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Presentation modality and comprehension of a factually dense educational text: The role of cognitive load and metacognitive calibration

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Abstract

Introduction. *The article addresses the scientific problem of whether a more vivid and engaging presentation modality necessarily supports more accurate comprehension of the same educational content. This problem is especially important for factually dense educational texts that require learners to retain proper names, chronological order, cultural references and causal relations. The aim of the study is to determine how written text, audio and video presentation of one and the same educational stimulus are associated with objective comprehension, productive recall, subjective cognitive load, evaluative perception and metacognitive calibration.*

Materials and Methods. *The study was conducted as an original between-subjects psycholinguistic experiment. A total of 456 participants worked with the stimulus "The History of Ice Cream" in one of three presentation conditions: written text (n = 146), audio (n = 167) or video (n = 143). The methodological framework combined the cognitive theory of multimedia learning, cognitive load theory, discourse-comprehension models and research on metacognitive calibration. The instruments included 14 objective comprehension items, an open summary scored with a 0–10 rubric, a*

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semantic differential, and subjective ratings of material difficulty, task difficulty, confidence, self-rated comprehension, memory accessibility and interest.

Subjective perception was measured with a 12-scale semantic differential and six additional ratings: difficulty of the material, difficulty of the tasks, confidence, self-rated comprehension, memory accessibility and interest. The data were analyzed using Kruskal–Wallis tests, Mann–Whitney tests with Holm correction, effect sizes, Spearman correlations, regression and exploratory mediation analysis.

***Results**. Written text produced the highest objective comprehension score, followed by video and audio. The written-text advantage was most pronounced for exact factual attribution, proper names and chronological reconstruction. Video was evaluated as more dynamic, interesting and visually rich, but this affective advantage did not result in the highest factual comprehension. Cognitive load was the strongest negative predictor of objective performance, whereas imagery/detail contributed positively and engagement did not show an independent direct effect after cognitive load was taken into account.*

***Conclusions**. The main result of the study is an experimental confirmation of the dissociation between subjective engagement and precise comprehension in multimodal educational input. For factually dense material, the effectiveness of a modality should be evaluated not by its attractiveness alone, but by the balance between external cognitive support, experienced cognitive load, productive recall and metacognitive calibration.*

Keywords

Presentation modality; Educational text comprehension; Cognitive load; Written text; Audio learning; Educational video; Productive recall; Metacognitive calibration; Semantic differential.

Introduction

Problem Statement

Digital educational environments have made it possible to present the same academic content as written text, audio, video or a combination of these formats. This technological variability creates not only a practical pedagogical issue but also a specific psycholinguistic problem: a modality that appears more dynamic and emotionally engaging may not necessarily lead to deeper or more accurate comprehension. The problem becomes particularly important when the material is factually dense and contains proper names, dates, historical attribution, causal links and a chronological sequence.

The theoretical background of this problem combines classical and contemporary research traditions. Mayer and Moreno [1] and Mayer [2; 3] describe multimedia learning as active selection, organisation and integration of verbal and pictorial information; Paivio's dual-coding theory [1] provides the classical basis for distinguishing verbal and imaginal processing systems. At the same time, Sweller, van Merriënboer and Paas [4] and Baddeley [5] show that new information is initially processed under the constraints of limited working memory. Therefore, a richer modality can support learning only when it helps learners build a coherent mental representation rather than increasing extraneous processing demands.

Recent studies show that this issue remains empirically unresolved. Mayer [2] argues that the current development of the cognitive theory of multimedia learning increasingly includes motivational, affective and metacognitive

[1] Paivio A. *Mental representations: A dual coding approach.* New York, Oxford University Press, 1986. URL: https://archive.org/details/mentalrepresenta0000paiv

processes rather than only the combination of words and pictures. Noetel and colleagues [6], in a systematic review of video in higher education, found that video can improve learning, especially when it supplements existing instruction, but its effect depends on instructional design and active learning. Fyfield, Henderson and Phillips [7], reviewing 113 studies on instructional video design, showed that shorter, segmented and coherent videos supported by learning activities are more likely to improve learning outcomes. Skulmowski and Xu [8] demonstrated that digital and online learning environments may create additional extraneous cognitive load, while Liu [9] showed experimentally that segmentation in a multimedia environment affects cognitive load, vocabulary retention and reading comprehension. These findings indicate that the educational value of video cannot be inferred from vividness or attractiveness alone.

The comparison between written and transient modalities is equally complex. Clinton-Lisell [10], in a meta-analysis of reading and listening comprehension, reported no universal superiority of either modality across all contexts, but showed that reading may become advantageous when learners can regulate the pace of processing and when tasks require precise comprehension rather than only general understanding. Research by Clinton [11] and Delgado, Vargas, Ackerman and Salmerón [12] further indicates that comprehension depends on task demands, genre, time constraints and learners' calibration of their understanding. In Russian-language research, Evenko, Glivenkova and Morozova [13] analyse blended learning from the perspective of cognitive load theory, while Pushkarev and Pushkareva [14] emphasise that the social and informational characteristics of digital educational environments can influence learners' engagement and interpretation of educational content.

