

FROM ROTE TO SKETCHNOTES: RETHINKING FORMATIVE ASSESSMENT IN UDL CLASSROOMS

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Abstract:

Classrooms today are no longer homogeneous spaces of one-size-fits-all learners. Diversity in learning styles, cognitive abilities and modes of expression demands assessment practices that are flexible, inclusive and responsive. Though classroom assessment continues to remain largely rote-driven and product-oriented, Universal Design for Learning (UDL) offers a student-centric framework. This study investigates the effectiveness of sketchnoting as a formative assessment strategy. The research was conducted on a sample of 200 B.Ed. student teachers from a teacher training college in Mumbai, selected using the repeated cross-sectional sampling technique. The CAP Learning scale was used to document development across the cognitive, affective and psychomotor domains. The repeated measures MANOVA established the overall effectiveness of sketchnoting, revealing a significant multivariate improvement in cognitive, affective and psychomotor development, thereby validating its role as a holistic formative assessment tool within UDL classrooms. Findings revealed that sketchnoting promoted creativity, learner engagement and higher-order thinking. It emerged as a powerful strategy for making thinking visible, enabling learners to organise ideas visually, integrate concepts meaningfully and communicate understanding, enhancing the development of 21st century skill sets such as critical thinking, creativity, and communication. Most importantly, it fostered positive attitudes and psychomotor engagement catering to the needs of kinaesthetic learners. The results underscore the pressing need for a paradigm shift from memory-based evaluation to inclusive formative assessment aligned with UDL principles. The study concluded that sketchnoting not only caters to diverse learning styles but holistically nurtures the three domains of learning, offering vital educational implications for transforming assessment practices in 21st century classrooms.

Key Terms- *Sketchnoting, Formative Assessment, Domain-based Development*

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Introduction:

Universal Design for Learning (UDL) has emerged as a foundational framework for inclusive education, advocating for curriculum and assessment systems that proactively accommodate learner diversity rather than retrofitting instruction after barriers appear. UDL emphasises multiple means of representation, engagement, action and expression to ensure that all learners, regardless of abilities, backgrounds, or preferences, have equitable opportunities to access, participate in, and progress through learning experiences. Such flexibility not only aligns with the broader educational aims of equity and inclusion but also supports varied ways of knowing and demonstrating understanding in increasingly diverse classrooms. Research indicates that classroom environments grounded in UDL principles enhance student engagement and academic achievement by allowing learners to connect with content in personally meaningful ways and to express their understanding through formats that meet individual strengths (CAST, 2018; Beck Wells, 2022). In the context of India's National Education Policy (NEP) 2020, which calls for transformative, learner-centred pedagogy and assessment practices that move beyond rote memorisation, UDL's relevance is underscored as a framework capable of operationalising the policy's vision of flexible, inclusive learning pathways that address diverse

learner needs and promote critical competencies for the 21st century. NEP 2020 emphasises assessment reforms that prioritise formative, competency-based evaluation over high-stakes examinations to develop analytical, creative, and lifelong learning capacities (Government of India, 2020). Integrating UDL into teacher preparation and classroom practices therefore resonates with both international research on inclusive pedagogy and national policy imperatives demanding innovation in teaching and assessment to cater to all learners.

Traditional assessment approaches often privilege singular expression modes and recall-based tasks, which can marginalise learners with diverse strengths and impede the cultivation of higher-order cognitive and meta-cognitive skills that are essential in the 21st century. As formative assessment occupies an increasingly central role in monitoring and supporting learning progress, researchers have underscored the value of creative and performance-based assessment tools that engage learners actively and provide richer, more nuanced evidence of understanding than conventional tests. Creative formative assessments such as projects, portfolios, concept maps, performance tasks, and visual artefacts have been found to foster deep learning, learner autonomy, and reflective thinking by encouraging students to construct and communicate knowledge in personally meaningful ways (Chew and William, 2020; Gordon et al., 2014). Such approaches contrast sharply with traditional methods that rely heavily on memorisation and decontextualised recall, which have been criticised for failing to capture the full spectrum of learner competencies and for limiting opportunities to integrate creativity, problem-solving, and communication into assessment practices. By foregrounding authentic tasks that mirror real-world challenges and emphasising iterative feedback, creative formative assessments enhance the relevance and inclusivity of evaluation, ultimately promoting motivational and cognitive benefits for learners across diverse profiles. The shift from static, rote-based tests to dynamic, learner-centred formative strategies thus represents a paradigm shift in classroom assessment, one that aligns with both constructivist learning theories and policy frameworks that prioritise holistic learner development.

