

MENTAL VISUALIZATION AS SOCIAL PRACTICE: REPERTOIRES, MATERIAL MEDIATION, AND MICRO-TEMPORALITY

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Abstract

This article reconceptualizes drawing from imagination as a distributed social practice and develops an empirically grounded triadic model that informs the design and assessment of visualization-literacy instruction. A mixed-methods pilot study with 30 Czech secondary-school graphic design students (March–June 2025) combines observation, questionnaires, and artifact analysis across three task regimes and age cohorts. The analysis identifies five repertoires and three recurring thresholds, interpreting difficulties as translation bottlenecks between modalities and between mental models and marks on paper. Visualization literacy is framed as a transferable material-discursive competence, and a triadic model is proposed as a portable script for assessing visualization-literacy activities.

Keywords

Mental imagery; Drawing processes; Translation thresholds; Externalization; Educational design.

Introduction

Across social life, visualizations coordinate joint attention, compress complex relationships into tractable wholes, and scaffold problem-solving, design, and explanation. *Visualization literacy* has therefore emerged as a key competence for navigating a data-saturated world (Brockbank et al., 2025; Pandey & Ottley, 2023). However, most operationalizations of visualization literacy focus either on the decoding of pre-made graphics or on canonical STEM (science, technology, engineering, and mathematics) domains. Much less is known about how visual-spatial thinking unfolds as a social practice within art and design education, especially in pre-creative phases where students must translate vague imagery into compositional decisions.

Existing work on visualization literacy and related assessments has primarily examined how individuals interpret charts and graphs produced by others, often in scientific or everyday data contexts (Brockbank et al., 2025; Ge et al., 2023; Pandey & Ottley, 2023). Research on mental imagery has, in turn, tended to emphasize internal representational formats and their neural or cognitive basis, e.g. (Kosslyn, 1994; Pearson, 2019). This article addresses the gap between these strands by focusing on mental visualization as a socially and materially organized practice in secondary-level art and design education, with particular attention to the micro-temporal organizers of drawing processes and to the transitions between inner imagery and external marks. What remains underexplored is how visualization literacy operates in pre-creative phases, where visual-spatial thinking must be coordinated, negotiated, and stabilized before any

finalized representation exists. In art and design education, this coordination unfolds through socially organized practices that link internal imagery, language, material marks, and time.

In this article, mental visualization is treated not as a purely internal capacity but as a distributed social practice in which internal imagery, discourse, materials, and time are coordinated. The analysis highlights how students engage with translation pivots, externalization cycles, and micro-temporal organizers during drawing tasks, and how these elements can be articulated into a portable script for instruction and assessment. Rather than treating drawing outcomes as isolated products, the article approaches mental visualization as a distributed social practice structured by recurring forms of verbal anchoring, material externalization, and temporal organization, which are later articulated into a coherent analytic and pedagogical framework.

Terminologically, this article works at the intersection of visual literacy and visualization literacy. Visual literacy is commonly used as an umbrella term for competencies involved in interpreting, evaluating, creating, and communicating with images across contexts (Association of College and Research Libraries, 2012; Fransecky & Debes, 1972). Visualization literacy is a more specific construct, typically concerned with making sense of—and producing—visual representations that organize relations, comparisons, and patterns (e.g., charts, diagrams, schemata) for reasoning and communication (Boy et al., 2014; Börner et al., 2019; Pandey & Ottley, 2023). In the present article, the term visualization literacy is deliberately used to foreground visualization as an active, processual practice of externalizing and coordinating meaning—notably in pre-creative art and design tasks, where students translate emerging mental imagery into material marks. The broader frame of visual literacy remains relevant. Still, the analytic focus here is on the micro-processes and instructional supports that make visualization teachable and assessable as a socio-material competence. Much of the existing operationalization of visualization literacy comes from data-visualization and STEM contexts; this article extends the construct by examining visualization as a pre-creative studio practice in art and design education (Boy et al., 2014; Börner et al., 2019; Pandey & Ottley, 2023).

The primary goal of this article is to reconceptualize drawing from imagination as a distributed social practice, focusing on translation pivots, externalization cycles, and micro-temporal organizers, and to develop an empirically grounded triadic model that informs the design and assessment of visualization-literacy instruction. The article reports on a mixed-methods pilot study conducted with 30 Czech secondary-school graphic design students in May and June 2025, which combines qualitative observation and artifact analysis with descriptive quantitative summaries to situate repertoires and thresholds across task regimes and age cohorts.

The article proceeds by outlining relevant literature on mental imagery, socio-cultural perspectives, and arts education, then describes the methodological design, presents the results, and discusses implications, limitations, and avenues for future research.

