

EFFECT OF INFOGRAPHIC-BASED LEARNING ON UNIVERSITY STUDENTS' ACADEMIC SUCCESS

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ABSTRACT

Improved teaching and learning methods are necessary for better education. Using dull learning materials, students are unable to handle the amount of content in each subject. They want to use learner-friendly devices and small content-based learning methodologies to quickly consume big amounts of knowledge. Therefore, figuring out the newest educational trends is sought to get students interested in learning. Infographic-Based Learning (IBL) provides concise and efficient teaching techniques that enhance students' comprehension and retention. By combining text, graphics, and images to provide information, infographics simplify and make complex concepts easier to understand. The purpose of this study was to determine how infographic-based learning affected students' academic performance at the university level. The two intact sections of the B.Ed. (Hon) Elementary 6th Semester from the Department of Education at Government College University Faisalabad were designated for intervention in this experimental study. The Pretest-Posttest None-Equivalent-Groups Design was chosen, and the experimental group received Infographic-based learning while the control group received Traditional Learning. Infographics were created as booklets pertaining to educational psychology topics, and the course was planned for six weeks. Data were gathered from the administration of the pre-test prior to the intervention, the post-test following the intervention, and the retention test two weeks after the post-test. The experimental research revealed significance in the perspective of academic achievements and retention levels, and the results demonstrated that Infographic-based learning was highly effective for students at the higher education level. This study contributes to presenting an effective teaching methodology for complex psychological concepts. Futuristic researchers are recommended to do experimental investigations on more short term learning trends that improve students' interest and engagement and establish flexible learning environment.

Keywords: Infographic-Based Learning, Traditional Learning, Info-Graphs Booklet, Educational Psychology, Academic Successes, Higher Education

INTRODUCTION

Education is very important for living better. It is very necessary to keep best knowledge for meet the life challenges. As we know about our traditional education, system cannot enhance the learning interest among the students. There is a big challenge for teachers to introduce learning in a very effective way. Boring learning material and its presentation methods bore the students, especially at higher education level. When almost all teachers are using lecture method and present long-term slides-based material that is too lengthy and large in amount. It is less interesting and just wastes time. Research presented huge number of articles on latest teaching methods but nowadays it is necessary to work out those learning ways which increase the interest level of the students. This research study focused to

introduce the infographic based learning that is very short, objective oriented, focused and interesting learning material (Arshad et al., 2024).

On behalf of current educational advancement, it is needed to work out the demanding educational strategies, teaching and learning activities that meet the needs of 21st Century. Today students need to change the classroom-learning environment, it could be flexible, inclusive and reduce the learning load. In other words, concept-based education always prefers to achieve high learning outcomes. Additionally, Technology Modes of Education (Global Trends) Fast Learning and Flexible Modalities for learners such as Time, Place, Pace, Contents, Mode, Assessment always encourage for best learners' academic achievements. No doubt, when students are given more learning choices, they enjoy their learning. These types of learning always insured good results as well as regulate in any Pandemic Situation very smoothly. These research study addresses all above calculated benefits for today learning and give the new ideas about self-regulated learning for future education (Tahira, 2021).

Further, Infographic-based learning has emerged as an effective way to enhance comprehension, retention, and engagement among learners. Infographics combine images, text, and design elements to present complex information in a concise and easily digestible format. Students with infographic based learning, are just consume the basic knowledge and keep remember it for long duration because this fast moving life cannot give the time to today students for long duration based leaning (Yuniarsih et al., 2022).

Additionally, incorporating infographics into the educational toolkit has the potential to revolutionize the way in which students engage with learning. The use of infographic-based contents; learning of the students is better as retention, enhance comprehension, engagement and critical thinking. If subject oriented infographic-based contents are designed and prepared with varies interactive styles, its result is higher and effective learning. No doubt, these types of contents are very impressive among all generations. Technology based interactive learning contents are always effective for classroom as real world. Infographic based contents such as posters, visual graphics and picture-based follow charts are enhancing the creativity among students. These all types of learning create the dynamic, inclusive and objective oriented learning environment (Susilana et al., 2022).

