent justification for their interrelationships and functional roles. Specifically, the following components are identified as indispensable: goals and objectives, information collection, pedagogical strategy, and expected outcomes. The study delineates the roles of these components within the pedagogical process and underscores their importance in ensuring educational efficacy. A distinguishing feature of the proposed framework is that these components operate as a unified logical system throughout the stages of designing, implementing, and evaluating the pedagogical process.

The propositions advanced in this article contribute to the consolidation of diverse theoretical perspectives within the field of pedagogical process modelling and facilitate the objective and comparative evaluation of research outcomes.

The implementation of the conclusions and recommendations presented herein will provide a robust foundation for the development of shared approaches to the scientific planning and organisation of pedagogical activity, as well as to the assessment of pedagogical research results. The findings of this study will serve as a valuable methodological and theoretical resource for specialists in pedagogy, academic researchers, and practising educators.

Keywords: pedagogical process; pedagogical model; components of the pedagogical model.

JEL: I20, I21.

Introduction

A highly developed cognitive disposition to perceive phenomena and objects that constitute human existence through sensory mechanisms – and to comprehend their inner essence through rational and analytical activity – is one of the defining features of human thinking. The realisation of this disposition is manifested, first and foremost, in the form of modelling, a phenomenon inseparably connected with visual perception ([1], p. 7). Representing objects, processes, or phenomena through visual depiction – namely, modelling – is an essential cognitive process that enables the revelation of their ontological essence, the analysis of their functional properties, and the prediction of their future development. The visualisation of processes presupposes a sophisticated intellectual activity that involves working with image-based information, analysing it, and interpreting it.

The rapid development of contemporary education, driven by digitalisation, globalisation, and the integration of

science and technology, has sharply increased the need for the scientific organisation and management of pedagogical processes. Under such conditions, ensuring the effectiveness of the educational process requires careful attention to constructing visual representations of the interactions among its structural components; analysing the purposes for which, and the stages of instruction in which, these representations are applied; and evaluating their impact on learning outcomes. In recent scientific research addressing these issues, there is a growing tendency to conceptualise the pedagogical process as a distinct system, represented through modelling. Such models – embodying structured networks of components arranged in a logical sequence – provide pedagogical researchers with powerful tools for simplified representation, analysis, evaluation, and the prediction of hypotheses related to the educational process. They also facilitate the discovery of new dimensions within pedagogical practice.

Given that the pedagogical process constitutes a multifaceted and complex system, direct analysis is often difficult, making it advisable to substitute the real process with a comparatively simplified and accessible model. Modelling thus serves as an effective method for analysing internal mechanisms, identifying and assessing functional behaviours, exploring capacities, and determining existing limitations. In this context, the model functions as an abstract construct that reflects the most essential, typical, and system-forming characteristics that define the pedagogical process.

Extensive scholarly work has been carried out by pedagogical researchers who have developed models of the pedagogical process and formulated their conclusions on this basis. However, analysis indicates that although pedagogical modelling has become a prevailing trend in contemporary pedagogical research, numerous shortcomings remain evident in models proposed by novice and inexperienced researchers. In this respect, the following deficiencies merit particular attention.

It is frequently observed that many pedagogical models published in open sources are developed without a sufficiently robust foundation in scientific and theoretical concepts. Furthermore, although some models appear relatively complete in structure, they often demonstrate limited applicability in real educational settings. Many such models remain confined to general descriptions, with insufficient integration into pedagogical and didactic principles.

The lack of well-defined systematic connections between components (e.g., goals, content, methods, forms, and results) creates significant challenges in organising the pedagogical process, as well as in understanding and analysing its underlying essence. A common shortcoming is the absence of coherent inter-component linkages – manifesting as partial or complete disruptions in the logical chain connecting stated goals to the anticipated learning outcomes.

Additionally, inadequate incorporation of modern information and communication technologies, digital tools, and interactive methods diminishes the relevance of many models and renders them incompatible with contemporary educational requirements. The rigid structural design of certain pedagogical models further restricts their adaptability to diverse educational conditions, learner groups, and resource environments, thereby limiting their universality.

It is evident that models exhibiting the aforementioned deficiencies – and lacking empirical validation – fail to deliver expected results in pedagogical practice. This, in turn, undermines the scientific credibility and reliability of the model. Therefore, addressing these shortcomings necessitates a scientifically grounded, theoretically robust, and practice-oriented systematic approach to the development of pedagogical process models. Only on this basis can a pedagogical model serve as a reliable instrument for organising educational activities effectively and evaluating the outcomes of scientific and pedagogical research.

Literature rewirv

Among the numerous sources devoted to pedagogical models, the pedagogical model of the Victorian State Government [2] is of particular significance. This model is described, firstly, as a tool enabling teachers to identify the actions necessary to engage learners in complex intellectual processes, and secondly, as a general outline of the learning cycle. It divides the pedagogical model into five domains or stages of teaching: engagement, learning,

explanation, elaboration, and assessment. The source emphasises that these domains do not represent separate or independent elements, but rather constitute interrelated components of a single, coherent teaching model. In practice, this serves as a valuable foundation for constructing pedagogical models.