1 Literature Review

In this article, the triadic model refers to three recurrent, instructionally actionable components that organize drawing from imagination as a socio-material practice: translation pivots, externalization cycles, and micro-temporal organizers (Vygotsky, 1978; Schön, 1992; Kirsh, 2010). *Translation pivots* are compact verbal or graphic anchors (e.g., attribute labels, metaphors, spatial goals) that stabilize a mental model and make intentions shareable and revisable (Vygotsky, 1978; Kirsh, 2010). *Externalization cycles* are iterative passes in which a provisional mark is produced, inspected, and adjusted—linking inner imagery to visible traces (Schön, 1992; Goldschmidt, 1991). *Micro-temporal organizers* are explicit structures of time (time-boxing, passes, check-pauses, prompts) that regulate attention and prevent premature over-commitment to detail (Schön, 1992; Fiorella & Zhang, 2018).

Importantly, the triadic model is not a stage model. The phases of visualization described in the tasks (idea generation, externalization, and evaluation) indicate a broad process sequence. In contrast, the triadic components specify how that process becomes teachable and assessable in classroom practice. In other words, phases describe what learners are doing. At the same time, the triad represents the socio-material support that shape how they do it and how breakdowns and improvements can be diagnosed.

Contemporary research on mental imagery has evolved beyond simple debates about “*pictures in the head*” to emphasize multimodal, flexible representations that support simulation, planning, and problem solving (Kosslyn, 1994; Pearson, 2019). Dual-coding theory (Paivio, 2014) posits the existence of interconnected verbal and non-verbal systems whose interplay is crucial when learners must translate between textual prompts, spatial layouts, and material traces.

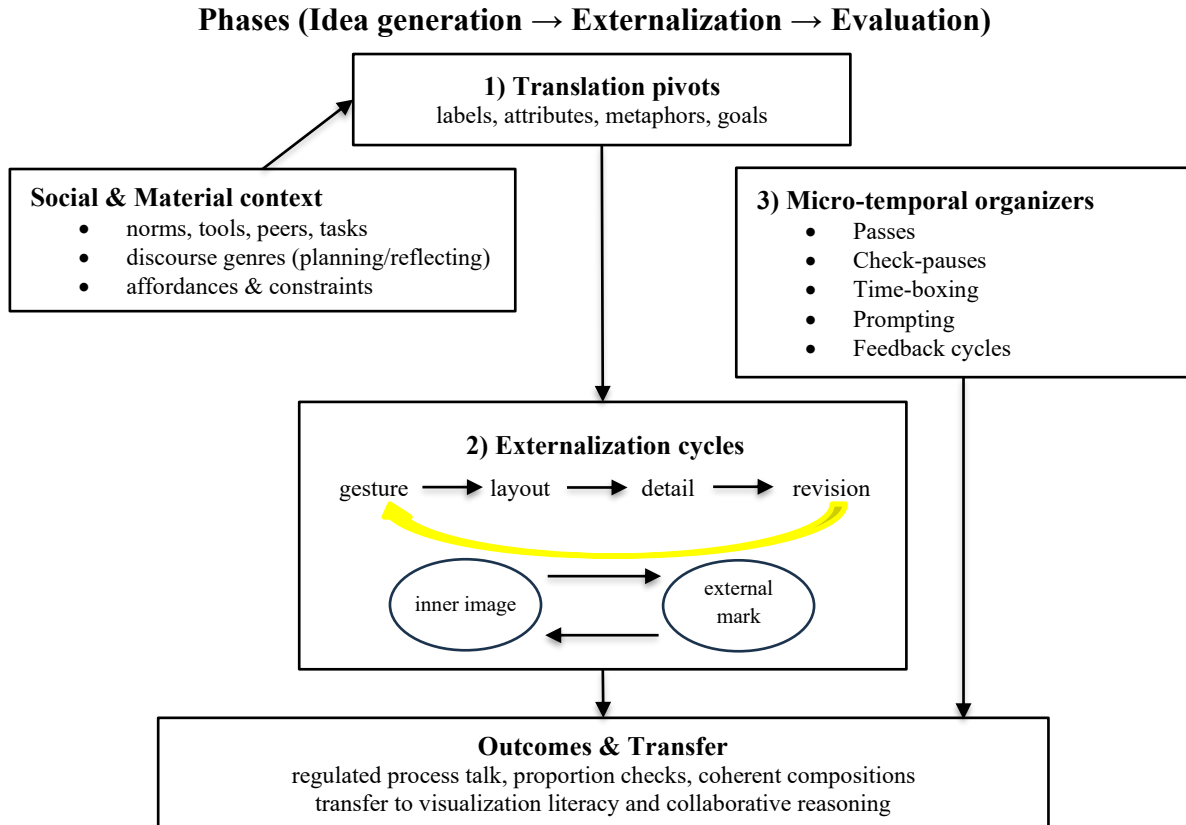
From a socio-cultural perspective, these processes are not purely internal. Vygotsky (1978) emphasized how tools and signs reorganize mental functions, with external inscriptions (such as drawings, diagrams, and notes) acting as mediators that reshape attention, memory, and reasoning. More recent work in arts education similarly highlights studio practices, routines, and material artefacts as key to developing disciplinary forms of thinking (Hetland et al., 2013).