Therefore, Infographic based learning resolves the academic problem as provide interactive, conceptual, mobile friendly learning to encourage students learning interest with any boring situation in the classroom. Students can access their learning from everywhere. Long theory-based contents are always forgotten by the students, but infographic-based learning based on relevant, focused and self-paced learning. This learning also addresses the short attention span with multiple revisions, practices and easily injectable knowledge (Mueller et al., 2011).

Additionally, our university students need in-depth knowledge to consume all courses. Some courses are practical, and some are theoretical. It is very difficult for students to complete their study requirement in a short semester-based system. Some time they do not know about their subject's knowledge, they are doing root memorize and forget it after exam. Long learning material forgets early as compared to short, focused and objective based contents. So, current study gives idea to plan the educational psychology subject as infographic-based contents. These infographics are more focused, interesting and short-based contents that make the learning more enjoyable, easy to consume and clear the concepts (Allela et al., 2020).

Therefore, this article investigates achievement through infographic-based learning at university level. Further, study also investigates the mean gain scores and retention score to further authenticate effectiveness of infographic based learning.

Research Objectives and Hypotheses

Objectives and aligned hypotheses of the study were:

Objective 1: To measure the effect of infographic-based learning on students' academic achievement

Ho¹ There is no significant difference between the mean achievement scores of two groups on the pre-test.

Ho² There is no significant difference between the mean achievement scores of experimental and control groups on the post-test.

Ho³ There is no significant difference between the mean gain achievement scores of experimental and control groups

Objective 2: To investigate the effect of infographic-based learning on students' retention scores

Ho⁴ There is no significant difference between the mean retention scores of experimental and control groups

Ho⁵ There is no significant difference between the mean reduction scores of experimental and control groups.

REVIEW OF LITERATURE

It is proved that if the contents are presented in visual and verbal modes then learner takes less time to consume the contents without any cognitive load because visual learning enhances retention and cognitive processing (Mayer, 2009). A study by Park and Hopkins (2021) found that students exposed to infographic-based materials demonstrated a 25% higher retention rate than those using traditional text-based resources. This effectiveness is attributed to infographics' ability to break down complex concepts into structured, visual representations, reducing cognitive overload.

Elaldı and Çifçi (2021) examined 12 experimental studies that was related to info-graphic based learning. This study consisted on meta-analysis-based methodology. All studies were selected between years as 2016 to 2021. Results summarized that students' academic results were highly impressive by using info-graphic based content. Further, for the reliability and consistency of results, retention test scores were also calculated after 4 to 5 weeks. The cognitive achievements of students showed consistency in results.

Furthermore, infographics have proven to enhance reading comprehension, particularly among students with diverse levels of language proficiency. Manickam and Abdul Aziz (2023) conducted an action research study with Year 5 pupils in Malaysia, demonstrating that the use of infographics significantly improved students' ability to comprehend English reading materials. The visual elements helped reduce cognitive load and facilitated better understanding of the texts. In another study focusing on cognitive styles, Ismaeel and Al Mulhim (2020) were reported that infographics based interactive contents were highly appreciated among undergraduate students, particularly those with reflective learning styles. The interactive nature of the infographics catered to the learners' cognitive preferences, enhancing their understanding and retention of information.

Additionally, the application of infographics extends beyond content comprehension to the development of higher-order thinking skills. Al-Mohammadi (2017) investigated the effectiveness of using infographics to teach programming fundamentals to high school students in Saudi Arabia. The study found that students taught with infographic exhibited enhanced analytical thinking skills compared to those taught through traditional methods. Similarly, Al-Bahadili and Jassim (2022) explored the impact of infographics on self-learning skills among fifth-grade students. Their research indicated that students exposed to infographic-based instruction showed significant improvements in goal setting, planning, and self-evaluation skills, highlighting the role of infographics in promoting autonomous learning.

