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RESEARCH PAPER

Developing Multimodal Literacy through Infographics: A Quasi-Experimental Study

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ABSTRACT

In modern Pakistani educational context, knowledge is not only reading and writing conventional text books, moreover it is now upgraded to ability to interpret and construct meaning through semiotic ways. This long drawn out understanding, commonly referred to modern learning system as multimodal literacy. It has become a potent fashion in digital facilitated learning environment especially for masters and graduation classes. The present study investigates usefulness of multimodal pedagogical approach based on infographic instruction, approach for infographics and multimodal literacy in BS level students. Adopting modern theory like multiliteracies framework and a quasi-experimental pre-test and post-test design, two same intact groups were selected of BS, an experiment group taught through infographics based on various topics like types of meaning, world englishes concepts designed by researcher, and other control group is taught through the conventional syllabus books and notes. Both group received same content in same time and have equal instructional time period. Data were collected through their test which was conducted before and after experiment measuring content comprehension and multimodal literacy and infographics in contrast with traditional educational techniques and notes. The data were analysed through descriptive statistics and inferential analysis using an independent samples test. The results and findings indicates that both groups have good performance, but the experimental group achieved significantly higher good results, which highlighting the effectiveness and authenticity of info graphic based instruction as a contemporary methodological alternative to text centre syllabus. The study concludes that applying multimodal instructional methodological, such as info graphics, can meaningfully enhance literacy development in higher education and BS university level students.

KEYWORDS Multimodal Literacy, Infographics, Visual Literacy, Quasi-Experimental Methodology, Higher Education

Introduction

The nature of learning and teaching have undergone a noteworthy transformation in last few decades (Qasim & Mustafa, 2025). Advancement in digital technology have totally reshaped the ways of producing, accessing, and communication, resulting in tremendous change from print dominated textbooks, notes towards the combine language with images, graphics, stats, layout, and design. Education in the 21st century is "not just a concern of linguistic knowledge or proficiency but also a concern of psychology" (Noreen, Mustafa & Anwar, 2026, p. 616). It requires excellence in interpreting and producing meaning across multiple modes. This modern method is commonly described as multimodal literacy.

Despite these innovations, educational and instructional practices in most educational systems are remain largely text centred and conventional educational techniques (Shoaib et al., 2021). Most of the students are normally expected to learn hard compound concepts through dense written materials, often with limited and less visual, image support. Such methods may not totally address learners' diverse cognitive styles or prepare them for the real world communication. On the other hand if we look at modern methods like multimodal and infographics which are very helpful in cognitive development for the study and very easy to understand in contrast to text centred books, learning material. As a result, educators are exploring alternative instructional approaches that integrates visual and textual modes in meaningful ways to help in learning.

One such approach is the use of info graphics. Infographics present information through a structured combination of visuals, text, graphs, stats, charts, and spatial organization. In this idea, it helps by effectively designed, simplify complex ideas, highlights relationship among concepts, which support deeper understanding. In Pakistani educational system, infographics have the potential to promote engagement, foster multimodal literacy skills which helps to improve better understanding for the students.

The present study seeks to examine the effectiveness of info graphic based instruction in developing multimodal literacy at the BS level. By comparing learning outcomes between students taught the modern infographic method and those who taught through traditional text based study material, the study aims to contribute to the growing body of research on multimodal pedagogy and modern ways of learning.

Literature Review

Multimodal Literacy

Multimodal literacy is a result of social semiotic theories of communication, according to which meaning is made up of a plurality of representational resources, not by way of language. In this light, images, typography, colours and space arrangement are all modalities that are critical in the generation of meaning. Multimodal literacy therefore involves the ability to comprehend, analyse and produce multimodal texts which combine two or more modalities of communication. In the field of educational research, multimodal literacy has increasingly become recognised as an essential skill of learners who participate in digital space. Multimodal texts are presented to learners on a regular basis (e.g. websites, social media posts, presentations, data visualisations). Development of multimodal literacy will arm the students with necessary ability to critically interpret such texts and to express their suggestions with a higher level of effectiveness.