Taken together, these studies demonstrate the contemporary relevance of the problem but also reveal an empirical gap: there are still relatively few studies that compare several presentation modalities while holding the educational content constant and assessing not only objective comprehension, but also productive recall, subjective difficulty, affective evaluation and metacognitive calibration. The gap addressed in the present article is the lack of integrated empirical evidence on how written text, audio and video of the same factually dense educational stimulus differ in these interrelated outcomes.

The aim of the study is to determine how presentation modality affects comprehension of one and the same factually dense educational text through the relationship between objective performance, productive recall, subjective cognitive load, evaluative perception and metacognitive calibration.

The central hypothesis of the study is that, when the same factually dense educational content is presented in different modalities, written text will support more accurate objective and productive comprehension than transient audio and video formats because it provides stronger external cognitive support and more favourable conditions for metacognitive calibration, whereas subjective engagement alone will not be sufficient to predict factual comprehension.

Methods

Methodological framework. The study was designed as an original experimental full article. The methodological framework of the study combines four complementary lines of research. First, the cognitive theory of multimedia learning developed by Mayer and Moreno [1] and further elaborated by Mayer [2; 3] was used to interpret modality as a form of distributing information

across verbal and visual channels; this line also relies on Paivio's classical dual-coding theory[2]. Second, cognitive load theory was used to explain how intrinsic and extraneous processing demands may limit comprehension under different presentation formats [4; 8; 15; 16; 17]. Third, discourse-comprehension models were used to treat understanding as the construction of a coherent mental representation that includes factual, causal and chronological relations[3, 4] [5; 18; 19]. Fourth, metacognitive research was used to analyse the relationship between objective performance and learners' confidence in their own understanding [20; 21; 22; 23].

Design and participants. The experiment used a between-subjects quasi-experimental design with three presentation conditions: written text, audio and video. The total sample included 456 participants: 146 in the written-text condition, 167 in the audio condition and 143 in the video condition. The sample included 273 male and 183 female participants. The most frequent age was 20 years. The sample should therefore be interpreted primarily as a young adult student sample.

Stimulus material. All participants worked with the same educational content, "The History of Ice Cream". The stimulus combined a narrative introductory episode with an expository historical account. It contained proper names, dates, cultural references, technological innovations and causal relations. This made it suitable for assessing both global understanding and precise factual comprehension. The use of one constant stimulus across conditions made it possible to attribute differences in outcomes primarily to presentation modality rather than to content variation.

Instruments. Objective comprehension was measured with 14 scored items. The items covered the main purpose of the text, the discourse function of the opening episode, true/false/not-given statements, factual recall, conceptual explanation, central idea identification and chronological ordering. Productive comprehension was assessed by an open summary scored with a 0–10 rubric. The rubric included the main idea, chronological structure, key facts, causal logic and accuracy or absence of distortions.

Subjective perception was measured with a 12-scale semantic differential[5] and six additional ratings: difficulty of the material, difficulty of the tasks, confidence, self-rated comprehension, memory accessibility and interest. The semantic differential was used to capture evaluative and affective profiles of the stimulus, while the subjective ratings were used as indicators of experienced cognitive load and metacognitive monitoring.

Procedure and data analysis. Participants worked with the stimulus in the modality assigned to their condition and then completed the same set of comprehension and subjective-evaluation instruments. The order and content of the assessment tasks were identical across conditions. Responses were processed in anonymized form. Because several dependent variables were ordinal or non-normally distributed, non-parametric

[2] Paivio A. *Mental representations: A dual coding approach.* New York, Oxford University Press, 1986. URL: https://archive.org/details/mentalrepresenta0000paiv

[3] Kintsch W. *Comprehension: A paradigm for cognition.* Cambridge: Cambridge University Press, 1998. URL: https://www.cambridge.org/gb/universitypress/subjects/psychology/cognition/comprehension-paradigm-cognition

[4] van Dijk T. A., Kintsch W. *Strategies of discourse comprehension.* New York, Academic Press, 1983. URL: https://onlinebooks.library.upenn.edu/webbin/book/lookupid?key=olbp74011

[5] Osgood C. E., Suci G. J., Tannenbaum P. H. *The measurement of meaning*. Urbana, University of Illinois Press, 1957. (1967 reprint of the 1957 edition) URL: https://archive.org/details/measurementofmea00osgo

statistics were used. Group differences were assessed with Kruskal–Wallis tests; pairwise comparisons were conducted using Mann–Whitney tests with Holm correction. Effect sizes were reported as epsilon squared or Cliff's delta where appropriate. Associations between objective and subjective measures were analysed using Spearman correlations. A regression model and exploratory mediation analysis were used to examine the role of cognitive load, engagement and imagery/detail. Metacognitive profiles were analysed with the chi-square test and Cramer's V.

