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MOSAIC THINKING AS A FACTOR DETERIORATING STUDENTS FROM FULL INVOLVEMENT WITH A TEACHING PROCESS

Annotation. *This article explores the concept of mosaic thinking - a cognitive style characterized by fragmented, non-linear information processing and synthesis of diverse perspectives - as a potential factor contributing to student disengagement in traditional educational settings. Drawing on*

empirical data from a study conducted at the State University «Kyiv Aviation Institute» (Ukraine) and Alfred Nobel University (Dnipro, Ukraine), which revealed that only 36% of students exhibit mosaic thinking (with over half at a low level), the paper argues that the mismatch between this cognitive style and conventional pedagogical values rooted in pre-digital education exacerbates motivation loss. By contextualizing mosaic thinking within the broader framework of student engagement factors, the study challenges assumptions about its universality and underscores its role as a destabilizing force in modern classrooms.

Key words: *mosaic thinking, student engagement, cognitive dissonance, traditional pedagogy, digital age education.*

Анотація. *У цій статті досліджується концепція мозаїчного мислення – когнітивного стилю, що характеризується фрагментарною, нелінійною обробкою інформації та синтезом різних точок зору – як потенційного чинника, що сприяє роз'єднаності студентів у традиційному освітньому середовищі. Спираючись на емпіричні дані дослідження, проведеного в Державному університеті «Київський авіаційний інститут»(Україна) та Університеті ім. Альфреда Нобеля (м. Дніпро, Україна), які показали, що лише 36% студентів мають мозаїчне мислення (більше половини – на низькому рівні), у статті стверджується, що невідповідність цього когнітивного стилю традиційним педагогічним цінностям, вкоріненим у доцифрову освіту, поглиблює втрату мотивації. Контекстуалізуючи мозаїчне мислення в ширшому контексті факторів залучення учнів, дослідження ставить під сумнів припущення про його універсальність і підкреслює його роль як дестабілізуючої сили в сучасних класах.*

Ключові слова*: мозаїчне мислення, залучення студентів, когнітивний дисонанс, традиційна педагогіка, освіта цифрової епохи.*

Introduction and relevance of the study. Imagine a world where the human mind mirrors the Internet — a sprawling network of hyperlinks, memes, and fleeting insights. Here, mosaic minds thrive, stitching together TikTok tutorials, academic journals, and midnight epiphanies into a patchwork of understanding. Yet, within the hallowed halls of universities, the ticking clock of lecture-based learning persists, a relic of an era when knowledge flowed like rivers, not torrents. This article ventures into this dissonant landscape, where the digital age's fragmented cognition collides with the rigid architecture of traditional education. The result? A generation of students suspended between two worlds, their minds flickering like pixels in search of coherence.

Student disengagement and disorientation, which this trend could cause, is a multifaceted issue influenced by conventional pedagogical methods incompatibility, technological shifts, and evolving cognitive preferences. Among emerging concepts, *mosaic thinking* - primary thought as the ability to integrate disparate ideas, media, and experiences into cohesive understanding, which has been praised as a 21st-century skill could also be precepted as a source of cognitive overload [5]. That's why this paper investigates how mosaic thinking when contradicting traditional teaching paradigms, contributes to declining student involvement. Mosaic thinking reflects the cognitive demands of the digital era, where learners navigate hyperlinked information, multimedia content, and interdisciplinary problems (Pianzola, 2022) [8]. However, its fragmented nature can clash with linear, discipline-specific curricula, creating cognitive dissonance [1]. While proponents argue it fosters creativity and adaptability, critics highlight risks: superficial understanding, reduced focus, and detachment from structured learning (Li & Wang, 2024) [7].

Problem statement in general form. Given the above, the objectives of this study include:

- Identifying the traditional educators' values, which are inherited from the pre-digital era in education,

- Mapping the cognitive landscape of students and schoolchildren based on their cognitive habits,

- Identifying the factors that are the most distinctive groupers of the students' cognitive landscape,

- Matching the cognitive landscape of the students and schoolchildren with educators' values.

Research methodology. The following methods and approaches were used in the study: a survey to assess the cognitive landscape of the students and schoolchildren; comparative study and cross-tables when exploring the qualitative nature of the cognitive landscape change related to the grouping variables introduced; neural network to define the most influential grouping factor from the set of chosen for the study.