Bringing these strands together, mental visualization is conceptualized as a social practice orchestrating at least three interacting elements: translation pivots, externalization cycles, and micro-temporal organizers.

- **Translation pivots** – compact/brief verbal/graphic anchors that stabilize a mental model or intention (e.g., attributes or spatial goals like “tilted oval”, “ridge”, “shadow seam”) and can be shared, revised, and re-combined.
- **Externalization cycles** – iterative passes where internal imagery is projected onto a surface and then marked, inspected, and adjusted.
- **Micro-temporal organizers** – explicit time-boxes, check-pauses, and prompts that regulate/structure attention and revision (e.g., multiple short passes rather than a single long attempt).

Figure 1 presents the triadic model of social mental visualization – translation pivots, externalization cycles, and micro-temporal organizers – and shows how these components structure the translation between inner imagery, language, and material marks across iterative passes. Bridging these strands, the analysis focuses on how specific task designs can render pre-creative visualization processes shared, inspectable, and improvable rather than treating drawings as just static outcomes (Brockbank et al., 2025; Ge et al., 2023).

The model in Figure 1 distinguishes broad phases of activity (*idea generation*, *externalization*, *evaluation*) from the socio-material support that make these phases teachable and assessable in classroom practice



Source: Own using (Paivio, 2014; Braun & Clarke, 2021; Vygotsky, 1978; Hetland et al., 2013; Fukuda & Woodman, 2017; Arnheim, 1969; Kosslyn, 1994; Pearson, 2019; Pandey & Ottley, 2023; Ge et al., 2023; Brockbank et al., 2025; Fiorella & Zhang, 2018; Binali et al., 2024; Jin et al., 2024)

Fig. 1: Triadic model of social mental visualization

2 Methodology

The study employed a mixed-methods design combining qualitative and quantitative components. 3 task regimes were designed to vary the source of imagery (perceptual, verbal, synthetic) and the degree of temporal organizers. Each student completed all regimes in counterbalanced order within a single double-period class. A mixed-methods approach was chosen because the construct of social mental visualization concerns both observable classroom practices and the fine-grained organization of drawing processes: qualitative data make visible students' repertoires, thresholds, and process talk, while descriptive quantitative summaries help situate how often particular strategies and difficulties occur and how they are distributed across regimes and cohorts.

In line with the study's aims, the analysis addressed 3 research questions (RQ):

RQ1: What repertoires do students mobilize when drawing from imagination across different task regimes?

RQ2: What recurrent thresholds or bottlenecks emerge as drawings grow more complex?

RQ3: How might these repertoires and thresholds be articulated into a script for teaching and assessing visualization literacy including data visualization and collaborative problem solving?

Data were collected between March and June 2025 during regular instructional sessions. Participants were 30 students aged 15–19 from a selected Czech secondary vocational school specializing in graphic design. This school was selected because drawing from imagination

constitutes a routine and explicit part of its graphic-design curriculum, providing a natural environment in which pre-creative visualization processes are regularly taught, practiced, and discussed. The author also works as a teacher at this institution, which enabled access to the classes involved and facilitated the observation of authentic instructional routines. The program, therefore, offered suitable conditions for examining how students coordinate internal imagery, material tools, and temporal structures during real classroom tasks. Participants were distributed across three-year cohorts corresponding roughly to ages 15–16, 16–17, and 18–19. All students had prior experience with drawing instruction, but their familiarity with explicit metacognitive framing of pre-creative processes varied. The focus on students specializing in graphic design reflects the study’s interest in contexts where drawing from imagination is a central curricular practice and where visualization strategies are part of everyday classroom work. The sample size corresponds to the complete set of students in the collaborating cohorts who were present and provided consent during the data collection sessions in regular instruction. As a pilot study, it was intended to support in-depth qualitative analysis rather than statistical generalization.

Participation was voluntary and occurred during regular instructional time. Students were informed that the activities formed part of a research project on drawing processes, but they would not affect their grades. Written consent was obtained from students and, where required, from parents or guardians. All data were collected within a limited number of lessons at the collaborating school, during one teaching period, so that task regimes could be implemented under comparable classroom conditions.

The study adhered to the *Ethical Guidelines for Educational Research* (5th ed.) as issued by the British Educational Research Association (BERA, 2024). These guidelines informed recruitment, consent, data handling, and reporting. Attention was paid to transparency about research aims, the right to withdraw without consequences, and the protection of student anonymity in all outputs.

To ensure that the triadic model functions as an analytic and pedagogical framework (rather than as a post-hoc interpretation), each task regime was designed to elicit observable evidence for all three components: translation pivots (written anchors), externalization cycles (iterative passes), and micro-temporal organizers (time-boxes and check-pauses). The regimes differed in the source of imagery (perceptual, verbal, synthetic) and in the intensity of temporal structuring, allowing comparison of how the same triadic support operates under different conditions.

Translation pivots were operationalized as 3–5 short verbal anchors recorded on a small card before drawing. Micro-temporal organizers were explicit time-boxes (e.g., several short passes of two to three minutes) with check-pauses of up to 30 seconds for proportion and intent alignment.