Results

Objective comprehension. The first stage of analysis compared objective comprehension across the three modalities. The written-text condition produced the highest objective comprehension score, followed by video and audio. The differences between modalities were statistically significant, $H = 29.529$, $p < 0.001$, epsilon squared = 0.061. Pairwise comparisons showed that written text outperformed audio ($p < 0.001$), written text outperformed video ($p = 0.0049$), and video outperformed audio ($p = 0.0166$).

Table 1

Objective comprehension scores by presentation modality

Таблица 1

Оценка объективного понимания в зависимости от модальности предъявления

Modality	N	Mean / 14	SD	Median	Mean %
Written text	146	11.17	2.60	12	79.8
Video	143	10.35	2.64	11	73.9
Audio	167	9.65	2.73	10	68.9

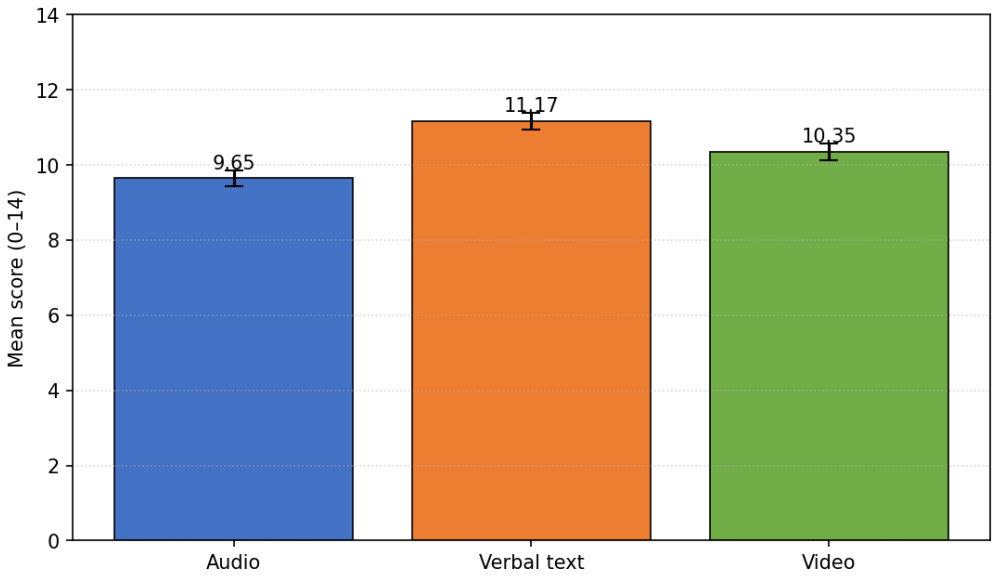

Fig. 1. Objective comprehension by presentation modality. Error bars show standard errors

Рис. 1. Объективное понимание в зависимости от модальности предъявления. Столбцы ошибок отображают стандартные ошибки

The strongest contrast was between written text and audio. This result supports the assumption that a written external trace reduces the pressure on working memory when learners have to process proper names, dates and causal relations. Audio, by contrast, requires continuous online processing of transient verbal information and is therefore more vulnerable to loss of exact factual detail.

Item-level analysis. The item-level pattern clarifies the source of group differences. The main purpose of the text was understood relatively well in all modalities, whereas the most difficult items concerned proper names, historical attribution and lists of civilizations. The lowest overall accuracy was observed for the item on ancient civilizations (55.7%), the false statement about an "English cook" (60.7%), Frederick Tudor (66.0%) and Antonio Latini (67.5%).

Table 2

Six most difficult objective items

Таблица 2

Шесть самых сложных объективных заданий

Item	Audio %	Written text %	Video %	Overall %
Civilizations	43.1	69.9	55.9	55.7
TF: English cook	48.5	74.7	60.8	60.7
TF: Tudor	65.9	69.2	62.9	66.0
Latini	65.3	74.0	63.6	67.5
Opening function	65.3	84.9	69.2	72.8
TF: soda fountains	62.3	84.2	78.3	74.3

The written-text advantage was especially visible for items that required exact attribution. For example, the item concerning the "English cook" was answered correctly by 74.7% of the written-text group but only by 48.5% of the audio group. This indicates that transient auditory presentation makes it harder to retain low-frequency proper names and culturally specific historical details.

Productive comprehension: summary analysis. Open summaries were scored using a 0–10 rubric. Written text again produced the highest score, followed by video and audio. The difference was statistically significant, $H = 9.795$, $p = 0.0075$, epsilon squared = 0.017. Pairwise tests showed that written text outperformed audio and video, whereas video and audio did not differ significantly.