Presentation of the main research material. Mosaic thinking is the mind's rebellion against linearity — a cognitive style where ideas are not bricks laid in sequence, but shards of glass arranged into fleeting, dazzling patterns [6]. Born in the digital crucible, it thrives on multitasking, interdisciplinary leaps, and the serendipity of a stray Google search. Yet, like Icarus soaring too close to the sun, this style risks cognitive burnout, leaving learners stranded in a sea of half-formed thoughts. Mosaic thinking is a cognitive approach where individuals process information as discrete, unconnected fragments rather than integrating it into a cohesive, sequential narrative [2]. Unlike linear thinking, which progresses logically from one idea to the next, mosaic thinking involves focusing on isolated "snapshots" of information, often jumping between concepts without clear linkage. This style is sometimes linked to the digital age, where rapid, bite-sized content consumption - through social media, short videos, and quick online snippets — may reinforce such patterns.

On the contrary, the pre-digital classroom stands as a cathedral of order: vaulted ceilings of syllabi, stained-glass windows of canonical texts, and pews of passive listeners. Here, educators - guardians of depth and discipline -

preach the gospel of linear progression, where knowledge is a ladder climbed rung by rung. This reverence for structure, while nurturing mastery, often silences the chaotic symphony of mosaic minds.

In traditional educational settings, where lessons are typically structured linearly and built incrementally on prior knowledge, mosaic thinking can present significant challenges. Students with this cognitive style may struggle to follow a step-by-step progression, finding it difficult to connect concepts or see the «big picture» [3].

This disconnection can result in confusion, frustration, or disinterest, ultimately reducing their full involvement in the teaching process. For instance, a lecture that unfolds sequentially might feel disjointed to a mosaic thinker, who may focus on individual details without grasping their cumulative meaning.

To generalize the mentioned above, one could conclude that pre-digital pedagogical values prioritize:

- **Linearity**: Sequential knowledge acquisition.

- **Depth over breadth**: Mastery of core disciplines.

- **Authority-driven learning**: Teacher-centric instruction.

Namely these values, still dominant in many institutions, conflict with the decentralized, exploratory nature of mosaic thinking.

A survey on mosaic thinking in conjunction with gender, location, current stress level, and the ultimate goal of AI-tolls utilization was held at Alfred Nobel University, Dnipro, Ukraine, and the Preparation Department of State University «Kyiv Aviation Institute» at the very beginning of the spring semester of the 2024/25 teaching year. A mixed-methods study surveyed **42 students** (STEM and economics). Mosaic thinking was assessed through a 30-item scale measuring preference for non-linear learning, multitasking, and interdisciplinary synthesis and the qualitative interviews exploring cognitive habits and engagement challenges developed by [4].

Unlike [4], where the cognitive landscape favoured mosaic thinking by 57,65%, the current empirical study provides critical insights into the prevalence of mosaic thinking among students.

Key findings from the surveys are the following (Fig. 1).
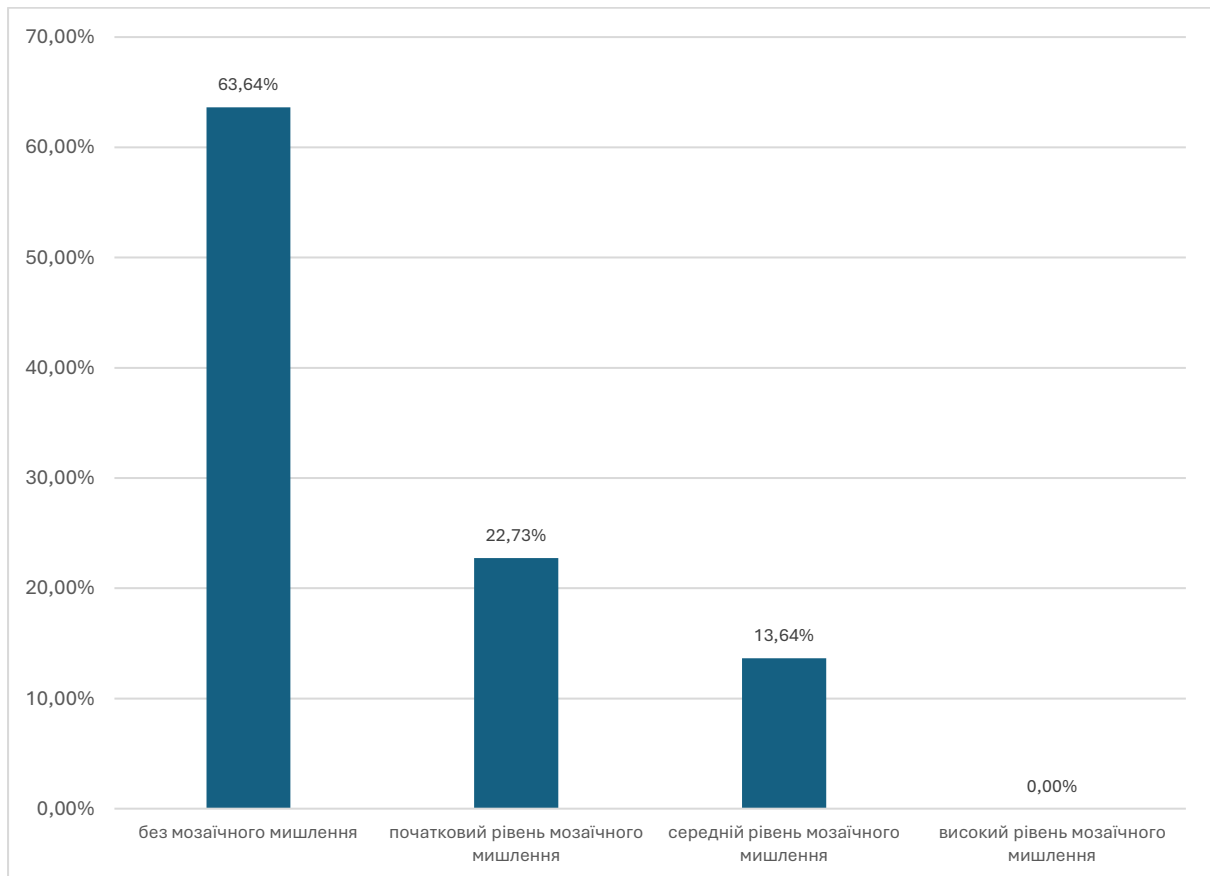
Fig. 1. A cognitive profile of respondents