Fidelity was logged as a simple index per step, indicating whether

- the instruction was read aloud,
- time was measured, and
- a check-pause occurred.

Across regimes, students used standard A4 drawing paper and graphite pencils. This produced a simple 0–3 fidelity score per regime (0 = none of the elements implemented; 3 = all implemented), used to document adherence and to interpret any deviations in observed use of pivots or checking behavior. Prompt cards were retained for analysis together with the drawings.

3 task regimes were used:

- In the **perceptual regime**, students first observed a tangible object for 30 seconds and listed three anchors (e.g., “tilted oval”, “ridge”, “shadow seam”). They then completed a blind-contour drawing from observation (2 minutes) and followed it with a memory drawing of the same object (3 minutes). A 30-second check-pause at the end invited them to compare the drawing with the object and annotate the main proportional adjustments they would make.
- In the **verbal regime**, students constructed an attribute map for an imagined object (e.g., shape, texture, function, mood) and selected 3–5 anchors from this map. They then produced a layout sketch (3 minutes) followed by a detail pass (3 minutes). A 30-second check-pause focused on the alignment between anchors and the emerging composition.
- In the **synthetic regime**, students combined attributes (e.g., “sharp/spiral/dark”) into a novel object concept and selected four anchors. They then conducted three short synthesis passes (3×2 minutes) with brief check-pauses between passes. Each pause prompted revision of anchors and/or composition, making shifts in intention explicit.

Across all regimes, translation pivots were captured via retained prompt cards. Externalization cycles were evidenced by the structure of multiple passes (blind/memory, layout/detail, synthesis passes) and accompanying annotations. Micro-temporal organizers were evidenced by recorded timing and the presence of instructed check-pauses. This alignment ensured that the same analytic vocabulary could be applied consistently across regimes when coding repertoires, thresholds, and process talk.

Data sources comprised:

- observation logs and a research diary documenting classroom interactions, visible strategies and notable breakdowns,
- brief pre- and post-questionnaires capturing starting approaches, perceived difficulty and perceived change of idea during drawing, and
- artifact analysis of students’ drawings and written anchors (composition coherence, relation between intention and outcome, spatial logic/proportion, degree of intention change, experimentation/variation).

De-identified materials (prompts, pivot templates) and coded artifact snapshots are available from the author of this article upon reasonable request. Together, these sources provided complementary evidence of intention (anchors), enactment (passes and observable strategies), and evaluation (check-pause annotations), enabling the analysis to track translation between imagery, language, drawing, and reflective checking.

Qualitative analysis followed a reflexive thematic analysis approach (Braun & Clarke, 2021, 2022). Coding cycles moved from initial semantic codes to patterned themes such as “anchored sketch”, “anchor re-write”, “late proportion audit”, and “missing check-pause” across regimes and cohorts. Rigor was supported through an audit trail in the research diary, peer debriefing, and repeated revisiting of the data to check coherence between codes, themes, and excerpts, in line with Braun and Clarke’s criteria for good thematic analysis (Braun & Clarke, 2021, 2022). Quantitative summaries (e.g., frequency of check-pauses, changes in anchors) were descriptive and served to support and situate the qualitative interpretations rather than to provide inferential statistical tests.

3 Results

Results are reported with the triadic model as an organizing lens. Specifically, the author describes repertoires as recurring ways of structuring externalization cycles, and thresholds as recurring breakdown points in translation between imagery, language (pivots), material marks, and evaluation that become visible under different micro-temporal conditions (passes and check-pauses).

3.1 Repertoires

Repertoires can be read as practical strategies for managing the move from intention to marks across iterative passes, i.e. different ways of running externalization cycles with reliance on explicit pivots and checking routines. Across regimes 5 broad repertoires emerged:

1. Contour-first – prioritizing outlines and silhouette before internal structure.
2. Axis-and-box – roughly blocking in axes and bounding boxes before details.
3. Detail-first – focusing on local textures or features without global structure.
4. Gesture-sweep – using loose gestural strokes to capture movement or flow.
5. Patchwork-assemble – constructing forms from multiple small fragments.

These repertoires were not mutually exclusive. Students often blended them within a single drawing. However, particular repertoires correlated with specific thresholds and with the presence or absence of translation pivots.

3.2 Starting Approaches (Self-Report)

Pre-task questionnaires revealed that many students initially described “drawing from imagination” in individualistic terms (such as talent and inspiration) and rarely mentioned planning. After the pivot-card introduction, several participants spontaneously reframed their approach as “making notes for the drawing” or “deciding what is important first”. Students who explicitly rehearsed their anchors aloud tended to adopt more structured repertoires (axis-and-box, gesture-sweep) compared to those who skipped or minimized the pivot step.