Visual Literacy and Cognitive Learning Theories

Visual literacy is a major part of multimodal literacy. It refers to the ability to process visual representations and make sense out of them. The didactic use of visuals has solid theoretical basis which cognitive theories of learning provide. The theory of social Semiotic as developed by Kress and van Leeuwen (2001) offers the paradigm of interpreting multimodality. This theory argues that all communication is always multimodal and relies on the multiple semiotic resources - language, image, layout, colour and typography, which are influenced by their social and cultural backgrounds. Importantly, it claims that meaning is not merely delivered in these modes but rather designed and redesigned by human beings with a particular purpose of communicative intent. According to this perception, an infographic is not a simple information container, but a purposeful multimodal design, in which all visual representations, space, and textual

snippets are meaning-making decisions. The Multiliteracies paradigm, originally introduced by the New London Group (1996) and further developed in modern pedagogy (Reyes-Torres, Brisk, & Lacorte, 2025), is a direct response to the dual needs of more multilingualism and to the explosion of multimodal texts. It purports that literacy pedagogy should be expanded beyond the conventional print literacy to prepare the learners with the capacity to read, analyse and produce various textual forms. At the heart of this scheme lies the notion of Design where meaning-making is regarded to be a dynamic process, one that involves the process of creating and reconfiguring the existing semiotic resources. The associated Learning by Design pedagogy is built on the knowledge process: Experiencing, Conceptualizing, Analysing and Applying learning.

Infographics in Education

Infographics are visual forms of information that combine textual, visual, quantitative and designing elements to deliver information concisely. The Cognitive Theory of Multimedia Learning (CTML), progressed by Mayer (2009 & 2014), provides the strict cognitive-psychology model, which can explain why carefully designed multimodal artefacts, including infographics, have better educational effects as compared with the unimodal texts presentations. Based on the assumptions of the Dual Coding Theory and Cognitive Load Theory, CTML formulates its propositions in a model of the human information -processing architecture. According to the theory, working memory has different channels respectively dealing with and processing visual/pictorial input and audio/verbal input and hence each channel is limited in terms of capacity. As a result, sound multimedia design can be considered as a project aimed at the rational control of this mental burden. Many principles in the canon emerge as a result of such theoretical orientation. An example of the latter is the Coherence Principle that requires the removal of extraneous material, and the Signalling Principle that dictates that salient information is explicitly marked. In addition, there is the Spatial and Temporal Contiguity Principles according to which the correlated linguistic and pictorial items are to be co-located and displayed at the same time, thus aligning two types of media channels in the learning field. These directives are all informative in creating the instructional infographics. These tools have also been used in pedagogical practises to summarise teaching materials, report research findings and offer project-based learning tasks. The hierarchical and visually pleasing nature of infographics helps the learners identify salient concepts and improve their knowledge on complicated interrelationships. Empirical studies show that learning through the use of infographics is linked to increased interest among learners and better academic performance. Students that came in contact with infographics also indicated that they felt more intrinsically motivated and exhibited a better memory and understanding when compared with students who only came in contact with textual materials only. Also, the construction and decoding of infographics lead to the development of more complex multimodal literacy skills. Although the benefits of using infographics as pedagogical tools are well-documented in existing literature, there is a paucity of empirical studies in the undergraduate-level that directly compares the use of infographics as instructional tools and traditional text-based instruction, specifically in terms of multimodal literacy levels. The current research attempts to address this gap by adopting a quasi-experimental design, which would compare the two methods of instruction in a systematic manner.

Hypotheses

H1: The current research revealed no significant difference between multimodal literacy development in students taught through infographics and those taught through text-based media.

H2: Students taught through infographics demonstrate significantly higher multimodal literacy development than those taught through text-based instruction.