Table 3

Productive comprehension by modality

Таблица 3

Продуктивное понимание по модальностям

Modality	Mean summary score / 10	SD	High-quality summaries %
Written text	5.90	3.67	42.5
Video	5.13	3.22	26.6
Audio	4.95	3.18	25.1

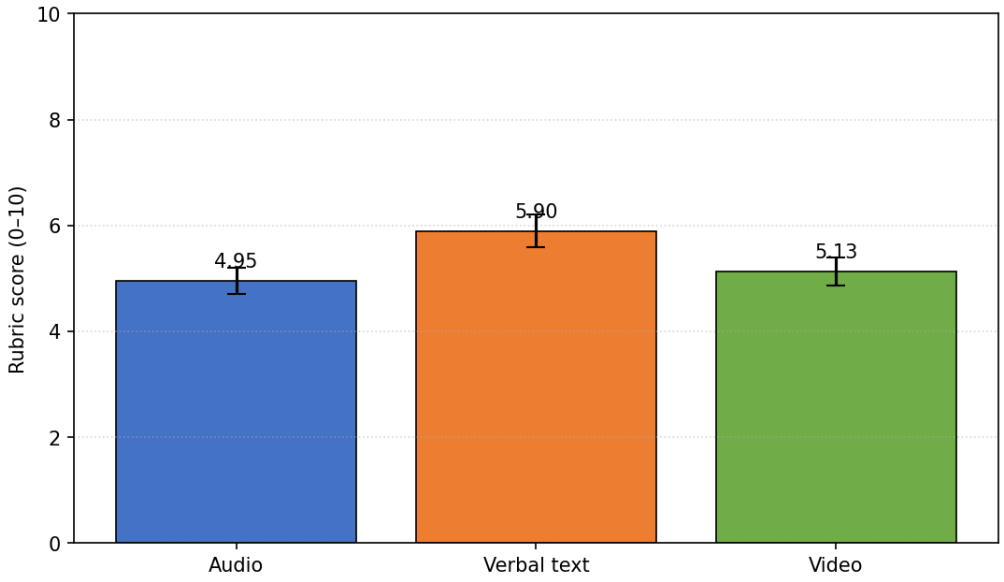

Fig. 2. Productive comprehension in open summaries

Рис. 2. Продуктивное понимание в открытых пересказах

The advantage of written text in summary writing shows that this modality supported not only the selection of correct answers but also the reconstruction of the global historical sequence and causal logic of the text. The proportion of high-quality summaries was 42.5% in the written-text group compared with 26.6% in the video group and 25.1% in the audio group.

Semantic differential and subjective perception. The semantic-differential profile revealed a different pattern. Video was evaluated more favourably in terms of dynamism, interest, unusualness and visuality. Written text was perceived as more structured, whereas audio tended to receive less favourable ratings on memorability and clarity. Thus, the modality that maximized subjective engagement was not the modality that maximized objective factual comprehension.

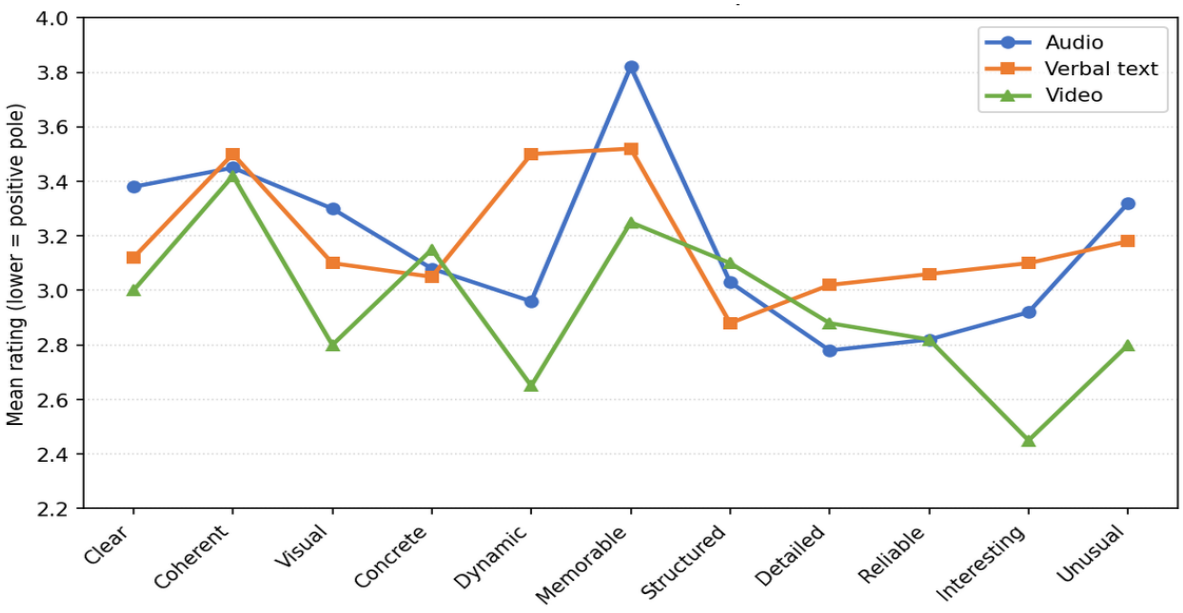

Fig. 3. Semantic differential profile. Lower values indicate proximity to the left, usually positive pole of each scale