Among creative formative assessment tools, sketchnoting—a visual–verbal note-taking strategy that combines imagery, text, symbols, and graphic elements, has gained attention for its potential to make thinking visible and to support learners in organising, synthesising, and communicating complex ideas. Empirical research suggests that sketchnoting facilitates dual coding of information by engaging both verbal and visual processing, which can enhance comprehension, retention, and meaningful learning. Studies in secondary and higher education contexts have reported that students who engage in sketchnoting demonstrate increased interaction with content, improved summarisation skills, and heightened engagement compared to traditional note-taking practices, particularly in STEM and humanities subjects (Arzaga, 2023; Csachová and Kidonová, 2022). Beyond cognitive benefits, sketchnoting has been linked with positive effects on motivation, creative expression, and learner agency, as learners personalise representations of content and articulate conceptual connections that reflect their individual understanding. Additionally, sketchnoting has shown promise as a formative assessment artefact, offering educators a rich and multifaceted source of evidence about students' conceptual development, thought processes, and communicative skills. By capturing how learners organise and integrate knowledge visually and textually, sketchnoting aligns with UDL's emphasis on multiple means of action and expression and provides a flexible assessment format that honours diverse learner strengths while promoting critical thinking, creativity, and communication, all skills that are central to learners in the 21st century.

Despite a growing recognition of creative and inclusive assessment strategies, formative assessment in teacher education continues to be dominated by rote and memory-based approaches, limiting opportunities for learners to demonstrate higher-order thinking, creativity, and reflective understanding. While UDL provides a robust framework

for accommodating diverse learning styles and promoting equitable learning, there remains a gap in operationalising its principles through practical, evidence-based assessment tools. Sketchnoting, with its capacity to make thinking visible and integrate cognitive, affective, and psychomotor dimensions, offers promising potential, yet empirical studies on its systematic application as a formative assessment tool within UDL-oriented classrooms remain limited. The present study, therefore, seeks to address this gap by examining the effectiveness of sketchnoting in fostering holistic development among B.Ed. teacher trainees. Specifically, it aims to establish how sketchnoting contributes to the three domains of learning, namely, cognitive, affective, and psychomotor, while catering to diverse learner profiles, thereby providing actionable insights for designing inclusive, engaging, and 21st century-aligned formative assessments in teacher education.

Aim and Objectives:

The aim of the study was to examine the effectiveness of sketchnoting as a formative assessment strategy in enhancing domain-based development among B.Ed. teacher trainees. The objectives were as follows:

- To determine the effect of sketchnoting on cognitive development
- To examine the influence of sketchnoting on affective development
- To assess the impact of sketchnoting on psychomotor development
- To analyse the overall effectiveness of sketchnoting across the three domains of learning

Hypothesis:

The null hypothesis formulated for the study was as follows:

There is no significant multivariate effect of sketchnoting as a formative assessment strategy on the combined cognitive, affective, and psychomotor development of B.Ed. teacher trainees.

Research Methodology:

The present study adopted a quantitative research approach employing a one-group multivariate design to examine the combined effect of sketchnoting as a formative assessment strategy on the cognitive, affective and psychomotor development of B.Ed. teacher trainees. MANOVA was selected as it allowed simultaneous analysis of multiple dependent variables, thereby controlling for intercorrelations among the domains and reducing the risk of Type I error. This design facilitated a holistic evaluation of sketchnoting as a formative assessment tool, enabling the study to determine whether it produces a statistically significant overall impact on students' holistic development rather than isolated effects on individual learning domains.

1. Population and Sample

The sample comprised of 200 student teachers of a private-aided English medium teacher training college, affiliated to the University of Mumbai selected by the repeated cross-sectional sampling technique.

2. Data and Sources of Data

The following tool was constructed for the purpose of data collection:

The CAP Learning scale: It featured a 4-point rating scale comprising of total 9 statements, with 3 statements pertaining to each of the 3 domains, cognitive, affective and psychomotor (CAP). The items of the scale sought to assess the extent to which the formative assessment tool of sketchnoting had contributed to the student teachers' understanding and analysis of concepts taught, their learner motivation, engagement, and attitude towards learning as well as their skill in organising, representing, and communicating concepts visually through sketchnotes.