The complexity and multifactorial nature of the pedagogical process make direct analysis challenging; consequently, it is advisable to replace the real process with a simplified and more manageable model – that is, to apply modelling as a methodological tool. Modelling significantly facilitates the analysis of the internal mechanisms of the pedagogical process, the identification and assessment of its functional behaviours, and the examination of its capacities and inherent limitations. In this context, the model functions as an abstract construct that encapsulates the most essential, typical, and system-forming characteristics defining the pedagogical process.

The theoretical and practical significance of pedagogical models and the modelling process has been examined by a number of scholars. In this regard, several research works, including [3], [4], and [5], may be noted. In particular, researchers such as V.I. Pisarenko [1] and C. Vásquez [5] have explored the concept and essence of the pedagogical model. Their studies contribute to enhancing our understanding of how pedagogical models may influence the educational process.

A considerable body of literature on the classification of pedagogical models is available in open sources ([1], [6], [7], [8], [9]). B.Z. Yusupov, for example, argues that "there is no universal typology of models in modern science" [7]. He identifies various classificatory approaches, including forms of model representation (material, immaterial, and informational models), variability of the modelled object (static and dynamic models), purpose of use (descriptive and optimising models), and spheres of practical application. The pedagogical models proposed by E.A. Lodatko [9], which incorporate a component of "random informational stimuli" and foreground apperceptive learning, provide further methodological insights for determining approaches to model construction. The conceptual considerations put forward by V.I. Pisarenko [1] have informed the development of the author's definition used in this study.

From the works of numerous scholars – including M. Babkulova [10], Brigmane [11], L.D. Yadgarova [12], and L. Dunayeva [13] – it may be inferred that "the principal components of the pedagogical process are the goal, content, teaching, training, upbringing, and assessment." In our view, such a list remains incomplete.

An analysis of the extensive research literature available in the open scientific domain reveals that the absence of unified scientific perspectives on the concepts of the pedagogical model and modelling has resulted in diverse interpretations of these categories. Such terminological and conceptual discrepancies generate methodological difficulties in assessing the scientific validity of newly proposed pedagogical theories and in predicting the effectiveness of emerging hypotheses. Addressing these challenges requires the development of generalised, systematic, and conceptually grounded pedagogical models. The proposals introduced in this study constitute a robust theoretical and methodological foundation for advancing the process of constructing such models.

Methodology

I. BASIC INFORMATION. For the sake of simplicity, in this article the term *object* is used to denote the aggregate of the most essential characteristics of the process, event, or entity under consideration. In this sense, the pedagogical process is perceived as a single object comprising its most significant components.

In contemporary pedagogical science, modelling is one of the most widely employed research methods. Consequently, the improvement and theoretical substantiation of the quality of constructing and applying pedagogical models may be regarded as a serious scientific problem. The purpose of this article is to articulate the concept of a pedagogical model in modern scholarship through the clarification of modelling-related terminology, the analysis of their characteristics, and the proposal of functional criteria for the classification of pedagogical models on the basis of defined requirements. Addressing this problem will contribute to the development of a unified scientific perspective on improving and assessing the quality of pedagogical research through the synthesis of diverse existing viewpoints.

To reconceptualise the pedagogical model from a modern perspective, several scientific terms must be considered. Below, the most important among them are examined.

System (from the Greek systema, a whole composed of separate part) – 1) an interconnected entity based on the arrangement of the parts that constitute an object [14]; 2) a set of parts, objects, or ideas organised to function collectively [15].

A system may be defined as an integrated set of elements or assemblies that work together to achieve a specific goal [16].

A tree refers to the hierarchical arrangement of constituent parts according to their status or authority within a system [17].

The components of a system are interconnected and reflect unequal relationships depending on their position within the hierarchy. Based on their location in the tree, one component may occupy a clearly higher or lower status relative to another.

From numerous comparable definitions, the following characteristics of the concept *system* may be identified:

- the system consists of a large number of constituent parts;
- all constituent parts of the system are logically interconnected according to a particular hierarchical structure;
- each constituent part receives incoming information from preceding parts and transmits outgoing information to subsequent parts in accordance with the hierarchy;
- each constituent part performs a distinct function;
- all components serve the overarching purpose of the system – that is, to ensure the achievement of the expected result.

It follows that if any link in the hierarchical structure is broken, the system will function inadequately or collapse entirely; put simply, the system will fail to guarantee the expected result.

The concept *model* is used across numerous fields and therefore carries multiple interpretations. In this article, the term is employed in the sense of *a simplified structure of a complex object*. The following definitions provide a conceptual basis for this usage.

Model (from the French *modèle* and the Latin *modulus*, meaning measure, standard, sample, or criterion) – 1) from the perspective of logic and scientific methodology, a simplified representation of natural or social reality – or of a specific part of it – constructed using a scheme, structure, or symbolic system [14]; 2) the process of creating a model of something; designing or planning something based on the example of an existing structure [15].

Since systems consist of numerous interconnected components with complex structures, it is generally expedient to study their behaviour through models. Such models are constructed as simplified diagrams of the essential aspects (components) of real phenomena, sufficient for analysing, understanding, evaluating, predicting, or controlling complex processes, events, or objects.

Scheme (Greek *schema,* appearance, image, form) – 1) a drawing that explains the principles of operation of a set of interconnected parts of a device, instrument, or system [14]; 2) a graphical document illustrating the components of an object and the connections between them using conventional graphic symbols or designations [18]; 3) a graphical document depicting a sequence of actions aimed at solving a given problem [19].