Рис. 3. Профиль семантического дифференциала. Более низкие значения указывают на близость к левому, обычно положительному полюсу шкалы

The integrated indices confirmed the dissociation between subjective perception and precise comprehension. Video had the highest overall positive perception index and the highest affective-engagement index, whereas written text retained an advantage in objective and productive comprehension. This pattern indicates that interest is pedagogically valuable but insufficient as a standalone criterion of learning effectiveness.

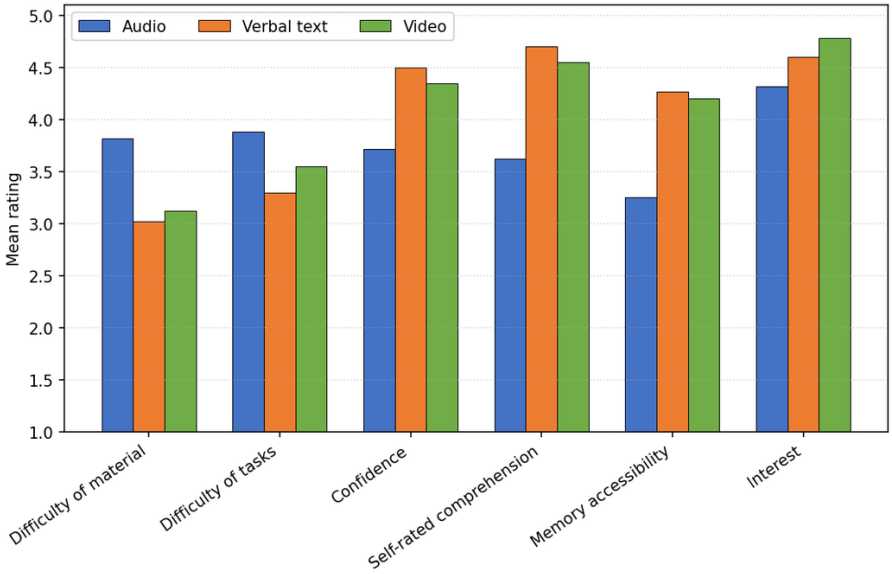

Fig. 4. Subjective difficulty, confidence, memory accessibility and interest

Рис. 4. Субъективная трудность, уверенность, доступность воспоминания и интерес

Subjective difficulty closely mirrored objective performance. Audio was rated as the most difficult modality and produced the lowest confidence, self-rated comprehension and memory accessibility. Written text and video both reduced perceived difficulty relative to audio, but written text produced the most favourable combination of objective performance and metacognitive confidence.

Metacognitive profiles and calibration. To analyse calibration, participants were assigned to four profiles according to the relationship between objective score and confidence: accurate high confidence, underconfident competence, illusion of understanding and aware difficulty. The distribution of profiles differed significantly across modalities, chi-square = 28.914, $p < 0.001$, Cramer's V = 0.178.

Table 4

Metacognitive profiles by modality

Таблица 4

Метакогнитивные профили по модальностям

Profile	Audio %	Written text %	Video %
Accurate high confidence	26.3	52.1	42.7
Underconfident competence	16.8	16.4	15.4
Illusion of understanding	25.7	18.5	24.5
Aware difficulty	31.1	13.0	17.5