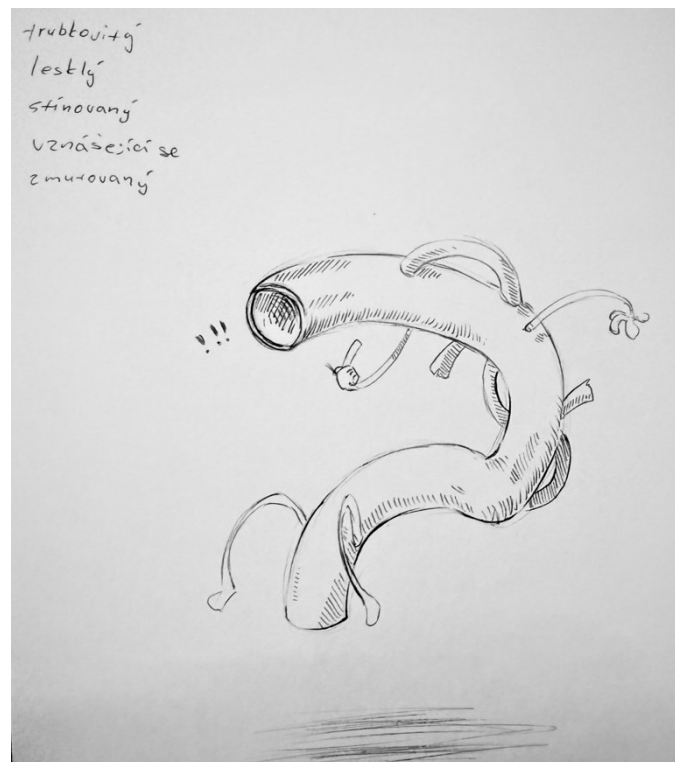
3.3 Difficulties / Thresholds

These thresholds correspond to the recurrent translation points in which one representational medium must be stabilized into another. The triadic support (pivots, cycles, and micro-temporal organizers) helps to explain when such translations break down and what classroom-visible practices tend to repair them. Difficulties clustered around 3 recurring thresholds:

- **Imagery** – language translation – generating anchors that were neither too vague (“nice”, “cool”) nor overly literal (“a cup”) proved challenging.
- **Language** – drawing translation – mapping anchors onto compositional decisions (placement, scale, direction) was often incomplete.
- **Drawing** – evaluation translation, making proportion checks explicit and linked to anchors, required sustained metacognitive effort.

Instead of individual deficits, “proportion/deformation problems” can be understood as temporary misalignments in translation across modalities, which may be relieved by some combination of anchors, check-pauses, or explicit comparisons.

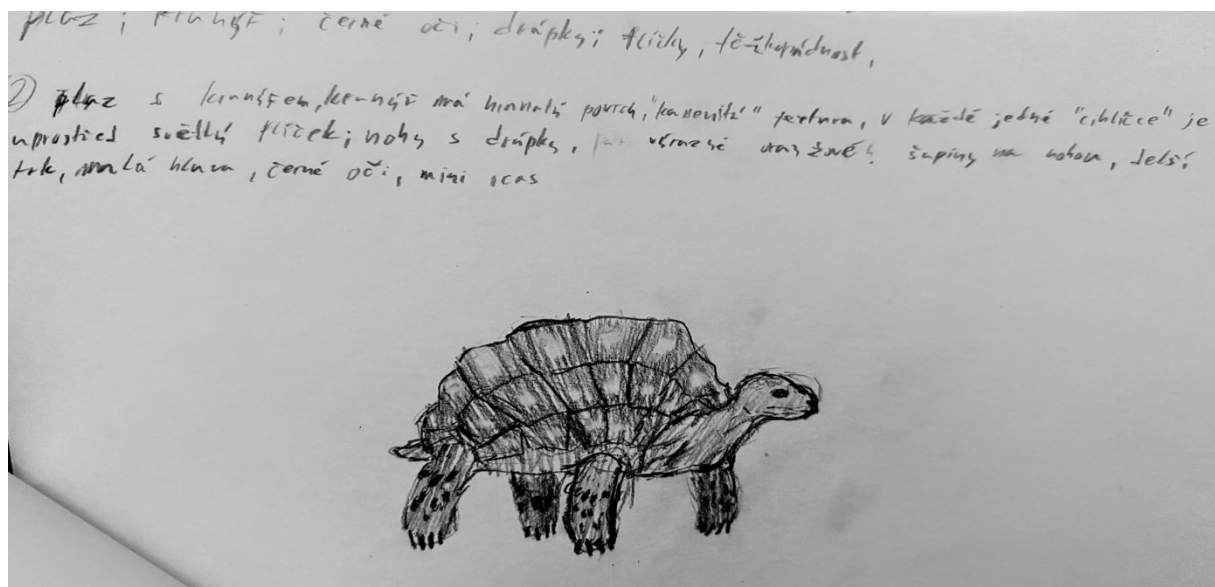
Figure 2 illustrates how a pivot set with the words “*tubular*”, “*glossy*”, “*shaded*”, “*floating*”, and “*mutated*” has been translated into an imagined form through an externalization cycle. The sketch visualizes how compact anchors guide silhouette, volume, and shading decisions under time-boxed synthesis conditions.