Several requirements have been established for the construction of schemes, among which the following, derived from the GOST 19.701–90 standard [20], are particularly important:

1. Data or control flows in diagrams must be indicated by directional lines.
2. The standard direction of flow is from top to bottom and from left to right. If the flow direction differs (i.e., bottom to top or right to left), this must be explicitly indicated.
3. Crossed lines should be avoided in schemes.

4. Each component of a scheme must have at least one input and one output line, except for the first and last components.

Given that many models deviate from these conventions, strict adherence to the above requirements is recommended. Furthermore, if the system being modelled is complex, it is advisable to model its individual components separately and represent the overall scheme as a composite of these components. In diagrams, such components are typically represented using dotted lines.

In contemporary modelling practice, the following classes of schemes are widely employed [18]:

- structural schemes – representing the principal functional components of an object, their purpose, and interrelationships; developed primarily at the design stage for general familiarisation;
- functional schemes – constructed to demonstrate processes occurring within the entire object or within its individual components;
- principle (complete) schemes – representing the full composition of elements and their interrelationships, typically used to develop a detailed understanding of operational principles;
- general schemes – graphical documents depicting the components of an object and the relationships among them, intended for familiarisation, observation, and practical application.

Based on the aforementioned information, the following conclusion may be drawn: *A model is a method of representing a specific event, process, or object of real existence as a holistic, systematic entity, through diagrams that fully or partially depict the hierarchical structure of all its components.*

II. PEDAGOGICAL PROCESS AND ITS BASIC COMPONENTS. Any system (or its substitute model) is characterised by the structure of its constituent elements, the relationships among them, and the set of functions that determine the system's behaviour in achieving a specified goal. Such structural and functional attributes of the model constitute the principal features that reveal the internal essence and distinctive characteristics of the object being modelled.

The pedagogical process may be defined as a set of interrelated actions directed towards the intentional and sustained acquisition of knowledge, skills, and competencies by teachers and learners, as well as the development of the capacity to apply these in practice.

The prominent scholar V.A. Slastenin asserts that "the pedagogical process represents the transition from educational aims to their results through the unity of teaching and learning" [21, p. 22], and therefore regards its key feature as integrity – expressed as an internal unity among components that nevertheless possess a degree of relative independence.

Similarly, R.L. Guseynzade conceptualises this process as "a system consisting of the processes of formation, development, education, and upbringing, which are inseparably connected with pedagogical conditions, forms, and methods," and identifies its core components as aims, principles, content, methods, means, and forms [22, p. 72].

As a subject of pedagogical science [21, p. 12], the pedagogical process may be understood as a real, coherent activity purposefully organised within specific social institutions (family, educational institutions, etc.). It is worth noting that the pedagogical process forms a relatively autonomous subsystem of the wider pedagogical system, addressing the traditional question of "how to teach".

From the above considerations, it becomes evident that the "pedagogical process is a holistic pedagogical phenomenon" [12], and therefore constitutes a system in which all components are intricately interconnected. The purposive organisation of the pedagogical process is achieved by determining how its main components interact in the pursuit of educational aims. Such determination facilitates the following tasks:

- constructing a pedagogical process design through identifying the placement of components within the hierarchical structure;

- developing new forms and methods of instruction;
- assessing and forecasting their impact on educational effectiveness;
- drawing scientific and practical conclusions;
- applying these conclusions in practice.

In order to harmonise existing scientific perspectives and resolve discrepancies within the field, it is proposed to regard the following educational elements as the basic – i.e., necessary and sufficient – components for designing the pedagogical process:

1. Aims and tasks
2. Information collection
3. Pedagogical strategy block
4. Conclusion

This proposed component structure possesses the following characteristics:

- it constitutes the core of any pedagogical process;
- it is minimal, yet expandable where necessary;
- each component represents an independent and complex substructure;
- the order of components is fixed, meaning that the position and significance of each within the hierarchy (design) is determined from top to bottom;
- each component may iteratively revert to a preceding one, depending on its tasks and objective or subjective circumstances.

The functions of the above-mentioned components in the pedagogical process are as follows.

1. Aims and tasks. Aims. The overarching goal of the pedagogical process is the formation of a harmoniously developed learner personality, shaped in accordance with the prevailing social, economic, and cultural paradigms of the given society. The goal constitutes the initial point of reference, providing impetus to the entire pedagogical process and representing the intended outcome of educational activity. The goal must be characterised by clarity and feasibility.

Tasks. To achieve the stated goal, this component must address at least four essential issues aligned with the chosen paradigm: instructional, educational, developmental, and motivational tasks.

Expected result: clear definition of the goals and tasks of the current pedagogical process.

2. Information collection. This component concerns the determination of the minimum set of initial information required for the pedagogical process. The following elements are proposed as its essential content: regulatory documents, educational content, resources (organisational, didactic, methodological, technical, and software), and pedagogical experience.

Expected result: a repository of initial information required for implementing the pedagogical process.

3. Pedagogical strategy block. This component covers the selection of tools necessary for the pedagogical process and the methods of their mutual integration. Its minimum composition of tools includes: instructional form, teaching paradigm, priority method, distribution of resources (administrative, didactic, technical, and software), interdisciplinary relations, and assessment.