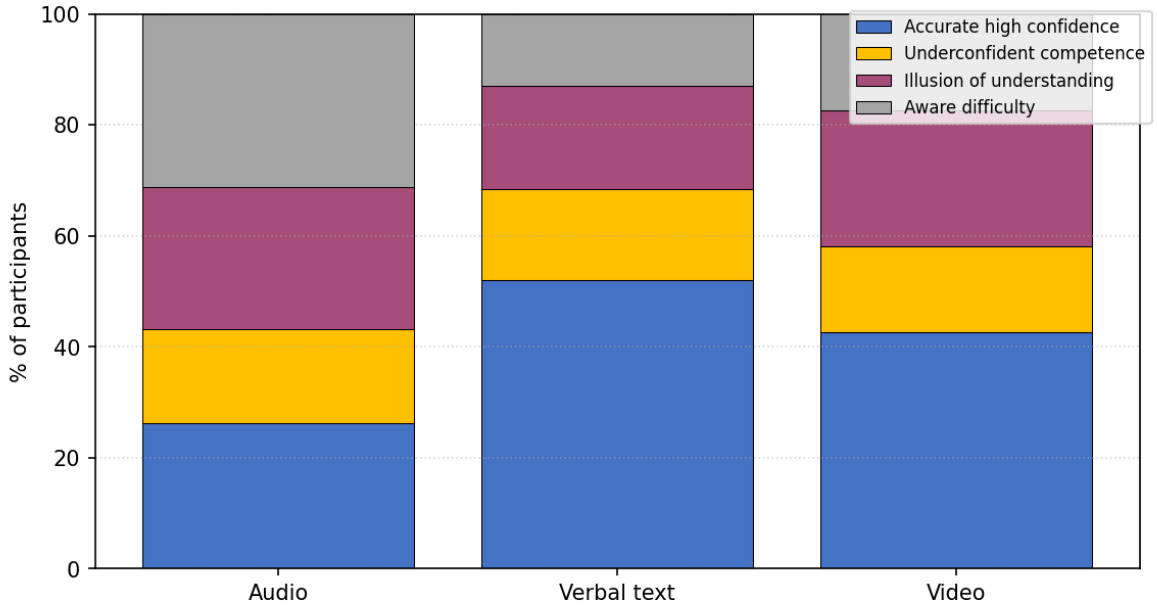

Fig. 5. Metacognitive profiles by presentation modality

Рис. 5. Метакогнитивные профили по модальности предъявления

The most favourable profile, accurate high confidence, was most frequent in the written-text condition (52.1%). The aware-difficulty profile was most frequent in the audio condition (31.1%). Video did not eliminate the risk of illusion of understanding: this profile appeared in 24.5% of the video group, compared with 25.7% in audio and 18.5% in written text. This confirms that vivid or engaging presentation can create a subjective sense of comprehension that is not always matched by factual accuracy.

Correlations and predictive model. Spearman correlations showed that objective comprehension was most strongly associated with perceived difficulty of the material (rho = -0.467), difficulty of the tasks (rho = -0.382), clarity (rho = -0.321), self-rated comprehension (rho = 0.294), confidence (rho = 0.286) and memory/difficulty indices. Interest had a statistically significant but weak association with objective score (rho = 0.117).

Table 5

Summary of regression findings

Таблица 5

Краткое изложение результатов регрессии

Predictor / association	Coefficient	p value	Interpretation
Text vs audio in regression	B = 1.099	< 0.001	Written text predicts higher score
Cognitive load	B = -1.091	< 0.001	Higher load predicts lower score
Imagery / detail	B = 0.450	0.006	Imagery/detail contributes positively
Engagement	n.s.	0.465	No independent direct effect
Video vs audio	n.s.	0.408	Effect explained by mediators/subjective variables

The regression model explained approximately 25% of variance in objective comprehension. Cognitive load was the strongest negative predictor, while imagery/detail had a positive contribution. Engagement did not independently predict precise comprehension when cognitive load and imagery were included. Exploratory mediation analysis indicated that the advantages of written text and video over audio were partly explained through lower cognitive load; the indirect effect through engagement was small and specific to video.

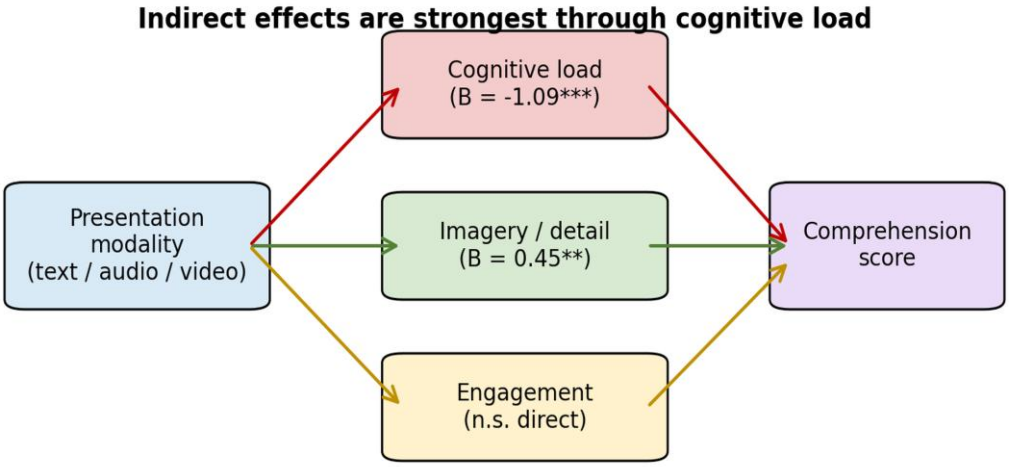

Fig. 6. Conceptual summary of the regression and mediation results

Рис. 6. Концептуальное изложение результатов регрессии и медиаторного анализа

Discussion

The obtained results clarify the current debate on multimedia learning and are consistent with the contemporary interpretation of the cognitive theory of multimedia learning. Mayer [2] emphasizes that multimedia learning is shaped not only by the coordination of verbal and pictorial channels, but also by motivational, affective and metacognitive processes. The present data support this view: video increased perceived dynamism, visuality and interest, but these affective advantages did not ensure the highest factual comprehension. Thus, the results do not contradict multimedia-learning theory; they specify that multimodal presentation is effective when it reduces unnecessary processing [24] and helps learners construct a stable mental representation rather than when it merely increases vividness.