Student perceptions of infographic-based learning are overwhelmingly positive. Alrwele (2017) conducted a study with university female students, revealing that those in the experimental group not only achieved higher academically but also reported that infographics positively impacted their intellectual and life skills development. Approximately 90% of participants acknowledged the benefits of infographics in their learning process.

While the advantages of infographic-based learning are well-documented, certain challenges persist. Elaldı and Çifçi (2021) noted that the effectiveness of infographics can be influenced by factors such as students' prior knowledge, the complexity of the content, and the design quality of the infographics themselves. Educators must ensure that infographics are thoughtfully designed to align with learning objectives and cater to diverse learner needs.

According to Davidson et al., (2014) and Ismaeel and Al Mulhim, (2019a), latest modes of technology have changed the way of learning at each level of education. Nowadays, it is increasing to present the contents as visual form with interactive design to appeal to the audience in almost all fields. Due to this rapid change emerging this way of learning is implemented in teaching and learning that improve student-centered learning. Therefore, it's a big challenge for the teachers to find out interesting ways to present contents towards students for encourage the students' attention span. Information processing model presents that if learning is presented with attractive stimuli, this learning is easily recorded, penetrates the short-term memory and finally, it is stored in their long-term memory that is long lasting (Baglama et al., 2017). So, many ways are used to process information by focusing on the cognitive style whose help to retain knowledge very easily. It is highly recommended that the contents present in the form of flexible, attractive and interactive modes due to highly appealing among individual learners (Riding et al., 1997, p.219).

Al-Mohammadi (2017) authenticated that graphics, charts, visuals, text images, and the like are very appealing ways to display the information at every level of education. It also includes static, interactive, and animation-based infographics in education. According to Ozdamli & Ozdal (2018), infographics in education gained popularity due to its organized visual presentation. Hassan (2016) is also in favor of infographic-based learning because these types of learning are easily consumed and stay remembered for long duration. He also said, this way of learning captures the students' mind and overcomes the cognitive load. As many researchers present, that infographic-based learning reduces the cognitive load. Undoubtedly, digital infographics are best in presenting the knowledge with highly appealing way among the learners (Lin et al., 2018).

Additionally, many researchers reported that infographic-based learning is best mode to display the learning styles that can help the learners to capture, analysis, organize, process and acquisition of the knowledge in very short time. This way of learning also increases their academic performance (Chiang, 2016; Lin et al., 2018; Shahsavari & Hoon, 2011; Tayebinik & Puteh, 2013).

Further, Knowledge, data, and information are visual representation is better than present in large number of contents. Further, maps, graphs, signs are using in the field of education as well as in the field of technical writing, journalism and so on, highly appreciated by the learners (Afify, 2018; Ozdamli & Ozdal, 2018; Yildirim, 2016). Lestari and Purnama (2023) demonstrated that integrating infographics into reading comprehension instruction led to a significant increase in students' test scores. The mean score improved from 34.75 in the pre-test to 63.76 in the post-test. Additionally, 80% of students reported that infographics aided their understanding of the material, highlighting the effectiveness of visual aids in enhancing comprehension.

Teaching and learning process is very useful with infographics (Yildirim, 2016). Contents prepared interactive ways encourage beneficial learning. So, according to Afify (2018), all social media platforms are also designed with interactive infographics that help learning any time and any place.