Expected result: a technological map of the current pedagogical process, or an educational technology.

Note: *Educational technology* refers to a systematic set of human factors, legal-normative, pedagogical, technical, and software tools used to enhance education and upbringing within a specific paradigm, as well as the actions

applied to these tools, which collectively ensure – with high probability – the achievement of the expected educational outcomes [24].

4. Conclusion. This component involves the development of new scientific, theoretical, practical, and methodological recommendations aimed at improving the activities of both the object and subjects of the process, thereby enhancing the efficiency, quality, and effectiveness of the pedagogical process.

Expected result: general conclusions, proposals, and recommendations regarding the current pedagogical process.

III. A NEW DESCRIPTION OF THE PEDAGOGICAL MODEL. As is well known, until a comprehensive and meaningful interpretation of the concept of a 'pedagogical model' is fully developed, it is not possible to correctly identify the structural components of the pedagogical process. In this regard, it is worth noting that there are various approaches to defining the concept of a pedagogical model. In particular, Vasquez G. C. defines a pedagogical model as a theoretical structure with scientific and ideological foundations aimed at interpreting, designing, and adapting pedagogical reality in accordance with specific historical needs [3]. Although UNESCO does not provide a precise definition, it considers a pedagogical model to be a means of systematically, purposefully, and effectively organising the educational process [25]. Similarly, E. A. Lodatko characterises a pedagogical model as an imaginary system that reflects certain features of the object of study, including its internal structure or principles of functioning, and is represented in a form characteristic of a particular socio-cultural practice [9].

Drawing on these descriptions, together with the insights of A.V. Pisarenko [1], the following working definition is proposed: ***A pedagogical model*** *is an informational and investigative construct, specially designed for the purpose of projecting, studying, analysing, and reconstructing the pedagogical process under new or changing conditions.*

This definition reflects the essential characteristics common to pedagogical models:

- designability (the capacity to structure or reorganise educational processes);
- informational value (the ability to consolidate, present, and mobilise knowledge);
- analysability, evaluability, and predictability (the potential to examine and forecast outcomes);
- connection with both objective and subjective educational realities;
- repeatability (the potential to reproduce the model in varied contexts).

Pedagogical models may therefore be understood as systems devised to support the development, implementation, evaluation, and forecasting of teaching and learning processes. They integrate a range of strategies and methodologies intended to enhance educational effectiveness, promote learner engagement, and facilitate meaningful learning experiences across diverse educational environments.

The rationale for developing such models arises from several core needs:

- presenting complex pedagogical systems in a simplified, structured form;
- disseminating, developing, and improving established pedagogical practices;
- designing or redesigning pedagogical processes;
- identifying the factors that influence educational outcomes;
- formulating and testing new hypotheses regarding teaching and learning.

Given that integrity and systematicity are fundamental qualities of the pedagogical process, its implementation necessarily involves the coordinated functioning of a set of educational components. The existence, positioning, quality, and condition of these components exert significant influence over the overall effectiveness of the pedagogical process.

On the basis of the preceding considerations, and recognising that every pedagogical process constitutes a complex

system whose components represent intricate subsystems, it is proposed that a general pedagogical model template be constructed as a linear combination of system components (Figure 1).

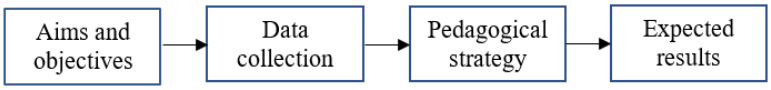

Figure 1. General pedagogical model.

Educational goals perform a system-forming function within the pedagogical process. The determination of goals establishes the anticipated outcomes in terms of the assimilation of new knowledge, the restoration and refinement of existing skills, and the acquisition of new competencies and qualifications. In this respect, the choice of goals directly shapes the tasks, content, methods, and means of the pedagogical process.

Within any pedagogical model, the *"Aims and Objectives"* component should comprise at least four fundamental tasks: educational, instructional, developmental, and motivational (Figure 2). Although many scholars contend that the development of learning motivation is embedded within later stages of the pedagogical process, its explicit inclusion at the goal-setting stage strengthens the coherence, integrity, and predictive capacity of the model.

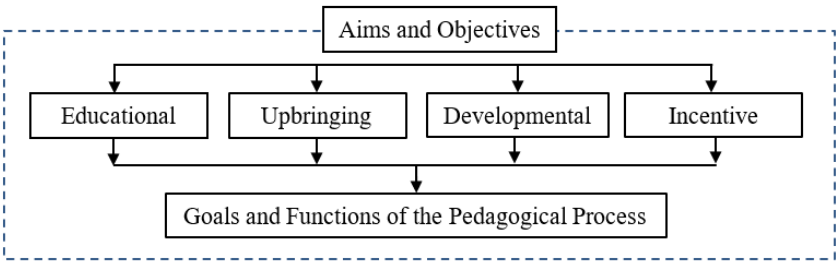

Figure 2. General model of the "Goals and Objectives" component.

In our view, the outcomes of the pedagogical process are closely linked to the level of learners' motivation. Consequently, it is both reasonable and pedagogically justified to situate the motivational task within the *"Aims and Objectives"* component of the model. The accurate formulation of goals and objectives provides a foundational basis for all subsequent stages of the pedagogical process, including the evaluation of its results.

