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Developing Future Preschool Educators' Multimedia Competence for Children's Speech Development Through the Samr Model

Fotima Dilshod qizi Narmatova [1]

Abstract

The aim of this article is to provide a theoretical justification for, and present in IMRAD format, a SAMR-based model for developing future preschool educators' multimedia competence in preschool children's speech development. The research materials comprised contemporary concepts of teachers' professional digital competence, studies on SAMR and digital storytelling, and regulatory documents on preschool education in the Republic of Uzbekistan. Comparative analysis, pedagogical modelling, structural and functional analysis, and the design of professionally oriented tasks were employed. The study clarified a five-component structure of multimedia competence, developed a matrix for transforming speech-development tasks across the levels of Substitution, Augmentation, Modification and Redefinition, and proposed a staged methodological cycle for preparing students and a system of assessment criteria. The professional value of a digital tool is shown to depend not on its technological complexity but on the quality of the changes in children's speech activity, methodological appropriateness, age appropriateness and safety. The tables, diagram and conceptual graph describe a theoretical and methodological model and are not interpreted as the results of a pedagogical experiment.

Keywords: SAMR model, multimedia competence, future preschool educator, preschool education, speech development, digital pedagogy, digital storytelling, professional preparation

Introduction

The digital environment of preschool education is changing faster than the content of traditional methodology courses. Future preschool educators gain

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access to interactive presentations, audio editors, story-building tools, voice-recording systems, image generators and other tools; however, technical availability alone does not guarantee pedagogically sound use. In practice, digital resources are often used merely as external substitutes: a paper card is transferred to a screen, a familiar illustration becomes a slide, and an educator's reading is replaced by a ready-made audio recording. Meanwhile, the amount, independence and communicative orientation of children's speech activity may remain almost unchanged.

For speech-development methodology, the fundamental question concerns not the number of digital tools but the specific speech action that becomes possible or changes qualitatively through technology. Pedagogically meaningful situations are those in which a child names an object and its attributes more precisely, expands a phrase, establishes a cause-and-effect relationship, engages in dialogue, constructs a coherent narrative, hears their own pronunciation and consciously corrects it. This approach corresponds to the contemporary understanding of teachers' professional digital competence: the emphasis shifts from operating a device to designing learning, selecting resources thoughtfully, supporting learners' activity and reflecting on practice (Dardanou et al., 2023; Falloon, 2020; Hamilton et al., 2016; Redecker, 2017).

This issue is particularly significant in the professional preparation of future preschool educators. Preschool education requires a delicate balance between direct interpersonal interaction and digital support. Screens should not replace communication, and multimedia material should not become a decorative background. Students therefore need a tool that enables them to distinguish superficial digitalisation from a substantive transformation of a pedagogical task.

One such tool is the SAMR model (Substitution, Augmentation, Modification, Redefinition). It allows the same educational idea to be considered at four levels, ranging from direct digital substitution to the emergence of a new form of activity. However, a critical analysis of the model indicates that it should not be interpreted as a rigid ladder "from bad to good": the choice of level should depend on the aim, context and quality of interaction (Hamilton et al., 2016). For this reason, applying SAMR to speech-development methodology requires additional criteria relating to age appropriateness, speech activity and pedagogical safety.

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The aim of the study is to provide a theoretical justification for the content of future preschool educators' multimedia competence in children's speech development and to develop a SAMR-based methodological model for its formation. To achieve this aim, the following objectives were set: 1) to clarify the structure of future preschool educators' multimedia competence; 2) to identify the functions of each SAMR level in relation to preschool children's speech development; 3) to develop a cycle of professionally oriented tasks for students; 4) to formulate criteria for assessing the development of this competence; and 5) to present the modelling results in tables, diagrams and a conceptual graphical trajectory.