Further, Sweller et al.'s (2011) addressed in his research study that our brain capacity of learning and working duration is limited. Large amounts of information needed large amount of time to understand that content. Therefore, it is very difficult for our brain to understand these large contents and remember it for long time. Therefore, it is focused on design learning as visual representation of data that enhances the capacity of brain for consuming the contents. Korbach et al. (2017), stressed that infographic-based learning is designed as objective oriented learning that reduces the irrelevant material can improve the performance of the students. Alshehri and Ebaid (2016) manipulated a study on elementary school students to check the effectiveness of infographic-based learning. The study results revealed that interactive infographic showed very effective for student's learning and interest in the subject of mathematics. Additionally, previous research recommended use of infographic-based learning at all levels of education. In this context, it is needed to work out on the design of infographic-based learning at different levels of education. The design of relevant concept is very important to be clear (Jomah et al., 2016). Understanding concepts is very important to achieve the target objectives. If we talk about learning at university level, conceptual clarity is needed to be clear to gain the learning objectives. In university, many subjects are too long to understand the concepts of different topics. When learners are to clarify the large number of contents, it takes long duration, and they feel bored and less interested in their learning. No doubt, boring, large amount of contents create cognitive load (Dolasinski & Reynolds, 2020). So, today's students demanded the short-term curriculum that should be interactive, objective oriented and concept-based contents. This article is related to work out on info-graphic based learning in the subject of educational psychology at university level.

MATERIALS AND METHODS

The positivism research paradigm was best for this entire study. The research design was Quasi-experimental. The nature of this study was experimental. The pretest-posttest nonequivalent groups design was the specific experimental design.

This experimental based study was held in Education department at GCUF. Two groups of sixth semester students from B.Ed. (Hon) Elementary were chosen as intact groups. Total sample of the study consisted of 60 students, 30 in each subgroup. The experimental group received infographic-based learning, while the control group received traditional learning. Before implementing the intervention, a pretest to measure their current achievement level was conducted for both groups. The intervention period was six weeks.

The contents of Educational psychology were used to prepare infographics. The infographics were designed through Canva. Canva is a very highly rated application to design infographic-based content with interactive navigations. All designs were ensured to be clear, meaningful, conceptual, objective-oriented, relevant, and interactive. The color scheme of all infographic designs was considered. All designs were compiled in booklet form. This booklet is available in soft and hard form. The link is available in annexure 1. Experimental group used booklet based on infographics. Traditional notes and books were used to teach the control group.

Before intervention, pilot testing was conducted to finalize the achievement test in Educational Psychology. Data on achievement test were collected from previous session students ($N=70$) studying the same course. Content validity was sought through expert opinion of the subject specialists. Difficulty and discrimination indexes after item analysis were prepared. 100 items from the whole contents were finalized to be used for experiment.

Pre-test scores were collected from both groups to measure their achievement level before intervention. After intervention of the info-graphic based learning, post-test was administered to check improved score on achievement test. Retention test was conducted to measure the consistency of academic achievements after two weeks of intervention. Data were analyzed through SPSS.

Figure 1 shows graphic presentation of study design and plan.