Source: De-identified student work from author's research documentation

Fig. 2: Excerpt from synthetic regime – Multi-attribute synthesis

Figure 3 shows how translation pivots derived from an attribute map have been transformed into a drawing. The written anchors in the top of the figure specify key features and constraints and the sketch in the bottom of the figure shows how these anchors are mapped onto structure and surface treatment (e.g., body plan, shell segmentation, texture cues).



Source: De-identified student work from author's research documentation

Fig. 3: Excerpt from verbal regime – Attribute map

3.4 Task-Regime Patterns (Descriptive)

Perceptual regime supported more accurate overall proportions but sometimes led students to rely heavily on observation without re-articulating anchors. **Verbal regime** elicited richer

conceptual descriptions but also more drift between anchors and drawing when check-pauses were rushed or omitted. **Synthetic regime** made transformation and experimentation most visible, with students frequently revising anchors between passes.

These patterns suggest that no single regime is intrinsically superior. Instead, each illuminates different aspects of visualization practice. Combining regimes within a curriculum could cultivate both perceptual calibration and flexible, concept-driven visualization.

3.5 Age Trajectories (Descriptive)

Older cohorts showed greater tolerance for iterative revision and were more willing to abandon initial anchors that “did not work”. Younger students were more likely to treat anchors as fixed and experienced frustration when drawings diverged from their initial ideas. Across ages, however, explicit micro-temporal organizers helped many students reframe “starting over” as a normal, not a failure.

3.6 Effect of Time-Boxed Prompts

Time-boxing into short passes with check-pauses reduced over-investment in early details for many students. The combination of a visible timer and written anchors encouraged them to treat drawings as provisional and to revisit global structure. Where time-boxes were not enforced (e.g., in a comparison session not reported here), students tended to proceed in a single long pass, with fewer explicit proportion checks and less anchor revision.

Instead of individual deficits, difficulties are thus understood less as a fixed lack of talent and more as challenges in organizers passes, producing an intermediate record, or adjusting the cadence of passes.

The observed shifts in planning language preceded stable changes in artefacts: Students began to talk about “passes”, “checking proportions”, and “changing the idea a bit” before these were consistently visible in drawings. Once this vocabulary stabilized, the inscription techniques on paper gradually followed.

3.7 Quantitative Summary Tables (Descriptive)

Descriptive summaries in Tables 1 and 2 reinforce the qualitative patterns by showing how often anchors were revised, how frequently explicit proportion checks were made, and how dominant repertoires varied across cohorts.

Tab. 1 *Frequency of explicit proportion checks and anchor revisions by regime as indicators of micro-temporal organizers and pivot use*

Regime	Mean checks per task	Mean anchor revisions per task
Perceptual	1.3	0.6
Verbal	1.7	1.1
Synthetic	2.4	1.9

Source: Own

Tab. 2 *Distribution of dominant repertoires by cohort in percentage of tasks*

Cohort (age)	Contour-first	Axis-and-box	Detail-first	Gesture-sweep	Patchwork-assemble
15–16 years	42%	18%	21%	9%	10%
16–17 years	31%	27%	16%	16%	10%
18–19 years	24%	33%	12%	21%	10%

Source: Own

4 Discussion

The findings support a shift from viewing mental visualization as a private, trait-like capacity towards conceptualizing it as a socio-material practice.

As an answer to RQ1 it was found that the 5 observed repertoires (contour-first, axis-and-box, detail-first, gesture-sweep, and patchwork-assemble) and the 3 thresholds between imagery, language, drawing, and evaluation together demonstrate that visualization processes can be described in a shared vocabulary rather than being treated as opaque, individual talents.

As an answer to RQ2 it was found that across regimes, students' difficulties with proportion, coherence, or "sticking to the idea" were less about a lack of innate visualization ability and more about when and how translation pivots, externalization cycles, and micro-temporal organizers were deployed.

The answer to RQ3 is formulated in the Conclusion section of this article.

In relation to existing research on visualization literacy and mental imagery, the study adds a focus on pre-creative classroom practice. Whereas many visualization-literacy assessments focus on the interpretation of ready-made charts (Brockbank et al., 2025; Ge et al., 2023; Pandey & Ottley, 2023), the present model emphasizes how learners generate, stabilize, and transform internal images while working with tangible materials and time constraints. Similarly, research on mental imagery and visual thinking (Arnheim, 1969; Kosslyn, 1994; Pearson, 2019) has focused mainly on internal representations; here, those representations are examined as they are continuously translated into verbal anchors, sketches, and revisions within a specific educational context. The triadic model thus bridges socio-cultural accounts that stress tools and signs (Vygotsky, 1978) with arts-education research on studio habits of mind (Hetland et al., 2013).