3. Theoretical framework

The Sketchnoting score was considered as the independent variable and the Domain-based Development scores were the dependent variables. The operational definitions of the key concepts in this research are given below:

1. **Sketchnoting:** A formative assessment technique in which B.Ed. teacher trainees represent their understanding of instructional content through a structured visual-verbal format that integrates drawings, symbols, keywords, connectors, and spatial organisation reflecting their ability to comprehend concepts, express attitudes and engagement, and demonstrate skill in visual representation and communication.
2. **Formative Assessment:** A classroom-based internal assessment process wherein B.Ed. teacher trainees' learning is evaluated through their sketchnote artefacts during instruction to monitor progress, provide feedback, and support the development of the cognitive, affective, and psychomotor domains of learning, as measured by a designated holistic rating scale.
3. **Domain-based Development:** The measurable progress of B.Ed. teacher trainees in the cognitive, affective, and psychomotor domains of learning, as evidenced through their sketchnoting performances and quantified using the CAP Learning Scale.

4. Statistical Analysis

Descriptive analysis included the Mean and Standard Deviation of the Domain-based Development Scores. To test the null hypothesis regarding the multivariate effectiveness of Sketchnoting, the following inferential statistics were applied:

- **Multivariate Analysis of Variance (MANOVA):** To determine the combined effect of Sketchnoting on cognitive, affective, and psychomotor development.
- **Univariate ANOVAs:** To identify the specific learning domains in which Sketchnoting had a statistically significant effect.
- **Effect Size (Partial Eta Squared):** To estimate the magnitude of the impact of Sketchnoting on each learning domain.

Results and Discussion:

1. Results of Descriptive Statistics of the Study Variables

Table 1: Descriptive Statistics of Domain-based Development Scores

Domain	N	Mean (Domain-based Development)	Standard Deviation (S.D.)
Cognitive	200	9.12	1.21
Affective	200	9.78	1.15
Psychomotor	200	10.86	0.94

As seen in Table 1, these values demonstrate that Sketchnoting produced a significant multivariate effect, with the maximum contribution in the Psychomotor domain, followed by Affective and Cognitive development.

2. Results of Inferential Statistics of Study Variables

Testing the Null Hypothesis

The Null Hypothesis states that there is no significant multivariate effect of Sketchnoting as a formative assessment strategy on the combined cognitive, affective, and psychomotor development of B.Ed. teacher trainees.

Table 2: Correlation Matrix

Domain	Cognitive	Affective	Psychomotor
Cognitive	1.00	0.48	0.44
Affective	0.48	1.00	0.57
Psychomotor	0.44	0.57	1.00

Table 3: Multivariate Tests (MANOVA)

Test Statistic	Value	F	df (Hypothesis, Error)	P
Wilks' Λ	0.46	76.31	(3,197)	< .001
Pillai's Trace	0.54	76.31	(3,197)	< .001
Hotelling's Trace	1.16	76.31	(3,197)	< .001

Table 4: Univariate ANOVA Results

Domain	F	df (1,198)	p	Partial η^2
Cognitive	31.48	1,198	< .001	0.14
Affective	47.26	1,198	< .001	0.19
Psychomotor	89.57	1,198	< .001	0.31

Table 5: Mean Scores across Domains

Domain	Mean Score	Interpretation
Cognitive	9.12	Moderate improvement
Affective	9.78	High improvement
Psychomotor	10.86	Very high improvement

Interpretation:

The results of the MANOVA indicate a statistically significant multivariate effect of Sketchnoting on the combined cognitive, affective, and psychomotor development of B.Ed. teacher trainees, as evidenced by Wilks' Lambda ($\Lambda = 0.46$, $F(3,197) = 76.31$, $p < .001$). This finding suggests that Sketchnoting, as a formative assessment strategy, had a significant overall influence on students' holistic development. Subsequent univariate analyses further reveal that the effect of Sketchnoting was significant across all three domains. Specifically, significant F-values were obtained for the cognitive domain ($F(1,198) = 31.48$, $p < .001$), the affective domain ($F(1,198) = 47.26$, $p < .001$), and the psychomotor domain ($F(1,198) = 89.57$, $p < .001$). Among the three domains, the psychomotor domain recorded the highest F-value, indicating that Sketchnoting exerted the maximum impact on students' psychomotor development, followed by affective and cognitive domains. These results collectively lead to the rejection of the null hypothesis and confirm that Sketchnoting is an effective formative assessment tool in enhancing holistic learning outcomes.

Discussion:

The results of the present study align with a growing body of research indicating that Sketchnoting and visual note-taking contribute positively to student learning outcomes across multiple domains. The significant multivariate effect demonstrated through MANOVA confirms that Sketchnoting not only enhances cognitive understanding but also promotes affective engagement and psychomotor expression, with the strongest impact seen in the latter.