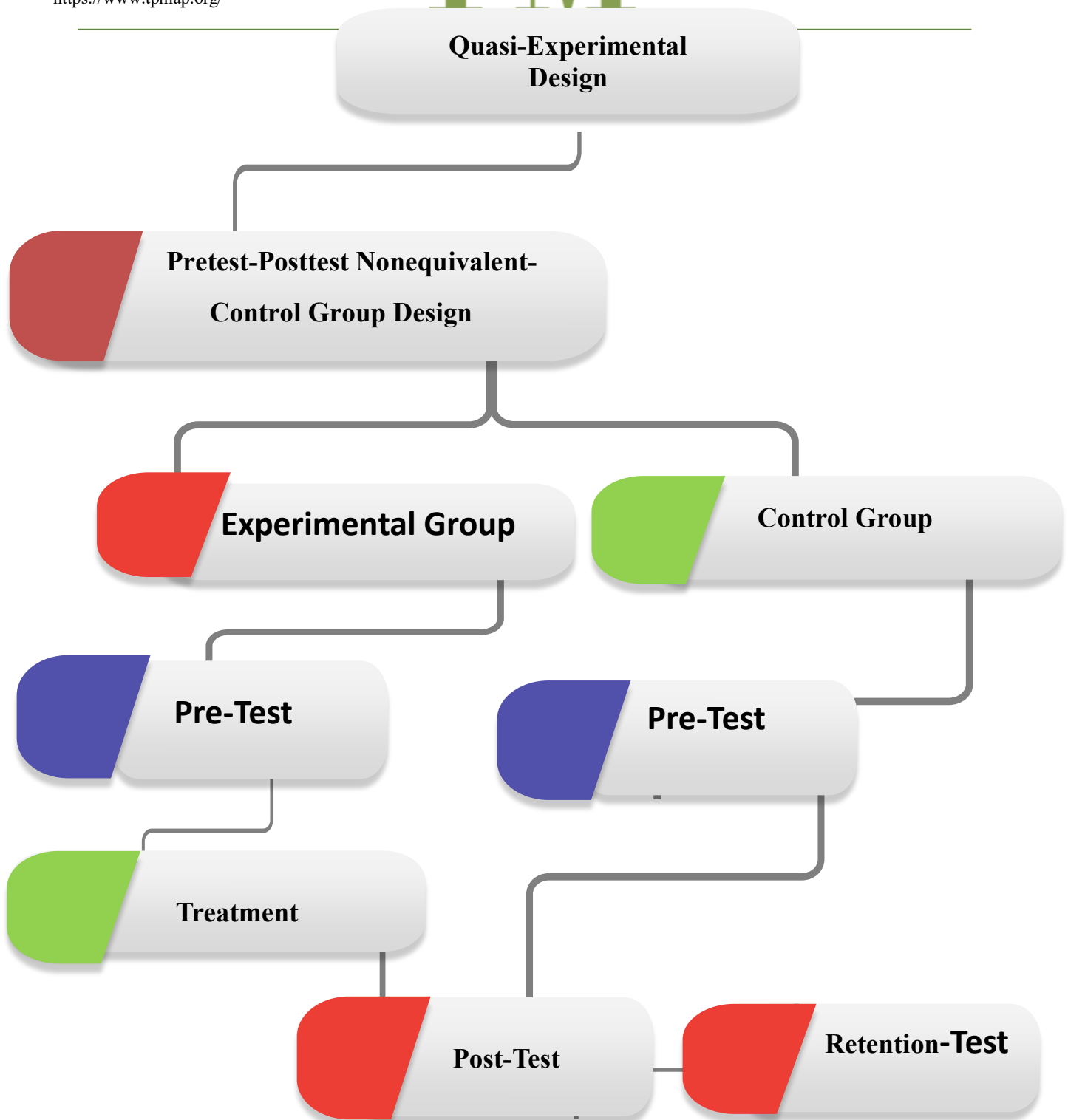


Figure 1: Design of the study

RESULTS & DISCUSSION

Table 1 Comparison of Both Intact Groups on Pre-Test Score

Group	N	M	SD	T	Df	Sig.
Group 1	30	16.83	4.01	-0.86	58	0.39
Group 2	30	17.73	4.06			

* $P < 0.005$

Cohen's $d = 0.22 > 0.2$.

Investigated through independent sample t-test, table 1 shows comparisons of two groups on achievement level before intervention. Both groups scored equal on pre-test. Therefore, any group can randomly be nominated as experimental group without facing experimental threats.

Table 2 *Comparison of Experimental and Control Groups on Post-Test Score*

Group	N	M	SD	t	Df	Sig.
Experimental	30	79.87	5.01	8.55	58	0.000
Control	30	60.40	11.09			

* $p > 0.005$

Cohen's $d = 2.20 > 1.4$.