Key findings from the surveys are the following:

- **Contrary to expectations, the study revealed that just 36,4%** of students demonstrated mosaic thinking (score ≥50/100). This finding challenges the assumption that mosaic thinking would be widespread in a digital-era student population exposed to fragmented information sources.

- **54%** of these exhibited low-level mosaic thinking (score 51-70), characterized by passive multitasking (e.g., switching between social media and lectures) rather than active synthesis.

- High-level mosaic thinkers (score ≥71/80) comprised **only ≈7%** of respondents and reported higher frustration with traditional teaching methods.

An in-depth analysis of the teaching habits of students with mosaic thinking (even low-level) showed:

- 22% lower participation in lectures even though in Dnipro, most classes are still online.

- 35% greater reliance on self-directed online resources, putting competitive pressure on teachers.

- 40% higher likelihood of describing courses as "monotonous" or "outdated" gaining additional tension in the relations with teachers.

So, a preliminary conclusion could be made that the empirical data from two Ukrainian universities provides a counterintuitive lens: as mentioned, despite the digital age's fragmentation of attention, only a minority of students exhibit mosaic thinking and even fewer at advanced levels. This paradox invites critical reflection on the interplay between cognitive evolution and institutional inertia.

The analysis of cross-tables by gender did not reveal any noticeable differences. The study of cross-tables by stress level showed that respondents who characterise their stress level as low are 15% less prone to mosaic thinking, which is quite in line with the intuitive assumption; moreover, we will come back to this fact when analysing the strength of influence of the selected factors on the cognitive landscape. As expected, the level of social media habituation gives a higher probability of mosaic thinking. However, this level of influence was much lower than expected. The purpose of gadgets and computer use showed that students using gadgets and computers for entertainment were 22% more likely to have mosaic thinking. As expected, location (rural, small towns, big cities) has no noticeable effect on the cognitive landscape.

Introducing more resolution, i.e. levels of mosaic thinking, allows for a deeper understanding of the influence of various factors. Respondents with high

levels of mosaic thinking are 12% more likely to be stressed – this is how the relationship between stress and mosaic thinking should be interpreted. Location and gender, as in the previous case, hardly show any effect. At the same time, the level of social media habituation is a significant influencing factor. All 100% of respondents who recognise the highest degree of social media habituation show a high degree of mosaic thinking. At the same time, the factor "Purpose of using gadgets and computers" demonstrates ambiguity – the tangible influence of this factor is evident only for respondents who demonstrate a low degree of mosaic thinking.