The results also clarify how different task designs afford different aspects of visualization practice. The perceptual regime supported more accurate overall proportions but sometimes led students to rely on observation without re-articulating anchors. The verbal regime elicited richer conceptual descriptions but also more drift between anchors and drawing when check-pauses were rushed or omitted. The synthetic regime made transformation and experimentation most visible, as students revisited and revised anchors between passes. Together with the observed age-related patterns—greater tolerance for revision and anchor change in older cohorts—these findings suggest that carefully structured passes and check-pauses (proportion check during check-pauses) can help students experience "starting over" as a regular part of practice, rather than as a failure.

At the same time, the interpretations offered here are shaped by the researcher's positionality. The author's background in art education and experience with studio critiques and design thinking workshops likely sensitizes her to material-discursive aspects of drawing and to distributed cognition perspectives. This position entails specific commitments, including an investment in framing drawing as a learnable practice rather than as an innate talent, which likely primed the analysis to foreground environmental and temporal factors over individual deficits. To mitigate unexamined assumptions, a reflexive research diary was maintained, and peer debriefing was used; alternative interpretations were considered before settling on the final thematic structure.

Several limitations temper the study's transferability. The sample was small and drawn from a single institution and program, which constrains the extent to which the findings can be generalized to other settings or disciplines. Task regimes were necessarily simplified, and fidelity of implementation could vary across sessions. The researcher also acted as the instructor, which introduces potential for reactivity and interpretive bias despite reflexive

mitigation strategies. Finally, the quantitative summaries were descriptive rather than inferential and should be interpreted as indicative patterns rather than as robust estimates of effect sizes. These limits underscore the need for follow-up studies with more diverse samples, additional instructors, and more comprehensive quantitative designs to test further and refine the triadic model.

Conclusion

Mental visualization can be viewed as a social practice organized around translation pivots, externalization cycles, and micro-temporal organizers, rather than as a fixed individual trait. In this pilot study with Czech vocational graphic design students, these constructs helped make pre-creative processes visible and malleable. Students' repertoires and difficulties were strongly shaped by how tasks sequenced observation, verbalization, drawing, and checking, and by the vocabularies available to them for talking about these steps.

The triadic model and associated repertoires provide a portable language for designing, facilitating, and assessing visualization-literacy activities across domains. For instructional design, the findings suggest embedding translation pivots (3–5 anchors) and micro-temporal organizers (passes and check-pauses) directly into prompts, making planning public and coachable. Separating idea generation, externalization, and evaluation phases can help students experience each phase as a regular part of practice rather than as “extra work”.

For assessment, artifact-centric rubrics can be complemented with evidence of process—such as anchor cards, annotated passes, or micro-timelines—with indicators concerning the clarity and usefulness of anchors, the frequency and quality of proportion checks, and the articulation of idea changes, alongside more traditional criteria like composition or technical execution. The triadic model supports a shift from evaluating only finished artefacts to evaluating evidence of process. Practical indicators include:

- pivot quality (specific, actionable anchors rather than vague descriptors),
- pivot use (visible alignment between anchors and compositional decisions),
- cycle structure (at least one revision informed by inspection), and
- micro-temporal discipline (documented check-pauses with proportion/intent notes).

These indicators can be captured through retained pivot cards, annotated sketches, or brief process notes, and combined with conventional criteria such as coherence, proportion, and clarity of the final drawing. In this sense, the model functions as a diagnostic grammar: it makes breakdowns locatable (which translation point failed) and makes feedback actionable (which supports strengthening).

To translate the triadic model into classroom practice, teachers can treat the three components as a lightweight instructional routine:

- make translation pivots explicit (students write 3–5 anchors that specify attributes and spatial goals),
- require at least two externalization cycles (a rapid layout pass followed by a revision pass), and
- enforce micro-temporal organizers (time-boxing and brief check-pauses) to normalize iterative adjustment rather than single-pass completion.

This routine is compatible with studio critique traditions as well as with structured design-thinking prompts, and it can be scaled from short warm-up sketches to longer project work.

For example, in a drawing-from-imagination warm-up, students can begin by generating pivots such as “tilted oval”, “shadow seam”, or “centerline axis”, then complete a 2-minute layout

pass and a 2-minute revision pass with a 30-second check-pause focused on proportion and intention alignment. In a concept-design task (e.g., inventing an object or character), pivots can be framed as “design constraints” (function, texture, mood, key silhouette) and revised between passes to make idea drift explicit and productive. In collaborative visualization tasks, groups can negotiate a shared pivot set (e.g., “trend”, “contrast”, “outlier”, “annotation priority”), sketch in short passes, and use check-pauses as moments for joint alignment before refining a final representation.

For collaborative work, shared pivot cards and agreed-upon check-pauses can support joint drawing or visualization tasks, helping students align their intentions and negotiate changes, and thereby fostering intersubjective alignment in group problem-solving and critique. Regarding transfer, the model can be explored in data-visualization literacy and collaborative problem-solving contexts by asking students to generate anchors for planned charts (e.g., “trend”, “contrast”, “outlier”), structure sketching in passes, and make translation thresholds explicit. In this conception, visualization literacy is a material-discursive practice: it concerns how people coordinate language, tools, time, and surfaces to make ideas visible, not only how they read or produce “correct” graphics.