For the subcomponents of the *"Aims and Objectives"* stage within a specific pedagogical process model, the tasks presented in Table 1 may be selected. Where necessary, this structure may be expanded through the inclusion of additional tasks to suit the particular context or paradigm of the educational process.

Table 1. Tasks of the subcomponents of "Aims and Objectives"

Subcomponent	**Tasks**
Educational	The formation of students' knowledge, skills, and competencies in the fundamentals of the discipline.
Unbringing	Ensuring the integration of education and upbringing; promoting the development of students' moral, aesthetic, and social qualities; enhancing a positive attitude toward work and professional activity, as well as fostering initiative and active engagement.
Developmental	Developing thinking skills; fostering systematic, algorithmic, logical, critical, and creative thinking; enhancing the abilities to analyze, compare, and generalize.
Incentive	Strengthening a positive attitude toward learning, the need for knowledge, aspiration, and intrinsic motivation; instilling the understanding that acquired knowledge will be essential in future professional activities.

The *"Information Collection"* component of the model embodies the minimum set of initial data that must be

identified to organize the current pedagogical process (Figure 3).

It should be noted that the *"Data Collection"* component comprises several elements, each representing a complex subsystem. We propose that the *"Educational Experience"* subcomponent be explicitly included within the *"Data Collection"* component of the model. This inclusion is justified by the fact that any contemporary pedagogical model is developed on the basis of enhancing a pre-existing, or "old," model. In this context, improving the "old" model entails amplifying its recognised advantages – identified through pedagogical experiments or validated by

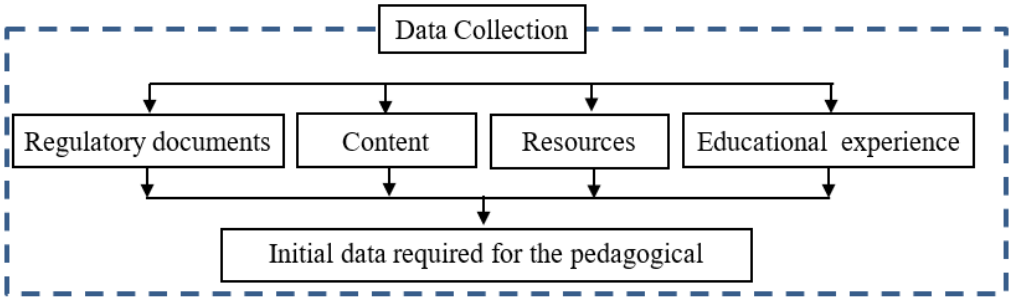

Figure 3. General model for the "Data collection" component.

scholars – while addressing and correcting its shortcomings.

Furthermore, for the *"Resource"* element of the model, the components illustrated in Figure 4 are proposed as mandatory. Although this element is absent from many existing models, we contend that it is essential. The effective implementation of a scientific or practical pedagogical process model requires the availability of pre-existing administrative, didactic, software, and technical resources. The pedagogical strategy is subsequently constructed on the basis of this information.

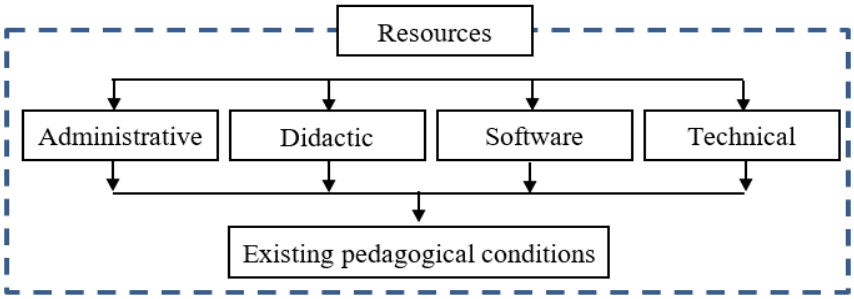

Figure 4. General model for specifying "resources".

During the "*Data collection"* phase, the tasks of the subcomponents are clarified based on the guidelines in Table 2.

Table 2.Instructions for the "Data collection" component

Subcomponent	**Tasks**
Regulatory documents	Qualification requirements; curriculum; working (practical) syllabus; syllabus; contracts.
Content	Theoretical materials allocated for the current pedagogical process, as well as practical and independent study assignments.
Resources	Administrative and organizational resources, didactic, software, and technical tools.
Educational experience	Information on existing teaching experiences for similar pedagogical processes.

The Pedagogical strategy block involves the specification and integration of parameters directly related to the current pedagogical process, including the lesson format, teaching paradigm, priority method, distribution of resources (temporal, didactic, technical, and software), intersubject relationships and assessment mechanisms (Figure 5). As previously noted, this component provides the foundation for constructing a technological map or pedagogical technology, which is subsequently applied in the lesson.

The subcomponents *"Pedagogical Paradigm"* and *"Resource Distribution"* proposed in Figure 5 are absent from many existing models. The pedagogical paradigm is of critical importance, as it determines the theoretical and practical approach to organising the educational system. In essence, it guides the integration of components and subcomponents within the *"Pedagogical Strategy"* block and directly influences the effectiveness of the tasks assigned to this component. The paradigm thereby serves as the theoretical underpinning for the implementation of the pedagogical strategy.