The experimental group ($M = 79.87$, $SD = 5.01$) and control group ($M = 60.40$, $SD = 11.09$) had significantly different mean scores, according to the values in table 2; $t(43) = 8.55$, $p = .000$ (two tailed) with a substantial effect size. Experimental group performed better compared to control group. So, info-graphic based learning proved to be better, interactive and easy to understand. In contrast, the control group that used traditional learning methods fell behind.

Table 3 *Comparison of Experimental and Control Groups on Gain Score*

Group	N	M	SD	T	Df	Sig.
Experimental	30	63.03	2.61	10.67	32	0.00
Control	30	42.67	10.12			

$p > 0.005$

Cohen's $d = 2.75 > 1.4$.

Students' gain score was calculated by subtracting pre-test score from post-test score. The experimental group ($M = 63.03$, $SD = 2.61$) and the control group ($M = 42.67$, $SD = 10.12$) had significantly different mean gain scores, according to the values in table 3; $t(32) = 10.67$, $p = .000$ (two tailed) with an extensive effect size. So, experimental group, with infographic-based learning, attained higher scores.

Table 4 *Comparison of Experimental and Control Groups on Retention-Test Score*

Group	N	M	SD	T	Df	Sig.
Experimental	30	77.70	5.11	12.94	58	0.00
Control	30	42.53	13.98			

* $p > 0.005$

Cohen's $d = 3.34 > 1.4$

Retention test was held after two weeks of post-test. The experimental group ($M = 77.70$, $SD = 5.11$) and the control group ($M = 42.53$, $SD = 13.98$) had significantly different mean scores, according to the values in table 4; $t(36) = 12.94$, $p = .000$ (two tailed), with a generous effect size. Results of Retention scores indicated that experimental group retained more concepts of educational psychology and longer, but control group forgot the concepts earlier. So, infographic-based learning is more retentive.

Table 5 *Comparison of Experimental and Control Groups on Reduction Scores*

Group	N	M	SD	T	Df	Sig.
Experimental	30	77.70	5.11	32.46	46	.000
Control	30	17.87	8.70			

* $p > 0.005$

Cohen's $d = 8.38 > 1.4$.

Reduction score was calculated by subtracting retention-test score from post-test score. The experimental group ($M = 77.70$, $SD = 5.11$) and the control group ($M = 17.87$, $SD = 8.70$) had significantly different mean scores, according to the values in table 5; $t(58) = -3.68$, $p = .000$ (two tailed) with big impact. Accordingly, experimental group that received instruction via infographics was less likely than the control group that received instruction using traditional methods to forget the ideas of educational psychology.

DISCUSSION

Infographic-based learning is gaining prominence in higher education as a strategy to improve student comprehension, engagement, and retention of complex information. This paper explores the theoretical underpinnings, cognitive benefits, and practical implications of using infographics in university-level instruction. It also discusses challenges and offers recommendations for effective implementation. As higher education institutions increasingly embrace learner-centered pedagogies, innovative strategies such as infographic-based learning are being explored for their ability to communicate complex ideas visually. Contents can present effectively through image-based interactive contents. Their use aligns with the cognitive principles of visual learning and supports students' ability to synthesize and retain information (Alrwele, 2017). Infographics aid in simplifying complex academic content by presenting it visually alongside text, reducing cognitive overload. This aligns with Paivio's (1991). Theory named as dual coding presents contents as verbal and visual modes, leading to better memory and comprehension. In disciplines like

medicine, engineering, and economics, infographics help students grasp abstract concepts by turning them into visual schemas. The process of designing infographics requires learners to research, evaluate, synthesize, and present data concisely—skills that foster critical thinking and analysis. This aligns with the upper tiers of Bloom's Taxonomy, emphasizing analysis, synthesis, and evaluation (Anderson & Krathwohl, 2001). Students must prioritize essential information, develop visual narratives, and justify infographics promote student engagement, especially in asynchronous or digital learning contexts. Alrwele (2017) found that students exposed to infographic-based materials reported significantly greater interest and satisfaction with their learning experience. The visual nature of infographics caters to modern learners accustomed to image-based content from digital media.