The findings are supported by empirical research demonstrating the educational benefits of Sketchnoting in diverse learning contexts. For instance, Csachová and Kidonová found that Sketchnoting engages learners in dual coding processes, facilitating deeper comprehension and retention by combining text and visual elements, which aligns with the study's cognitive domain results (Csachová and Kidonová, 2021). Likewise, studies examining Sketchnoting as an instructional strategy report improvement in students' ability to synthesise and organise information, attributes central to meaningful learning and cognitive engagement. In higher education contexts, research indicates that Sketchnoting activities contribute to improved revision outcomes and learner performance, suggesting that visual note-taking practices can enhance recall and conceptual understanding (Hughes et al., 2022).

In addition to cognitive effects, Sketchnoting has been associated with positive affective outcomes, including increased enjoyment, creativity, and engagement. For example, intervention research shows that students' achievement emotions improved when Sketchnoting was used in lessons, with learners reporting reduced negative emotions and enhanced connection with content through creative visual representations (Haidl et al., 2025). This emotional shift reflects the present study's affective results, underscoring how Sketchnoting can cultivate learner motivation and

positive attitudes toward learning- a key aspect of effective formative assessment. Furthermore, qualitative and self-report findings from classroom studies describe students' perceptions of Sketchnoting as "helpful," "refreshing," and "creative," indicating that such creative assessment activities may boost learner engagement and satisfaction (Hughes et al., 2022).

The present study's psychomotor domain findings showing the greatest impact of Sketchnoting on learners' skills, are consistent with research emphasising the embodied aspects of visual note-taking. Sketchnoting inherently involves fine motor coordination and spatial organisation as students draw, symbolise, and connect ideas in visual formats. These processes not only support motor skills but also reinforce conceptual linkages, making learners' thinking visible through multimodal expression (Csachová and Kidonová, 2021). Collectively, the existing research supports the notion that Sketchnoting is an effective tool for fostering holistic development, advancing beyond traditional rote practices to engage learners cognitively, affectively, and physically in the learning process. Such evidence highlights the value of integrating innovative, creative assessment strategies like Sketchnoting into teacher education, aligning with contemporary pedagogical priorities that emphasise active learning and multimodal expression.

Conclusion:

This investigation not only aligns with the vision of NEP 2020 but also contributes to a broader understanding of innovative assessment practices that support creativity, critical thinking, and communication, preparing future educators to implement learner-centred, UDL-informed strategies in their classrooms. Sketchnoting emerges as a powerful formative assessment tool that transcends traditional rote practices, enabling learners to express understanding visually, verbally, and creatively. Within

a UDL framework, it caters to diverse learning styles while simultaneously nurturing cognitive, affective, and psychomotor growth, making thinking visible in meaningful ways. Looking ahead, integrating Sketchnoting systematically into teacher education and K-12 pedagogy would foster a future-ready, inclusive, and dynamic assessment ecosystem, transforming how learning is captured, celebrated, and advanced.

References:

- 1) Arzaga, J. (2023). *Sketchnoting: A pedagogical tool in the delivery of printed modular distance learning*. *American Journal of Multidisciplinary Research and Innovation*, 2(3).
- 2) Beck Wells, M. (2022). *Student perspectives on the use of Universal Design for Learning in virtual formats in higher education*. *Smart Learning Environments*, 9(37).
- 3) CAST. (2018). *Universal Design for Learning guidelines version 2.2*. CAST.
- 4) Chew, S. and William, J. (2020). *Issues in formative assessment design and implementation (Ontario Ministry of Education report)*.
- 5) Csachová, S. and Kidonová, D. (2021). *Exploring potential of sketchnoting as a tool for constructing learner's knowledge in geography*. *European Journal of Educational Research*, 11(2), 1151–1159.
- 6) Csachová, S. and Kidonová, D. (2022). *Exploring potential of sketchnoting as a tool for constructing learner's knowledge in geography*. *European Journal of Educational Research*, 11(2), 1151–1159.
- 7) Gordon, D., et al. (2014). *Universal Design for Learning and assessment strategies*. In *Innovative digital pedagogies (ecampusOntario Pressbooks)*.
- 8) Government of India. (2020). *National Education Policy 2020*. Ministry of Education.
- 9) Haidl, T. et al. (2025). *Feeling better when working with creative tools? Exploring the effects of a sketchnote intervention on students' achievement emotions*. *Zeitschrift für Erziehungswissenschaft*, 28, 529–551.
- 10) Hughes, S. et al. (2022). *Using sketchnoting as a revision aid with forensic students*. *Science & Justice*, 62(6), 822–826.

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