Material and Methods

This study used a quasi-experimental pre-test post-test control group design. Two intact BS level classes were picked and termed as experimental and control group. The design selected was deemed to be suitable based on the practical limitations to random assignment. Theoretically, the study is based on the Social Semiotic Theory and the Multiliteracies approach, both of which define the meaning-making as a process that is multimodal in nature, socially situated. According to social semiotic perspective, learning is not restricted with a textual form of language; instead, it occurs when there is a combination of several semiotic tools including images, symbols, layout, and written language. In these regards, it was decided to use the infographic-based instruction as the main pedagogical intervention in the experimental group since the infographics combines both visual and linguistic representations in a systematic and goal-oriented way. This design is based on the supposition that learners build meaning better when the information is represented using more than one mode as compared to relying on text. Moreover, the Multiliteracies framework informs the methodological design of this research because it highlights the need to go beyond the conventional print-based literacy practises in favour of modern-day digital communication needs. The use of infographics in the experimental group indicates the shift in the paradigm by involving students into multimodal texts that are similar to the real world academic and digital genres. Such a juxtaposition between the concept of an infographic-based instruction and the concept of a text-based instruction, in turn, allows an empirical analysis of the effect of various literacy pedagogies on the acquisition of multimodal literacy skills. The study is systematic and explores the hypothesis that multimodal and multiliteracy-based instruction can be applied at the BS level and result in better learning outcomes by following a quasi-experimental approach.

Participants

The respondents included undergraduate students who were enrolled in a given discipline at a private institution. The two groups of participants had similar demographics, such as age, educational history, and previous exposure to the topic being discussed. The total sample size was found to have statistically relevant power to make substantive intergroup comparisons.

Instructional Materials

The educational material that was spread to both groups was the same. The experimental group was exposed to the content using infographics designed by the researcher with a limited amount of text, symbolic icons, graphic representations, and intentional visual hierarchy, as opposed to the control group, which consumed the same content in a traditional text-based format, which was similar to regular lecture notes and reading materials.

Instruments

This was done with the help of a researcher-developed pre-test and post-test to fetch data. The tools assessed content understanding as well as multimodal literacy skills, including the visual information comprehension understandings and the ability to understand the text-visual relationships. Expert review was made to have content validity.

Procedure

The two groups were pre-assessed before the use of the instructional intervention. The intervention of teaching took place within a number of weeks. A post-assessment was conducted on both cohorts after the intervention was done. The conditions in which they were tested were uniform to assure uniformity.

Data Analysis

The quantitative statistical methodologies were applied to the data collected with the help of the pre-test and the post-test to determine the effect of multimodal literacy learning on the students when the infographics-based instructional intervention is provided. To summarise the performance of the experiment and to examine the trends of improvement, initially, descriptive measures of means and standard deviations were calculated in both experimental and control cohorts. Pre-test scores were analysed to bring about equivalence of the scales at the baseline between the groups and also to ensure that other eventual differences that arose in post-test results are attributable to instructional intervention and not to the previous knowledge levels. To determine the effectiveness of the treatment, gain scores were calculated by comparing post-test and pre-test scores of both groups. Inferential statistical analysis was used subsequently to find out whether the differences between the cohorts were statistically significant. The independent-samples t-test was used in the comparison of the post test mean scores of experimental and control groups. The given analytic choice was deemed to be suitable since we have two independent groups in the study that were exposed to different instructional modalities. Based on the findings in respect to the theoretical assumptions of the Social Semiotic Theory and the Multiliteracies model, especially on the premise that learning is facilitated when various learners apply different semiotic modes, the high results of the experimental team were considered as indicative of more multimodal meaning-making which had been effected by infographic-based learning.

Results and Discussion

Pre-test scores were analysed using the statistic significant test, with no possible statistically significant difference with the experimental and control group, which implies a similarity in the pre-test knowledge and skills. Post-test scores, however, showed that there was a marked difference in scores. The experimental group showed much higher increases in content comprehension and multi modal literacy skills. Learners in the group demonstrated a better capacity to match visual images, extract essential information, and combine the text and the image. The improvement on the control group was also witnessed although the improvement was not as high. The findings give empirical confirmation of the applicability of the use of infographic-based teaching to improve multimodal literacy at the BS level.