Methodology

The study is theoretical and methodological in nature. Its materials included the European Framework for the Digital Competence of Educators, DigCompEdu (Redecker, 2017); a systematic review of professional development for digital competencies in early childhood education and care (Dardanou et al., 2023); studies addressing the transition from digital literacy to professional digital competence and teacher preparation for the digital age (Starkey, 2020; Falloon, 2020); research on the SAMR model and its methodological limitations (Hamilton et al., 2016); publications on digital storytelling and preschool children's speech interaction (Işıkoğlu & Güzen, 2024; Shengjergji et al., 2026; Solichah & Hidayah, 2022); R. Mayer's theory of multimedia learning (Mayer, 2021); and regulatory documents of the Republic of Uzbekistan governing preschool education (Republic of Uzbekistan, 2019; Cabinet of Ministers of the Republic of Uzbekistan, 2020).

Source selection was purposive rather than systematic: the corpus included studies directly addressing teachers' professional digital competence, the SAMR model, multimedia learning and digital storytelling in the preschool years. Accordingly, this article does not claim the status of a systematic review and does not present meta-analytic conclusions.

The methodological procedure consisted of four consecutive steps. The first involved a comparative analysis of interpretations of digital competence and the identification of professional actions relevant to preschool educators' work. In the second step, these actions were related to the main areas of preschool children's speech development: vocabulary work, grammatical structure, speech sound culture, and dialogic and monologic speech. In the third step, the same speech-

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development task was modelled in four SAMR versions, making it possible to distinguish a change in the digital medium from a change in the structure of the activity. In the fourth step, assessment criteria for student projects were formulated, and a training cycle for future preschool educators was designed.

The unit of analysis was a future preschool educator's professional pedagogical action involving the selection, creation or transformation of a multimedia resource. Functional sufficiency was adopted as the guiding principle: a digital element was considered methodologically justified only when it was possible to specify which particular speech action it supported and why that action was appropriate for the child's age.

An important limitation of the study is the absence of a specifically conducted pedagogical experiment. The article therefore presents no artificially constructed percentages, mean scores or statistically significant differences. The graphical visualisation of SAMR levels is used as a conceptual representation of task change rather than as a measure of effectiveness. This distinction preserves the evidential integrity of the text and avoids attributing empirical effects to the proposed model that remain to be tested in subsequent trials.

Results

- **The Structure of Future Preschool Educators' Multimedia Competence**

Analysis of the approaches considered makes it possible to define future preschool educators' multimedia competence as an integrative professional ability to select, create, methodologically justify and transform digital resources to address specific tasks in children's speech development, taking account of age, the content of communication, cognitive load, safety and opportunities for children to respond actively. This definition differs fundamentally from an understanding of competence as a collection of software skills. A student may create a technically flawless presentation, yet the product will be professionally weak if the child merely watches and listens. Conversely, a simple audio recorder may have considerable methodological value when integrated into a cycle of "speak – listen – compare – clarify – repeat".

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Structural and functional analysis identified five interrelated components of competence. Their content and observable professional manifestations are presented in Table 1.

Table 1. The structure of future preschool educators' multimedia competence

Component	**Content**	**Observable manifestation**
Motivational and value-related	A commitment to pedagogical appropriateness, the value of direct interpersonal communication, and a responsible attitude towards screen time, confidentiality and the child's digital footprint.	The student justifies the need to use or refrain from using a digital tool, taking safety and age into account.
Cognitive and methodological	Knowledge of speech development, multimodal information presentation, cognitive load and the functions of digital resources.	Connects a tool with a specific speech-development task: vocabulary, grammar, pronunciation, dialogue or coherent speech.
Operational and technological	The ability to record and edit sound and create simple videos, digital stories, interactive cards and visual prompts.	Creates a technically reliable resource without unnecessary effects and follows rules for storage and source attribution.
Communicative and design-related	The ability to turn a resource into a communicative situation and provide for an addressee, a motive, roles and the joint creation of a spoken product.	Designs open-ended questions, dialogue, collaborative storytelling, feedback and a real recipient of the message.
Reflective and evaluative	The ability to assess the contribution of technology, the SAMR level, limitations and alternatives.	Explains what has changed in the child's activity and proposes a simpler or more productive solution.