The written-text advantage corresponds to recent evidence on reading and listening comprehension. Clinton-Lisell [10] showed that neither reading nor listening is universally superior, but reading becomes more favourable when the learner can regulate processing and the task requires exact details. Clinton [11] and Delgado et al. [12] similarly connect comprehension outcomes with medium, genre, task demands and calibration. In the present experiment the stimulus required retention of names, historical stages and causal links; therefore, written presentation served as an external cognitive scaffold and supported the construction of a coherent situation model[6][7] [5; 18; 19].

[6] Kintsch W. *Comprehension: A paradigm for cognition.* Cambridge: Cambridge University Press, 1998. URL: https://www.cambridge.org/gb/universitypress/subjects/psychology/cognition/comprehension-paradigm-cognition

[7] van Dijk T. A., Kintsch W. *Strategies of discourse comprehension.* New York, Academic Press, 1983. URL: https://onlinebooks.library.upenn.edu/webbin/book/lookupid?key=olbp74011

The video results should be interpreted in relation to recent research on educational video[8]. Noetel et al. [6] showed that video can improve learning in higher education, especially when it is used as a supplement to existing instruction. Fyfield, Henderson and Phillips [7] concluded that the learning value of instructional videos depends on concrete design principles, including brevity, coherence, segmentation, learner control and integration with learning activities [25]. Liu [11] provided experimental evidence that segmentation in multimedia learning affects cognitive load and comprehension. The present data show that video can be more interesting and emotionally engaging than written text, but this advantage does not automatically produce the most accurate comprehension. According to the generative learning framework [26], deeper comprehension requires learners to actively reorganise and integrate incoming information; this process may be compromised by the transient nature of video unless explicit generative prompts (e. g., summarisation, self- explanation) are provided. These findings explain why the video condition in the present study increased interest and visual richness but did not surpass written text: the modality itself did not provide enough stable external support for precise factual reconstruction.

The role of cognitive load was central. Participants who experienced the material as more difficult performed worse, and modality differences were partly explained by cognitive load. This result is consistent with Sweller, van Merriënboer and Paas [4], who relate instructional effectiveness to working-memory limitations, and with Skulmowski and Xu [8], who argue that digital and online learning environments may create paradoxical combinations of additional load and potential learning benefits. It is also compatible with recent meta-analytic evidence on subjective cognitive-load measures in multimedia research [17]. A parallel meta-analysis comparing instructional animation with static pictures [27] concluded that dynamic visualisations are not inherently superior; their effectiveness depends on factors such as realism, temporal contiguity and learner prior knowledge – a conclusion that aligns with our observation that video (dynamic) did not outperform written text (static) for factually dense material. In the present study, cognitive load was not a secondary subjective reaction but the strongest negative predictor of objective comprehension.

The metacognitive findings add an educationally important dimension. Written text most often produced the profile of accurate high confidence, while audio more often produced aware difficulty. Video still showed a relatively high rate of illusion of understanding. This is consistent with Koriat and Bjork's work on metacognitive illusions [20; 23] and with broader research on self-regulated learning [21; 22]: learners may feel that they understand material when study conditions provide cues that are not available at test. Therefore, subjective interest and clarity should not be used as the only evidence that learning has occurred.

The applied implication of the study is not that video or audio should be rejected. Rather, the results indicate that factually dense educational materials should not be replaced by video without written support. Video can be used for motivation, contextualization and imagery, but learners need textual anchors for names, dates and causal relations. Audio materials require scaffolding through preview questions, key terms, repeated listening and note-taking. In all modalities,

[8] Guo P. J., Kim J., Rubin R. How video production affects student engagement: An empirical study of MOOC videos. *Proceedings of the First ACM Conference on Learning @ Scale*, 2014, pp. 41-50. New York, Association for Computing Machinery. DOI: https://doi.org/10.1145/2556325.2566239

retrieval tasks and summary writing are needed to check whether subjective understanding corresponds to actual comprehension.