Future research can test and refine the proposed model along several concrete directions.

- First, replication with larger, more diverse samples across multiple schools would allow estimation of the stability of the identified repertoires and thresholds beyond a single vocational graphic design context.
- Second, implementing the same regimes with different instructors would help separate the effects of task design from teacher-specific facilitation styles and reduce reactivity linked to the researcher’s dual role.
- Third, the model can be examined for transfer to non-art domains by adapting pivots and passes to diagramming, data-visualization sketching, or scientific explanation tasks, thereby clarifying which components are domain-general and which are studio-specific.
- Fourth, future studies can operationalize fidelity and process evidence more granularly (e.g., logging the timing and content of check-pauses, capturing intermediate passes, or using brief think-aloud or stimulated-recall prompts) to better connect micro-temporal organization to observed improvements.
- Finally, incorporating curated visual exemplars of student artefacts—paired with short analytic commentary—would strengthen the transparency of qualitative interpretation and support cumulative comparison across cohorts and contexts.

Across these directions, the central evaluative question is how strengthening pivots, structuring cycles, and enforcing micro-temporal organizers changes the location and frequency of translation thresholds.

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MENTÁLNÍ VIZUALIZACE JAKO SOCIÁLNÍ PRAXE: REPERTOÁRY, MATERIÁLNÍ MEDIACE A MIKROTEMPORALITA

Tento článek přináší nové pojetí kreslení z představivosti jako distribuovanou sociální praxi a vyvíjí empiricky podložený triadický model, který slouží jako podklad pro návrh a hodnocení výuky vizualizační gramotnosti. Pilotní studie se smíšenými metodami, do které se zapojilo 30 středoškolských českých studentů grafického designu v období březen–červen 2025, kombinuje pozorování, dotazníky a analýzu artefaktů napříč třemi režimy úkolů a věkovými kohortami. Analýza identifikuje pět repertoárů a tři opakující se prahy a interpretuje obtíže jako překážky v překladi mezi modalitami a mezi mentálními modely a značkami na papíře. Vizualizační gramotnost je pojímána jako přenositelná materiálně-diskurzivní kompetence a je navržen triadický model jako přenositelný scénář pro hodnocení aktivit v oblasti vizualizační gramotnosti.

MENTALE VISUALISIERUNG ALS SOZIALE PRAXIS: REPERTOIRE, MATERIELLE MEDIATION UND MIKROTEMPORALITÄT

Dieser Artikel präsentiert ein neues Konzept des Zeichnens aus der Vorstellungskraft als verteilte soziale Praxis vor und entwickelt ein empirisch fundiertes triadisches Modell, das als Grundlage für die Gestaltung und Bewertung des Unterrichts in Visualisierungskompetenz dient. Eine Pilotstudie, an der 30 tschechische Grafikdesign-Schüler der Sekundarstufe teilnahmen zwischen März und Juni 2025, mit gemischten Methoden inklusive Beobachtung, Fragebögen und Analyse von Artefakten über drei Aufgabenbereiche und Alterskohorten hinweg kombinierte. Die Analyse identifiziert fünf Repertoires und drei wiederkehrende Schwellenwerte und interpretiert Schwierigkeiten als Hindernisse bei der Übersetzung zwischen Modalitäten und zwischen mentalen Modellen und Zeichen auf Papier. Visualisierungskompetenz wird als übertragbare materiell-diskursive Kompetenz verstanden, das triadische Modell wird als übertragbares Szenario für die Bewertung von Aktivitäten im Bereich der Visualisierungskompetenz vorgeschlagen.

WIZUALIZACJA MENTALNA JAKO PRAKTYKA SPOŁECZNA: REPERTUARY, MEDIACJA MATERIALNA I MIKROTEMPORALNOŚĆ

Niniejszy artykuł przedstawia nowe ujęcie rysowania z wyobraźni jako rozproszonej praktyki społecznej oraz rozwija empirycznie ugruntowany model triadyczny, stanowiący podstawę projektowania i ewaluacji nauczania alfabetyzacji wizualizacyjnej. Badania pilotażowe wykorzystujące różne metody, w których uczestniczyło 30 czeskich uczniów szkół średnich uczących się projektowania graficznego (marzec-czerwiec 2025), łączą obserwacje, kwestionariusze i analizę artefaktów w trzech trybach realizacji zadań i w różnych kohortach wiekowych. Analiza identyfikuje pięć repertuarów i trzy powtarzające się progi oraz interpretuje trudności jako bariery w tłumaczeniu między modalnościami oraz między modelami mentalnymi a znakami na papierze. Alfabetyzacja wizualizacyjna ujmowana jest jako możliwa do przeniesienia kompetencja materialno-dyskursywna, a model triadyczny proponowany jest jako możliwy do przeniesienia scenariusz służący ocenie działań w obszarze umiejętności wizualizacyjnych.