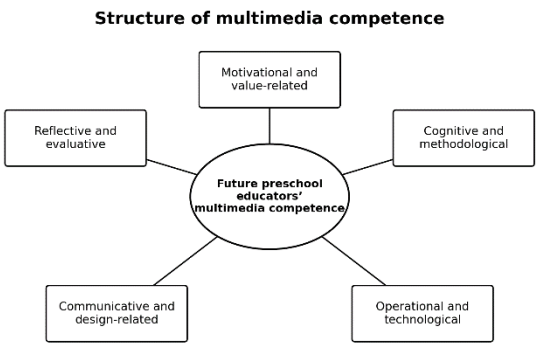

Figure 1. A structural model of future preschool educators' multimedia competence

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The structure presented emphasises that the technological component is only one of five. It cannot compensate for the absence of a methodological aim, communicative orientation or reflection. In professional preparation, this means assessing not the quality of visual design in itself but the justification for the relationship between a digital function and children's speech activity.

- **A Matrix for Transforming Speech-Development Tasks across SAMR Levels**

The SAMR model is considered a logic of redesign rather than a scale of technological prestige. At the Substitution level, a digital tool directly replaces a traditional medium; Augmentation adds a functional improvement; Modification substantially changes the structure of the task; and Redefinition creates a form of activity that would be difficult to organise in a comparable way without a digital tool (Hamilton et al., 2016).

A single basic task—describing a toy—was used to demonstrate the applicability of SAMR to speech-development methodology. Retaining the original speech-development aim makes it possible to identify exactly what changes in the transition from one level to another. The modelling outcome is presented in Table 2.

Table 2. Transformation of the task "Describing a Toy" across SAMR levels

Level	**Digital solution**	**The child's speech action**	**Nature of the change**
Substitution	A photograph of a toy is displayed on a screen instead of a paper card.	The child names the object, its attributes and actions.	The medium changes; the task structure remains the same.
Augmentation	The image is enlarged and individual details are highlighted; the child's description is recorded.	The child describes the toy, then listens to the recording and refines the wording.	Functional feedback becomes available.
Modification	Several children record separate parts of a description, then jointly rearrange them into a logical sequence.	Planning, coordinating, listening to and editing a coherent utterance.	The structure of speech activity changes.
Redefinition	The group creates a "Guess the Toy" audio guide for another group; the	Describing without naming, formulating attributes, communicating with a real	A new communicative situation and

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	recipients send back an answer and their reasoning.	addressee and giving a response.	spoken product emerge.

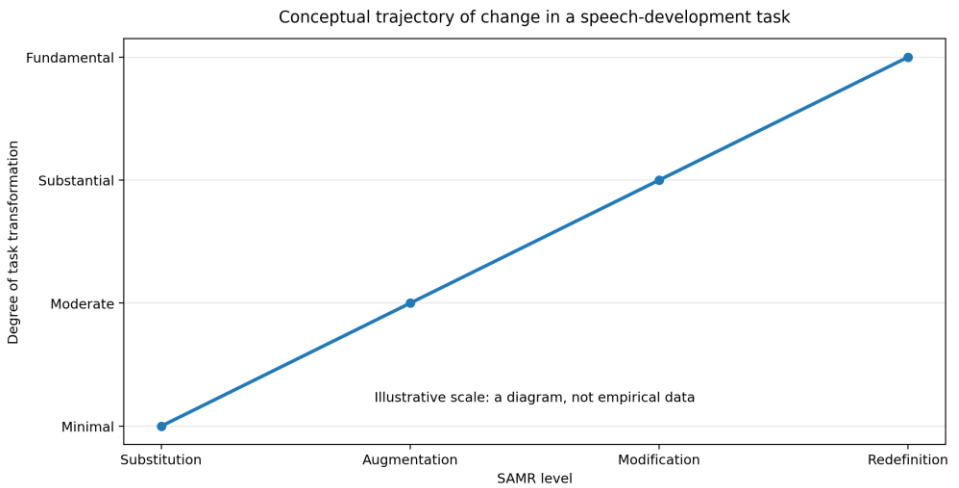

Figure 2. A conceptual trajectory of the degree of task transformation across SAMR levels (illustrative scale, not empirical data)

The graph in Figure 2 serves an exclusively analytical function: it visualises a qualitative transition from a minimal change in task structure to its fundamental transformation. No numerical statistical interpretation of this trajectory is applied in the present study. Subsequent empirical testing will require the development of a validated observation scale and a comparison of design levels with actual indicators of children's speech activity and students' professional actions.