Moreover, many models restrict themselves to indicating the allocated time for the pedagogical process, listing didactic materials, software, and technical means, without specifying the parameters of resource distribution – namely, when, for how long, and for what purpose these resources are to be utilised. It is well established that uncertainty in resource allocation can negatively impact educational effectiveness. Accordingly, the growing demand for dynamic and innovative approaches within the constraints of limited educational resources renders resource distribution a priority task in the pedagogical process. In this respect, we recommend drawing on the guidelines of E.V. Tissena [26] when developing models for educational resource allocation.

Additionally, a number of models listed in open sources enumerate the teaching methods to be employed, yet fail to indicate the preferred or priority method. While recognising the value of multiple teaching approaches, clarifying the preferred method enhances the precision and quality of the model and provides a foundation for the pedagogical paradigm. On the basis of these considerations, it is proposed that the subcomponents *"Pedagogical Paradigm"* and *"Resource Distribution"* be recognised as mandatory elements of the pedagogical model, with the priority teaching method highlighted as a distinct component.

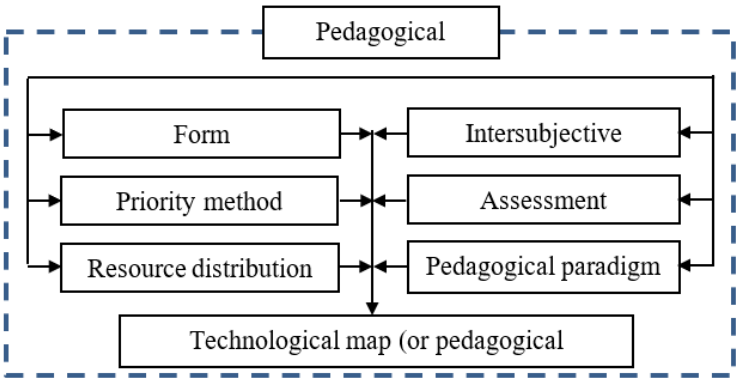

Figure 5. General model for the pedagogical strategy component.

It is recommended to clarify the tasks of the subcomponents of the pedagogical strategy blog for a specific process based on the guidelines in Table 3.

Table 3. Instructions for forming the "Pedagogical Strategy" component

Subcomponent	**Tasks**
Form	Forms of education and upbringing: classroom sessions (theoretical, practical, seminar, laboratory work), extracurricular activities (clubs, electives, etc.), independent study, individual, group, distance learning, etc.
Pedagogical paradigma	Concepts of process organization: traditional, technological, learner-centered, innovative, competency-based, and others.

Priority method	For each process, the predominant method is selected individually based on the existing pedagogical conditions, objectives, and content.
Intersubjective relations	Forms of collaboration among participants in the educational process (teacher, student, parent, stakeholder organizations, etc.).
Resource distribution	Allocation of available pedagogical resources (human, time, material, software-technical, financial, informational, etc.).
Assessment	The purpose of assessment, its types (formative, intermediate, summative, diagnostic, etc.), forms (written, oral, test, questionnaire, interview), and criteria.

IV. EXPECTED RESULTS. The *"Expected Results"* section represents the final stage of the pedagogical process, in which general assessments are made regarding the most probable outcomes of the process. At this stage, the results of the pedagogical activities are determined, their effectiveness is forecasted, and conclusions, proposals, and recommendations of a scientific, practical, analytical, generalising, and corrective nature are formulated to guide future pedagogical practice (Figure 5).

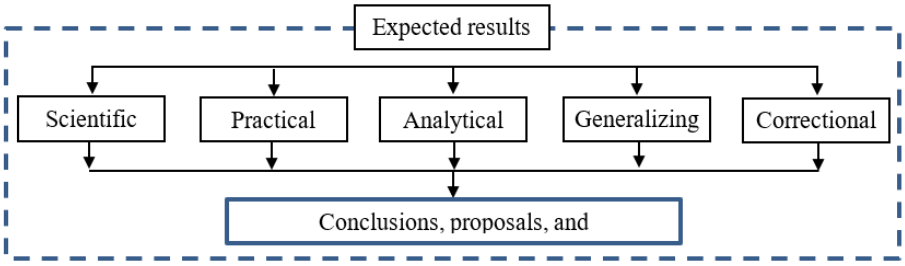

Figure 5. General model for the "Expected results" component.

It is recommended that the guidelines presented in Table 4 be followed when formulating the tasks associated with the *"Expected Results"* component of the model.

The individual models developed for the proposed components may be integrated into a ***generalised model*** (a unified system), in accordance with the concept illustrated in Figure 1 (Figure 6).

Table 4 Tasks for the "Expected results" component

Subcomponent	**Tasks**
Scientific	The level of change in students' knowledge, skills and competencies, personal development (social activity, independence, values), the effectiveness of the methods and technologies used, and the level of achievement of educational goals.
Practic	Improving the quality of education and motivation, improving teacher performance, harmonizing education and upbringing, developing skills and competencies, etc..
Generalizing	The overall effectiveness of the pedagogical process, the level of achievement of set goals and objectives, the dynamics of students' knowledge, skills, qualifications and personal development, and the summarization of qualitative and quantitative indicators.
Analitical	Analysis of assessment results, comparison (initial and final indicators), monitoring and diagnostics, reflection and analytical thinking, etc.
Correctional	Redesigning the content, paradigm, and assessment system of education; improving strategies and methodologies, reformulating motivational factors, improving cooperation between process participants, etc.