Descriptive and Inferential Statistics

In order to understand the effect of infographic-based instruction on the growth of multimodal literacy, both the descriptive and inferential statistical analysis was performed. Experimental and control cohorts were assessed in pre-testing and post-testing in order to assess differences in the performance as well as learners gaining. The mean scores, standard deviations and t-test results on the two groups are presented in Table1. Analysis of the pre-test data indicates that there are no statistically significant differences between the experimental and the control group, thus, proving these two groups to be similar before

the intervention. Conversely, post-tests show that there is a statistically significant benefit of the experiment group.

Table 1
Comparison of Pre-test and Post-test Scores of Experimental and Control Groups

Group	Test	Mean (M)	SD	t value	p value
Experimental	Pre test	51.84	6.21	0.47	0.639
Control	Pre test	51.12	6.04		
Experimental	Post test	76.38	5.74	4.92	0.78
Control	Post test	67.15	6.02		

Narrative Interpretation of Results

The quantitative results suggest that the progress of both cohorts was shown to be improved between the pre-test and post-test, however, the degree of the progress was significantly different. Mean score on post-test was higher in the cohort that was taught using infographics compared to the control cohort. Statistically significant t -value indicates that this inter-group difference would not possibly be explained by random error. Using the prism of Social Semiotic Theory, the higher success of the experimental group presupposes that more effective meaning-making was allowed because of the exposure of semiotic resources, i.e. visual tropes, spatial planning, and integration of text and media elements in one. Therefore, the learners could interact with information in a comprehensive manner as opposed to relying on linguistic decoding. The resultant semiotic interaction in the form of increased post-test performance is evident in the attendant. Similarly, as viewed through the Multiliteracies model, the results may be summarised as showing that an exposure to multimodal practises in pedagogy better scaffolded contemporary literacy development. The fact that the experimental cohort scores higher on the ability to understand and interpret multimodal texts that can imitate real-life academic and digital texts support the idea that they have a more developed ability to respond to various kinds of multimodal texts. On the other hand, the relatively low gains of the control group highlight the limitations of the traditional text-oriented approach to development of multimodal literacy skills. Taken together, the quantitative data can provide the empirical confirmation of the effectiveness of infographic-based teaching at an undergraduate level.

Discussion

The findings of this study corroborate existing literature emphasizing the value of multimodal instructional approaches. The superior performance of the experimental group can be attributed to the integration of visual and textual modes, which likely facilitated deeper cognitive processing.

Infographics may have reduced cognitive load by organizing information in a clear and visually accessible manner. This organization allowed students to focus on conceptual understanding rather than decoding dense text. Furthermore, the visually engaging nature of infographics may have increased student motivation and sustained attention.

The results also highlight the limitations of text-only instruction in developing multimodal competencies. While traditional texts remain important, they may not sufficiently prepare students for the multimodal communication demands of contemporary academic and professional contexts.

Conclusion

This quasi-experimental study at the MS level observed at how well infographic-based training developed multimodal literacy. The results show that compared to pupils

taught using traditional text-based resources, those taught using infographics had noticeably greater learning gains. The study comes to the conclusion that infographics are an effective teaching tool for improving engagement, comprehension, and multimodal literacy. Infographic-based instruction can be included into higher education to assist teachers adapt their methods to the needs of modern literacy and the reality of digital communication.

Recommendations

In light of the results, the following suggestions are put forth:

- Infographics should be a part of the instructional methods used by higher education instructors.
- Traditional texts should be combined with multimodal elements by curriculum designers.
- Multimodal and visual pedagogy should be taught to instructors in professional development programs.
- Longitudinal effects and student-made infographics should be investigated in future studies.

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