Coming to the power of factors influencing the tendency to mosaic thinking, which was identified through neural network utilisation, it should be noted that 4 out of 6 factors demonstrate approximately the same impact being visibly more substantial than others – stress, the habit of using social networks, the ultimate goal of using Internet & digital devices and gender (Fig. 2).
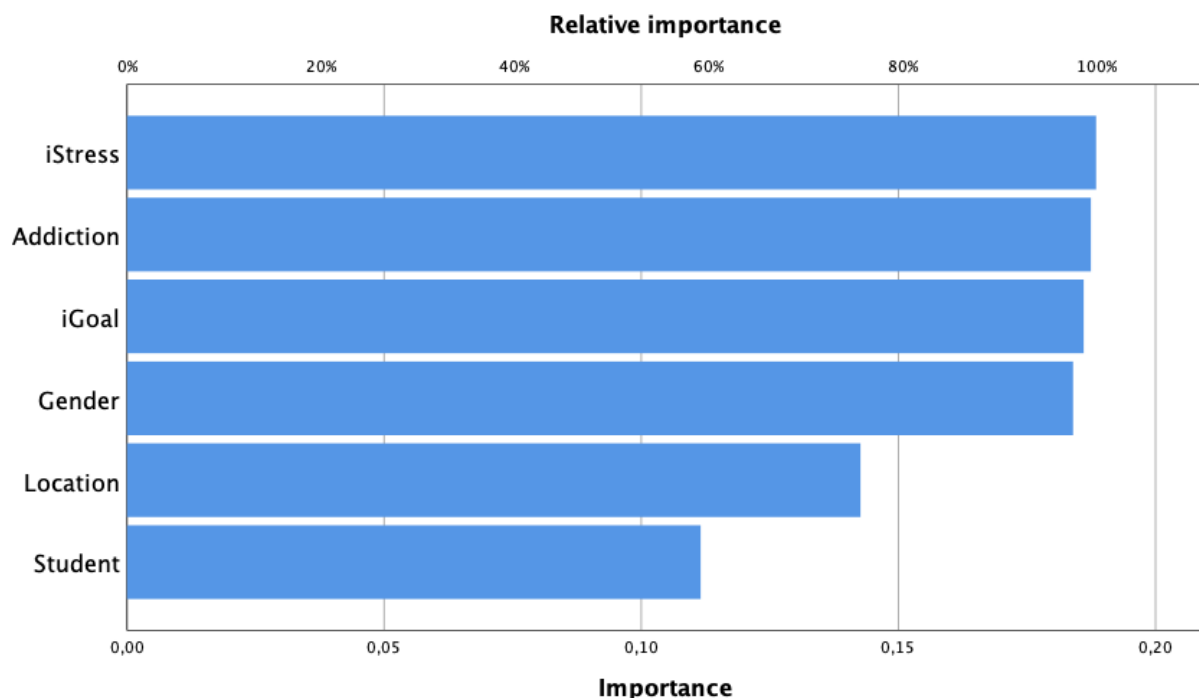
Fig. 2. Importance of factors influencing the cognitive landscape.

The unexpectedly low share of «mosaic thinkers» revealed by the study prompts several possible explanations, and the following reasons could hint at the leading factor influencing the cognitive landscape specifics:

- **Educational Background**: students may have developed more linear thinking habits through prior schooling, mainly aiming at specialised fields like aerospace engineering. The need to deepen more into STEM subjects could push future students to process information sequentially, already reducing the prominence of mosaic thinking by the time they ever reach higher education.

- **Selection Bias**: Admission to Ukrainian universities through EIT might favour students with stronger linear thinking skills, as entrance exams and academic prerequisites at STEM specialities often reward sequential reasoning and structured problem-solving. This could filter out individuals with pronounced mosaic thinking tendencies.

- **Measurement Constraints**: despite the comprehensive and reliable statistical testing of the mosaic thinking survey made by its author (Литвинова, 2017), the methodology still might be somewhat conservative, capturing only significant manifestations and overlooking subtler forms.

- **Contextual Influences**: The Ukrainian educational system or cultural emphasis on disciplined, systematic learning outcomes might discourage mosaic thinking, shaping students toward more conventional cognitive patterns. We will discuss it later.

These factors suggest that while mosaic thinking exists, its prevalence and intensity may be moderated by educational and contextual variables. The finding that only 36% of students exhibit it — many at a low level — implies that it may not be as dominant in student disengagement as initially hypothesised. However, we must map this trend to the conventional educators' values.

As mentioned above, traditional educational values rooted in the pre-digital era in the Ukrainian HEI prioritise linear thinking, sequential

progression, and structured curricula. This model could only deliver knowledge through lectures, textbooks, and step-by-step instruction — formats which are optimised for linear learners. Mosaic thinking clashes with this paradigm, as its fragmented approach struggles to align with the continuity and coherence emphasised in conventional classrooms (physical or virtual). Pre-digital education, relying on sustained focus and gradual knowledge-building, likely suited linear thinkers while marginalising those with mosaic tendencies.