Infographics promote student engagement, especially in asynchronous or digital learning contexts. Alrwele (2017) found that students exposed to infographic-based materials reported significantly greater interest and satisfaction with their learning experience. The visual nature of infographics caters to modern learners accustomed to image-based content from digital media. Infographics can support diverse learners by providing multimodal content that caters to different learning preferences. For English language learners or students with learning difficulties, infographics act as scaffolds that enhance understanding. Meyer, Rose, & Gordon, 2014 reported as UDL follow chart shows content as many time due to its shortness, focused and objective oriented contents. Creating infographics develops transferable skills such as data visualization, information synthesis, and digital communication. These are increasingly valuable in professional environments that demand the ability to translate complex information into accessible formats. Infographic-based learning has significant potential in higher education as an effective strategy for enhancing understanding, fostering critical thinking, and promoting student engagement. However, its implementation must be pedagogically sound, incorporating principles of good design, scaffolding, and assessment. With the appropriate support and integration, infographics can be powerful tools for both teaching and learning in the 21st-century classroom.

Findings

Students' interest in studying could be greatly increased by using infographic-based learning resources. It has been demonstrated that infographics, which blend facts with captivating visuals, improve the readability, retention, and engagement of educational content. Infographics can help students access resources more easily, become more involved in their education, and enhance self-directed learning. According to research results, infographics can help students overcome a variety of learning challenges, including boredom and trouble comprehending complex content. The visual presentation of information in infographics facilitates comprehension and memory. This is consistent with the views of specialists who stress the value of utilizing visual aids in the classroom to enhance knowledge and memory.

Additionally, using infographics facilitates the digital dissemination and accessibility of educational resources, which is crucial in the current technology era. Infographics can therefore be a useful tool for raising student engagement and learning quality, which will have a big positive effect on the educational process. All things considered, infographics are a useful substitute for traditional classroom instruction. They encourage students to participate more actively in the learning process while also making learning more dynamic and interesting. In order to get better learning results, instructors are therefore encouraged to incorporate infographics into their lesson plans.

CONCLUSION

Students taught through infographic-based contents better performed in their academic, retention, and gain as well as reduction scores as compared to control group. Furthermore, infographic-based content in the subject of educational psychology helped the students to clear difficult concepts. These contents make learning enjoyable, long lasting and as they overcome the cognitive load. The integration of infographics into educational practices offers a multifaceted approach to enhance learning outcomes. By combining visual and textual information, infographics support improved academic achievement, reading comprehension, analytical thinking, and self-directed learning. Infographic-based learning offers a dynamic and effective strategy for higher education by aligning with visual literacy demands and encouraging deeper engagement with course material. While there are challenges to overcome, thoughtful integration of infographics can significantly enrich the learning experience and prepare students for the visual communication demands of the professional world.

Recommendations

1. Subject specialists may plan and design educational courses with interactive charts, posters, graphics and present in booklet form.
2. Teachers may be trained to plan and design contents by focusing on interactive and effective latest modes.
3. Research seminars may be conducted on latest info-graphic designing applications and software for awareness.
4. Teacher training must be organized to ensure the usability and flexibility of designing applications.

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9- Definition of Learning
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<https://create.kahoot.it/course/4ccb4c3f-afb1-437a-afe6-6e1176aa03f713>- Parts of Memory
<https://create.kahoot.it/course/2733c723-c878-440d-ae6a-ca0746ceced314>- Methods to improve Memory
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<https://create.kahoot.it/course/5be446df-2f3e-4171-86f8-59b123245a1c16>- Concept of intelligence
<https://create.kahoot.it/course/ea7be3f1-e7ff-4513-9847-42314352957517>- Theories of intelligence
<https://create.kahoot.it/course/908a6da7-2ce1-4c61-a596-c6b66fbb46818>- Individual Differences
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