As this model synthesises the components of the educational process described in sources such as M. Babkulova [10], B. Brigmane [11], and A. Granic [27], the content of its components may be regarded as minimal.

The generalised model comprises a minimum of four principal components and their associated subcomponents, which are considered mandatory. Additional subcomponents may be incorporated only when necessary. Each subcomponent interacts solely with the components to which it is directly related. It is evident that

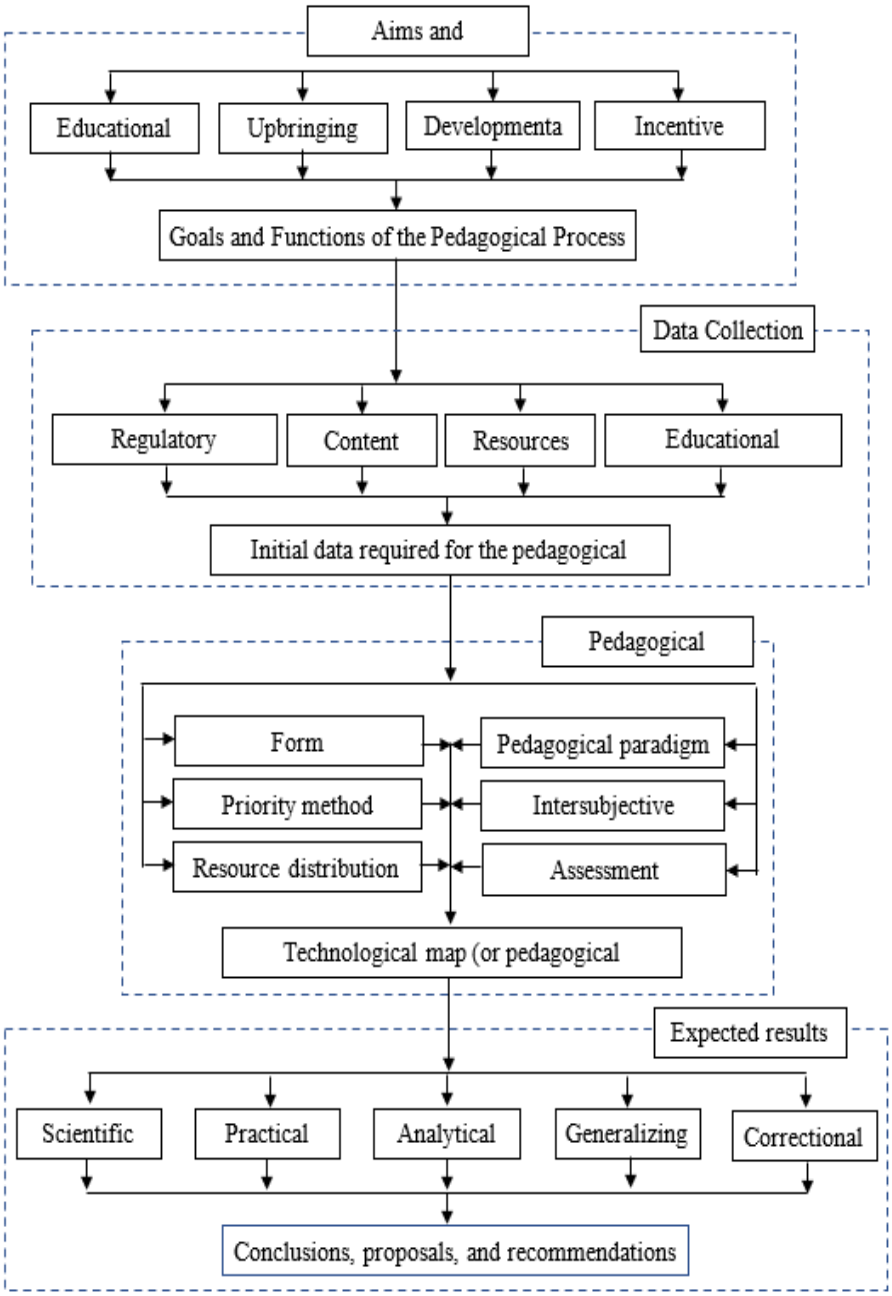

Figure 6. Generalized model for the pedagogical process.

necessary. Each subcomponent interacts solely with the components to which it is directly related. It is evident that the removal of any optional component or subcomponent from the generalised model would result in an incomplete representation of the pedagogical process. Accordingly, it is appropriate to define each of these as mandatory components of the pedagogical model.

