Section: Community Medicine

Original Research Article

IMPACT OF VISUAL MICROLEARNING ON KNOWLEDGE RETENTION AND LEARNER PERCEPTIONS: A QUASI-EXPERIMENTAL MIXED-METHODS STUDY

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ABSTRACT

Background: Visual microlearning uses short, focused, visually rich instructional modules and has emerged as an innovative approach aligned with cognitive load theory and multimedia learning principles. The Objective is to our primary objective is to compare the effect of visual microlearning and traditional Socratic teaching on knowledge retention among Phase III part 1 MBBS students. Our secondary objectives are to assess short-term memory retention (1 week) and long-term memory retention (4 weeks) between the two groups and to explore students' perceptions and learning experiences regarding visual microlearning sessions.

Materials and Methods: 100 students were divided into two study groups, the Intervention group receiving Visual Microlearning, and the Control group receiving Traditional method of teaching.

Results: This study showed significant Long- term memory retention among students of Intervention group. The students reported enhanced conceptual understanding, improved attention and engagement, better retention and recall.

Conclusion: Visual microlearning demonstrated significantly higher long-term knowledge retention compared to traditional teaching. Students reported improved engagement, attention, and conceptual clarity with visual microlearning. The integration of microlearning with active discussion showed enhanced learner satisfaction and perceived effectiveness.

Keywords: Visual facilitation, Microlearning, Knowledge retention, Attention span.

INTRODUCTION

Recently, digital technology and digital materials have started to be widely used in education from primary school (60%),[11] to college (73%),[12] worldwide. Microlearning is one of the innovative teaching techniques that use digital technologies. Many studies show that microlearning facilitated learning by dividing into smaller groups, encourages students to study.[1] With an overall rise in technology adoption, the information-seeking behaviours of today have become instant and single-focused, and demand convenience for learning and the acquisition of knowledge. Digital technologies expand the reach of learning and allow for the development of innovative and creative methods of teaching.[2] Visual microlearning uses short, focused, visually rich instructional modules and has emerged as an innovative approach aligned with cognitive load theory and multimedia learning principles. Microlearning is an instructional approach that delivers targeted, action-oriented, bite-sized content to achieve specific objectives within a short period, typically within a few seconds

or minutes and accessible when and where convenient for the learner.[4] Seven attributes associated with microlearning are single focus, bite-sized, asynchronistic, accessibility, flexibility, interactivity, and multimodal delivery.[2] However, evidence comparing its impact on short-term and long-term knowledge retention in undergraduate medical students remains limited. This study aims to evaluate the effectiveness of visual microlearning compared to routine Socratic teaching using a quasi-experimental mixed-methods design. Our primary objective is to compare the effect of visual microlearning and traditional Socratic teaching on knowledge retention among Phase III part 1 MBBS students. Our secondary objectives are to assess short-term memory retention (1 week) and long-term memory retention (4 weeks) between the two groups and to explore students' perceptions and learning experiences regarding visual microlearning sessions.

MATERIALS AND METHODS

Qualitative and quantitative techniques provide different but noncompeting representations of what exists in the world; findings from qualitative research do not generalize to a large population, whereas those from quantitative research may not apply to individuals within the diverse and heterogeneous larger population. Mixed-methods research combines these complementary representations, allowing the strengths of each method to be combined and the strengths of 1 method to address the limitations of the other.[3] Hence the use of mixed-method study design is justified here.

The study participants were selected based on convenient sampling comprising of 100 Phase III Part 1 student of Government Medical College, Omandurar Government Estate. The participants were divided into two intact group allocated in non-random manner. Group A being Intervention group, were provided with a session of short, focused, visually rich instructional modules and Group B being Control group were provided with routine method of teaching. Both the study groups were taught by the same individual under the guidance of mentor to avoid bias.

Assessment was done to both study groups at four-time intervals using the same structured questionnaire as Pre-Test to assess baseline knowledge, Post-Test to assess learning gain, one week questionnaire to assess short term retention, one month questionnaire to assess long term retention. Focused group discussion (FGD) or short reflective feedback was obtained from the Intervention group after the session. Data collection was started after IEC approval, with google forms. Participants were explained about the nature, purpose, benefits, risks, discomforts, precautions and information about how this project will be carried out after which consent was obtained as a part of questionnaire. Both the study groups were exposed to the intervention equally at the end of Data collection to avoid deprivation of knowledge.

Inductive and deductive content analysis was done. p value ≤ 0.001 – Statistically significant. Analysis was done using Paired t-test (within-group comparison and Independent t-test / Mann–Whitney U test (between-group comparison). The time frame for completing the study was 1 month.