- **A Methodological Cycle for Developing Competence in a Teacher Education Institution**

A five-stage methodological cycle was developed on the basis of the resulting structure. The first stage is diagnostic and motivational. Students analyse several visually appealing digital materials and identify which elements actually help a child speak, listen, compare or make sense of an utterance, and which serve a decorative function. The aim of this stage is to develop a commitment to the functional sufficiency of multimedia.

The second stage is SAMR-based redesign. Students select a traditional speech-development task and create four versions of digital support while retaining the

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same pedagogical aim. This technique requires them to recognise the boundary between changing the medium and changing the activity itself. During peer review, students justify the SAMR level and receive feedback based on speech activity, age appropriateness and technological necessity.

The third stage is digital storytelling. Research indicates the promise of digital storytelling for developing preschool children's language and narrative skills [7; 8]. In preparing future preschool educators, the key consideration is not the production of an impressive video but the methodology of collaborative storytelling: distributing meaning-making prompts, asking questions that encourage causal explanation, allowing pauses for children's choices, enabling changes to the sequence or ending, and recording and listening again.

The fourth stage involves analysing audio and video recordings of speech. Students work with an anonymised or specially simulated recording of a child's utterance and document parameters accessible to pedagogical observation: the completeness of the response, sequencing, vocabulary diversity, grammatical form, clarity of pronunciation, and the ability to maintain a topic and respond to an interlocutor. A short digital exercise is then designed to address only one identified difficulty. This format connects diagnosis, methodological choice and technology.

The fifth stage is microteaching and an electronic portfolio. Students conduct part of a lesson with their study group, receive expert feedback, and include the original task, a SAMR analysis, the digital material, a self-assessment and an improved version in their portfolio. The portfolio thus documents the reasoning behind a professional decision rather than the number of software applications mastered.

Table 3. Stages of the methodological cycle for preparing students

Stage	**Main activity**	**Intended outcome**
1. Diagnosis and motivation	Analysis of ready-made multimedia materials	Identify the speech-related function and remove unnecessary elements
2. SAMR-based redesign	Four versions of a single task	Learn to distinguish substitution, augmentation, modification and redefinition
3. Digital storytelling	Collaborative creation of a story	Develop the ability to design dialogue and coherent utterances and provide for a real addressee

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4. Speech recording analysis	Audio/video observation and a targeted exercise	Connect pedagogical diagnosis with the selection of a digital tool
5. Microteaching and portfolio	Trial teaching, reflection and an improved version	Consolidate professional reasoning and reflective evaluation

❖ Criteria for Assessing the Development of Multimedia Competence

Five assessment criteria are proposed, corresponding directly to the structure of competence: goal-related, methodological, technological, communicative and reflective. The goal-related criterion indicates how precisely the intended speech outcome is formulated and whether the digital resource is connected to it. The methodological criterion captures age appropriateness and the presence of an active oral response. The technological criterion reflects functional sufficiency and the absence of excessive effects. The communicative criterion assesses the presence of an addressee, a motive and opportunities for speech initiative. The reflective criterion indicates students' ability to justify the selected SAMR level, identify limitations and propose an alternative.

It is essential not to convert a SAMR level into a number of points. A transformative level of professional competence does not necessarily imply the use of Redefinition. A strong student may deliberately choose Augmentation if it addresses the speech-development task more precisely. The highest assessment should be awarded to the most pedagogically justified work rather than the most technologically complex.

Table 4. An assessment rubric for future preschool educators' multimedia competence

Criterion	**Reproductive level**	**Constructive level**	**Transformative level**
Goal-related	The aim is stated in general terms; the digital resource is only formally connected to it.	The speech-development aim is specific; the resource's function is partly justified.	Each digital function is directly related to an observable speech action by the child.
Methodological	The child mainly watches or selects a ready-made answer.	Independent utterances and feedback are provided for.	The task encourages coherent speech, dialogue, editing or joint authorship.

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Technological	There are unnecessary effects, complicated operations and unreliable solutions.	The tool is generally sufficient and manageable.	Minimally sufficient technology is used to provide the required function.
Communicative	The addressee and motive for speaking are not apparent.	There is an imagined addressee and question-and-answer interaction.	There is a clearly understood real addressee, a motive for speaking and opportunities for initiative.
Reflective	The justification is limited to "interesting", "modern" or "visual".	The student explains the choice and recognises some limitations.	The student provides a reasoned justification of the SAMR level, limitations, risks and alternatives.