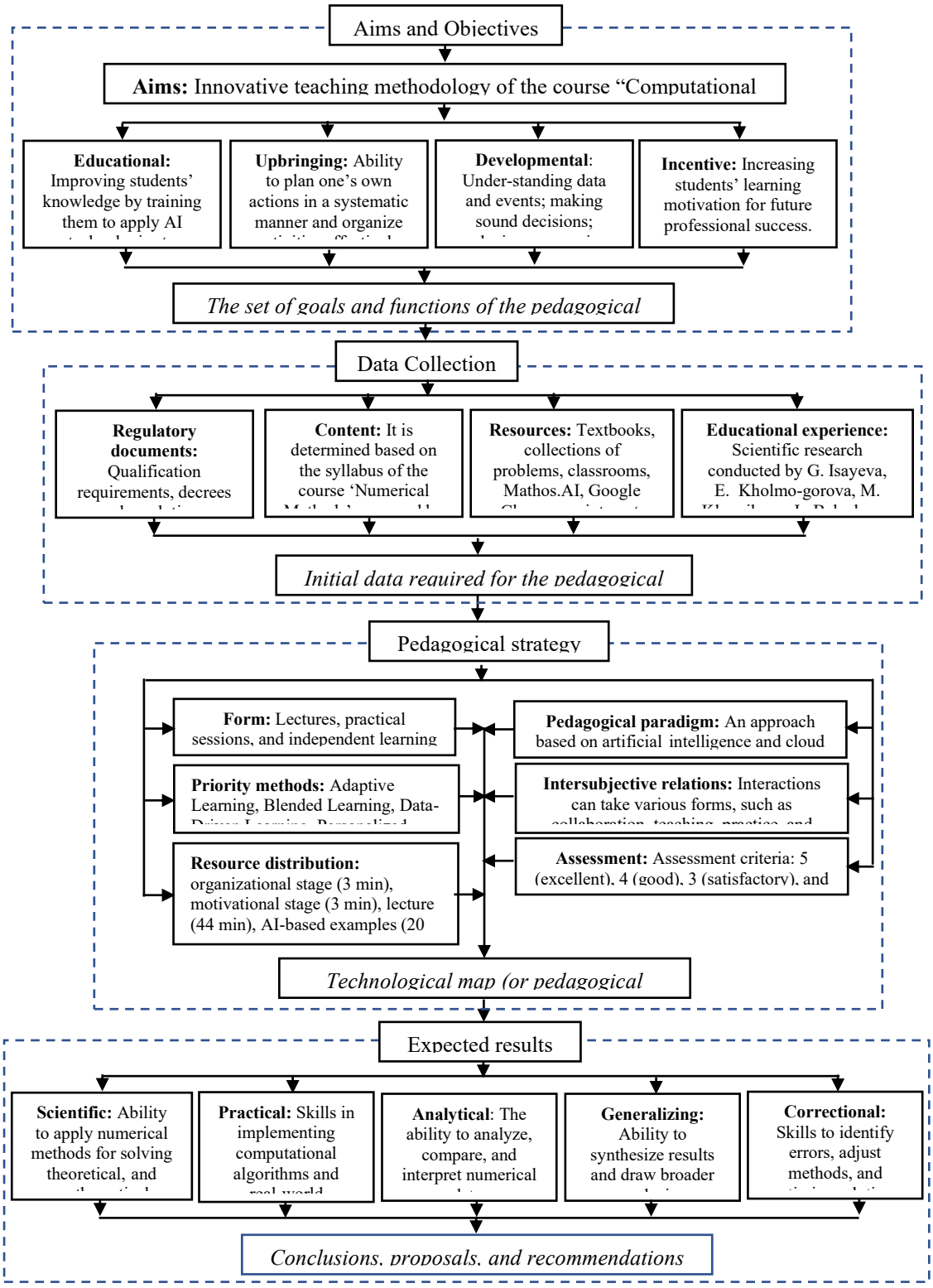

Figure 7. Example of a generalized model for the pedagogical process.

Conclusion And Recommendations

This study provides a comprehensive analysis of the theoretical and methodological foundations for modelling the pedagogical process and proposes a systematic model that aligns with the requirements of contemporary scientific research. The model synthesises the perspectives of numerous scholars on pedagogical models. Organising pedagogical activities according to this model facilitates understanding, analysis, and prediction of the

outcomes of the pedagogical process. Moreover, it serves as a critical instrument for evaluating research results and enhancing the overall effectiveness of educational practice. Importantly, it addresses and eliminates the typical errors frequently observed in models reported in open sources.

The pedagogical process model proposed in this study is distinguished by its capacity to correct common shortcomings found in existing models, as well as by its simplicity and clarity of presentation. Such a model enables the consistent representation of research findings and provides a framework for generalising diverse scholarly perspectives while resolving existing methodological deficiencies.

The following recommendations are proposed for the development of pedagogical process models:

1. For any pedagogical process model, the following components should be regarded as mandatory elements: goals and objectives, data collection, pedagogical strategy, and expected results (Figure 1).

2. The minimum content of subcomponents for each mandatory element should be defined in accordance with the proposals illustrated in Figures 2–5.

3. All components and subcomponents, with the exception of the first and last, must have at least one input and one output.

4. Only the first component should have an output without an input, and only the last component should have an input without an output.

5. When constructing a specific pedagogical process model, the content presented in Figures 2–5 may be expanded or adapted as required.

The application of research models provides a general framework for planning and organising pedagogical processes, testing innovative hypotheses, analysing results, and evaluating educational outcomes from a unified scientific perspective. Consequently, the proposed pedagogical process model possesses both scientific and practical significance within educational institutions and research settings and can be regarded as a methodological foundation for future pedagogical studies.

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