Inclusion Criteria

All Phase III part 1 MBBS students studying in the academic year of 2025- 26 in Government Medical College, Omandurar Government Estate willing to take part in the study

Exclusion Criteria

Students of any other academic year studying in Government Medical College, Omandurar Government Estate and students of academic year 2025- 26 not willing to take part in the study.

RESULTS

Quantitative Analysis:

[Table 1] presents the comparison of learning outcomes between the micro-learning (Group A) and traditional teaching (Group B) across four time points.

At baseline, there was no statistically significant difference between the groups ($p = 0.23$), indicating comparable pre-intervention knowledge levels. Following the intervention, both groups demonstrated substantial improvement in post-test scores; however, the difference between the groups was not statistically significant ($p = 0.44$).

At one-week assessment, a decline in scores was observed in both groups, with the traditional teaching group showing slightly higher mean scores, although this difference was not statistically significant ($p = 0.12$).

At one-month follow-up, the micro-learning group demonstrated significantly higher delayed recall scores compared to the traditional teaching group (7.20 ± 2.40 vs 5.35 ± 2.49), and this difference was statistically significant ($p < 0.001$).

Qualitative Analysis

As we felt that no new information was obtained, we limited to 2 focused group discussions.

THEME: Visual Microlearning as an engaging strategy.

Under this broad theme five categories emerged.

Enhanced Conceptual Understanding

Participants commonly expressed that visual micro-learning improved their understanding of the topic. The use of pictorial representations helped simplify complex concepts and allowed them to grasp the overall idea more effectively. One participant mentioned, "We were able to understand it better because of visual representation," while another noted, "We were able to get a proper idea of what you are trying to experiment." The integration of

content into a single visual format also helped learners connect different aspects of the topic.

Improved Attention and Engagement

Another prominent finding was the improvement in attention and engagement. The short duration of the session was frequently highlighted as a major advantage. Students felt that the brief and focused format helped sustain their concentration compared to routine teaching methods. As one participant shared, "It was short and I was able to have a better attention compared to usual method of teaching," and another added, "Given that it was a very short session; I was able to concentrate well."

Better Retention and Recall

Participants also emphasized that visual elements contributed to better retention and recall. The use of colours, diagrams, and concise key points made the content more memorable. One student remarked, "The colours were really nice and this was better for memory retention," while another stated, "Mainly because of the visuals, we were able to remember better." The combination of images with brief explanations appeared to support memory reinforcement.

Efficiency with Limited Depth

Despite these advantages, participants pointed out certain limitations. While the method was appreciated for its efficiency, it was also perceived as providing only a broad overview of the topic. Some students felt that important details might be missed. For instance, one participant said, "We cannot cover the topic fully, we might miss something," highlighting concerns about depth and comprehensiveness.

Challenges in Assessment and Implementation

Finally, challenges related to assessment and implementation was identified. Many participants felt that visual micro-learning may not be sufficient for answering theory-based examination questions, which require detailed knowledge. One participant noted, "If you give a particular Essay question we cannot answer based on visuals," While another mentioned, "Reproducing it in words would be difficult." There were also concerns about the difficulty in designing such visual content and the possibility of omitting key information during teaching.

Table 1: Comparison of learning outcomes between Micro-learning and Traditional teaching

Time Point	Group A (Mean±Sd)	Group B (Mean±Sd)	T Value	P Value
Pre-Test	4.01±2.16	4.54±2.18	1.22	0.23
Post-Test	8.34±2.21	8.01±2.04	0.78	0.44
Immediate Recall (1 Week)	6.40±2.51	7.19±2.53	1.56	0.12
Delayed Recall (1 Month)	7.20±2.40	5.35±2.49	3.79	0.0002

Sample size: n=50 in each group.

DISCUSSION

While immediate learning outcomes were comparable between the two teaching methods, micro-learning showed a significant advantage in long-term retention? Visual micro learning is ideal for fast, engaging education while Traditional method of teaching is best for deep learning and reasoning. The success of microlearning techniques is closely related to the personal characteristics of learners and teachers and the external factors such as access to learning materials. As in the previous studies 14, lack of indepth explanations was perceived by the students.

CONCLUSION

Visual microlearning demonstrated significantly higher long-term knowledge retention compared to traditional teaching. Students reported improved engagement, attention, and conceptual clarity with visual microlearning. The integration of microlearning with active discussion showed enhanced learner satisfaction and perceived effectiveness.

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