Discussion

The resulting model supports the appropriateness of combining speech-development methodology with future preschool educators' digital preparation. In common practice, these areas may exist in parallel: one course develops technological skills, while another develops methodological skills. The proposed approach integrates them through the unit of professional action: a digital tool is assessed only in relation to the child's speech-development task.

The five-component structure is consistent with broader frameworks of professional digital competence, in which technical proficiency is only one part of teachers' professional activity (Dardanou et al., 2023; Falloon, 2020; Hamilton et al., 2016; Redecker, 2017). This is particularly important in preschool education, where the visual appeal of a multimedia product can easily be mistaken for its pedagogical value. In the proposed model, this error is reduced by requiring goal-related and reflective justification.

The results of theoretical modelling also support a critical reading of SAMR. Hamilton, Rosenberg and Akcaoglu identify the risk of excessive hierarchisation and insufficient attention to context (Hamilton et al., 2016). Accordingly, this article uses SAMR as a language for describing task change rather than as a universal indicator of quality. The choice between Augmentation and Redefinition should be determined by the speech-development aim and age appropriateness rather than by an attempt to formally reach the "highest level".

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Digital storytelling is of particular interest because it combines images, voice, a sequence of events and a real addressee. Studies involving preschool children demonstrate its potential for language and narrative development (Işıkoğlu & Güzen, 2024; Solichah & Hidayah, 2022), while analysis of educator–child interaction emphasises the role of questions that support coherence and an imagined continuation of the story (Shengjergji et al., 2026). This supports the model's central proposition: even at a high level of technological transformation, the quality of pedagogical guidance remains decisive.

At the same time, multimedia learning requires the control of excessive cognitive load. R. Mayer's theory indicates that outcomes depend on meaningful coordination between channels rather than on maximising the number of effects (Mayer, 2021). This principle is additionally significant in the preschool years: each visual, auditory and interactive element should have a clear function and should not compete with the speech-development task.

The study's limitations arise from its theoretical and methodological design. Demonstrating effectiveness will require empirical testing with teacher education students, the development of diagnostic instruments, verification of the reliability of the assessment rubric, and a comparison of competence development before and after training. The relationship between the quality of students' task design and preschool children's actual speech activity requires separate investigation. Until such data become available, the proposed model should be regarded as a substantiated design for organising preparation rather than an experimentally proven instructional approach.

Conclusion

This theoretical and methodological study made it possible to present the development of future preschool educators' multimedia competence as part of professional methodological preparation rather than as an extended computer literacy course. In speech development, the value of a digital tool is determined by whether it helps children speak more and with greater substance, construct coherent utterances, listen to themselves and others, clarify word meanings, engage in dialogue, and create a spoken product for a clearly understood addressee.

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Analysis of the sources clarified a five-component structure of competence comprising motivational and value-related, cognitive and methodological, operational and technological, communicative and design-related, and reflective and evaluative components. A matrix for SAMR-based transformation of speech-development tasks, a five-stage training cycle, and an assessment rubric focused on the pedagogical precision of the chosen solution were developed.

The SAMR model can provide a useful basis for professional preparation when used as a means of analysing qualitative changes in activity rather than as a rigid hierarchy. Successively redesigning a single speech-development task at the levels of Substitution, Augmentation, Modification and Redefinition helps future preschool educators recognise the boundary between digital substitution and pedagogical transformation. The final choice of level should nevertheless be guided by the speech-development aim, the child's age, safety and the principle of minimally sufficient technology.

Further research will focus on empirical testing of the model in the preparation of students in specialisation 13.00.02, the development of a diagnostic scale, expert verification of its content validity, and assessment of changes in students' professional actions when designing multimedia-supported speech situations.

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- The author agrees to take responsibility for every facet of the work, making sure that any concerns about its integrity or veracity are thoroughly examined and addressed

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Correspondence:

Fotima Dilshod qizi Narmatova

fotimanarmatova273@gmail.com

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