The digital age, however, introduces a shift. Fragmented information delivery — via individually controlled online platforms and multimedia — may amplify mosaic thinking, yet the current study suggests that traditional educational structures still hold sway, possibly tempering its spread. This tension between old values and new realities underscores a challenge: engaging mosaic thinkers without abandoning the strengths of traditional methods. That seems to be a very challenging assignment.

Why does mosaic thinking generally falter in academia's halls? Let's look at this issue more comprehensively. The answer lies in education's iron grip on analogue rhythms. Rigid syllabi, like sheet music for a forgotten sonata, leave no room for improvisation. Students, trained to march in lockstep, find their mosaic instincts stifled, reduced to clandestine scrolls beneath desks. That finally results in «engagement's erosion». Mosaic thinkers in off-record talks speak of classrooms (again, no matter which – physical or virtual) as «flashbacks of the past», while their fingers itching to swipe or click.

Traditional pre-digital educators' values, once the bedrock of learning, now cast long shadows exacerbate engagement's erosion due to the following aspects:

- **Monodisciplinary focus**: Discourages connecting concepts across fields, alienating mosaic thinkers.

- **Passive learning formats**: Lectures prioritise absorption over creation, clashing with mosaic thinkers' need for active synthesis, and the online format only strengthens this preference.

- **Assessment rigidity**: Standardized tests favour linear reasoning, marginalising non-linear cognitive styles.

- **The Lectern's Loneliness**: Professors, like oracles of old, still tend to dispense wisdom to silent rows while students' fingers itch to tweet, question, and collaborate, especially in the case of online format where the students most frequently are represented by black rectangles with initials in the middle.

The classroom is a cage, especially for the 7% high-level synthesisers. Meanwhile, low-level mosaic thinkers drown in distraction, their half-formed mosaics crumbling under the weight of disengagement. Correspondingly, according to the authors, the low prevalence of mosaic thinking contradicts assumptions about «digital native» ubiquity. This discrepancy arises because:

- **Educational systems suppress mosaic habits**: Rigid syllabi and assessment frameworks penalise non-linear exploration.

- **Shallow digital exposure**: Frequent device use does not equate to advanced synthesis skills; many students engage in «surface-level» multitasking (e.g., scrolling during lectures).

It should be mentioned again that mosaic thinking is not wholly detrimental. Objectively, it can enhance creativity, adaptability, and the ability to draw connections across diverse domains, skills of great value in innovative or interdisciplinary contexts. Nevertheless, its misalignment with conventional teaching methods often casts it as a factor in deteriorating engagement. While high-level mosaic thinkers thrive in flexible environments, low-level practitioners struggle to reconcile fragmented attention with traditional expectations, as revealed in the empirical study.

For example:

- A student skimming lecture notes while watching a tutorial may retain less than a peer focused solely on the lecture.

- Interdisciplinary curiosity, if unmet by curricula, leads to disengagement.

Conclusions. Thus, the following conclusions and generalisations could be made summarising the research mosaic thinking as a factor that is deteriorating students from full involvement with a teaching process.:

The study reveals that mosaic thinking is not only an engagement's erosion source but could also be suppressed by old-fashioned educators' behaviours making students even more dissatisfied. To bridge the chasm, we propose:

- Hybrid Classrooms: Where lectures coexist with collaborative digital mind-maps, and AI tutors adapt to cognitive styles.

- Synthesis Labs: Spaces for students to fuse disciplines, turning fragmented thoughts into art, apps, or activism.

- Educators as Curators: Guiding learners in weaving their mosaics without losing the thread of rigour.

In this reimagined landscape, mosaic thinking transforms from a disruptor to a collaborator, fragments not shards of distraction but tiles in a grander design. In the interplay of chaos and order, the classroom becomes not a battleground but a studio—where every mind, linear or mosaic, paints its masterpiece.

The study positions mosaic thinking not as a universal trait of digital natives but as a *minority cognitive style* that accelerates disengagement when mismatched with traditional pedagogy. Rather than dismissing it as a «distraction», educators must recognise its dual role:

- **As a destabiliser**: Unsupportive environments turn mosaic tendencies into sources of frustration.

- **As a potential catalyst**, Structured integration (e.g., flipped classrooms, interdisciplinary projects) could harness fragmented thinking for deeper learning.

To mitigate motivation loss, institutions must:

- **Update pedagogical values**: Blend linear and non-linear approaches.

- **Train educators** in scaffolding mosaic thinking without sacrificing rigour.

- **Redesign assessments** to reward creativity and synthesis.

The Ukrainian case study underscores a global challenge: education systems built for analogue mindsets risk alienating even those students whose cognitive habits align imperfectly with the digital age.

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