Limitations. The study has several limitations. First, it compared three modality conditions using one stimulus text; future research should replicate the design with other genres, lengths and difficulty levels. Second, the sample was composed primarily of young adult students, which limits generalization to other age groups. Third, the summary coding was rubric-based and should be strengthened in future work through independent double coding and inter-rater reliability estimates. Fourth, mediation results should be interpreted as exploratory because the data are cross-sectional within the experimental procedure.

Conclusions

The aim of the study was to determine how presentation modality affects comprehension of one and the same factually dense educational text through the relationship between objective performance, productive recall, subjective cognitive load, evaluative perception and metacognitive calibration. The results allow the following conclusions to be formulated.

First, presentation modality significantly affected objective comprehension. Written text produced the highest score, video occupied an intermediate position, and audio produced the lowest score. The written-text advantage was especially visible when tasks required exact factual attribution, proper names and chronological reconstruction.

Second, the same modality did not maximize all outcomes. Video was perceived as more dynamic, interesting and visually rich, but it did not produce the highest objective or productive comprehension. This means that subjective engagement and precise factual understanding should be treated as related but distinct educational outcomes.

Third, cognitive load and metacognitive calibration explain the main authorial result of the study. Cognitive load was the strongest negative predictor of performance, while written text most often produced the favourable profile of accurate high confidence. Video, despite its engagement advantage, did not eliminate the risk of illusion of understanding.

The authorial contribution of the article consists in experimentally demonstrating, on the basis of a 456-participant sample, that the effectiveness of presentation modality for factually dense educational material should be assessed through the combined indicators of factual accuracy, productive recall, cognitive load and metacognitive calibration rather than through subjective attractiveness of the format alone.

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Модальность предъявления и понимание фактологически насыщенного учебного текста: оценка влияния когнитивной нагрузки и метакогнитивной калибровки

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Проблема и цель. *В статье рассматривается научная проблема соотношения субъективной привлекательности модальности предъявления учебного материала и точности его понимания. Данная проблема особенно значима для фактологически насыщенных учебных текстов, где обучающийся должен запоминать, сопоставлять и воспроизводить имена собственные, хронологию, культурно-исторические сведения и причинно-следственные связи. Цель исследования состоит в выявлении того, как письменная, аудиальная и видеомодальность предъявления одного и того же учебного стимула связана с объективным пониманием, продуктивным пересказом, субъективной когнитивной нагрузкой, оценочным восприятием материала и метакогнитивной калибровкой.*

Финансирование проекта: Исследование выполнено в рамках реализации государственного задания Министерства науки и высшего образования Российской Федерации № 075-03-2026-305 (от 16 января 2026 г.) по теме «Прикладные исследования по внедрению технологий искусственного интеллекта в высшее образование» (шифр научной темы: FSMG-2025-0086)

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Методология. *Исследование выполнено в формате оригинального межгруппового психолингвистического эксперимента. В нем приняли участие 456 испытуемых, работавших со стимульным материалом "The History of Ice Cream" в одной из трех модальностей: письменный текст (n = 146), аудио (n = 167) или видео (n = 143). Методологическую основу исследования составили когнитивная теория мультимедийного обучения, теория когнитивной нагрузки, модели дискурсивного понимания и исследования метакогнитивной калибровки. Использовались 14 объективных заданий на понимание, открытый пересказ, оценивавшийся по рубрике 0–10 баллов, семантический дифференциал и субъективные шкалы трудности материала, трудности заданий, уверенности, самооценки понимания, доступности воспоминания и интереса. Данные анализировались с применением критерия Краскела – Уоллиса, попарных сравнений Манна – Уитни с поправкой Холма, показателей размера эффекта, корреляций Спирмена, регрессионного анализа и разведочного медиаторного анализа.*

Результаты. *Наиболее высокий показатель объективного понимания был получен в условии письменного текста, далее следовали видео и аудио. Преимущество письменного текста было наиболее выражено в заданиях, требовавших точной фактологической атрибуции, запоминания имен собственных и восстановления хронологии. Видео оценивалось как более динамичное, интересное и визуально насыщенное, однако это преимущество не приводило к наивысшей точности понимания. Когнитивная нагрузка оказалась главным отрицательным предиктором объективного результата; образность и детализация вносили положительный вклад, тогда как вовлеченность не имела самостоятельного прямого эффекта после учета когнитивной нагрузки.*

Заключение. *Основной авторский результат заключается в экспериментальном подтверждении расхождения между субъективной вовлеченностью и точным пониманием при мультимодальном предъявлении учебного материала. Для фактологически насыщенного содержания эффективность модальности следует оценивать не по ее привлекательности самой по себе, а по соотношению внешней когнитивной опоры, переживаемой когнитивной нагрузки, продуктивного пересказа и метакогнитивной калибровки.*

Ключевые слова: *модальность предъявления; понимание учебного текста; когнитивная нагрузка; письменный текст; аудиальное обучение; учебное видео; продуктивный пересказ; метакогнитивная калибровка; семантический дифференциал.*

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