

The Role of Graphic Organizers on Learning Outcomes of Trainees with Diverse Learning Needs

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ABSTRACT

Education is a fundamental right for all children, including those with diverse learning needs, and plays a critical role in achieving the Sustainable Development Goals. The integration of Information and Communication Technology in education has brought particular benefits to learners with diverse needs, including visual presentations, self-paced learning, engaging graphics, and greater autonomy in the learning process. Despite these advancements, there is limited research on the development of inclusive Graphic Organizers, ensuring that all learners feel supported and valued. This study aimed to address this gap by examining the effect of Graphic Organizers on learning outcomes of learners with diverse needs. The study adopted a mixed-methods approach within an experimental research design. The target population comprised 52 participants: the Centre Manager, seven instructors, and 44 trainees with diverse learning needs, all selected purposively from the Kenyatta Industrial Vocational Rehabilitation Centre in Nairobi County. A census approach was used, with all 44 trainees participating in the study. These trainees were evenly divided into two groups: 22 in the experimental group and 22 in the control group. The experimental group received instruction using Advance Organizer treatments over a two-week period, while the control group received conventional instruction from their regular instructor during the same timeframe. After the instructional period, a post-test was administered to both groups to assess learning outcomes. Additionally, structured questionnaires were distributed to the trainees with clear guidance on how to complete them. A key informant interview was also conducted with the Centre Manager to gather in-depth qualitative insights. The findings revealed a significant improvement in the performance scores of trainees in the experimental group following the use of Graphic Organizers. Based on these results, it is recommended that the Ministry of Education formally integrate Graphic Organizers into instructional design for special education programs to enhance inclusivity and learning outcomes for all learners.

Keywords: Graphic Organizers, Trainees, Learning Needs, Learning Outcomes

INTRODUCTION

Globally, research has consistently demonstrated that advance organizers enhance student achievement. For instance, Boon, Barbetta, and Paal (2018) found that the use of advance organizers positively influences students' motivation in learning Biology. These tools are particularly valuable in situations where learners may struggle to identify the relevance of their prior knowledge or when educators aim to help students understand the relationships between interconnected ideas and the broader concepts they form (Jamshidi et al., 2020). Additionally, graphic organizers have proven effective in improving the learning of social studies among students with learning difficulties, particularly in grades 4 and 5 (ibid).

Ausubel's classical work (1963) emphasizes that, similar to Taba's Model, Graphic Organizers (GOs) have the potential to be applied in individual lessons or as a framework for curriculum development, functioning as a deductive instructional strategy. In this approach, an advance organizer serves as a connecting link between the new content and the learner's existing cognitive structure (Muiriri, Wambugu, & Wamukuru, 2016). It acts as

a mental guide, helping students navigate through new material. Ausubel's model itself is a deductive Information Processing Model, structured to facilitate the teaching of interconnected concepts by introducing broad, overarching ideas first, followed by more specific details. GOs function as instructional tools that provide learners with a clear preview of the lesson's content. As such, an advance organizer acts as a cognitive bridge, enabling students to connect prior knowledge with new learning objectives

Research conducted across various teaching subjects in Kenya has shown that advance organizers positively influence students' learning outcomes. However, there is limited research specifically examining the impact of graphic organizers on the learning outcomes of trainees with diverse learning needs. According to a study by Waichigo N. Addy (2013), such trainees often experience learning disabilities such as dyslexia (reading difficulties), dysgraphia (writing challenges), and dyscalculia (difficulties with arithmetic) which make it more difficult for them to access and process education compared to their peers. These learners typically require additional or specialized support beyond what is provided to others of the same age group. Cure, Batu, and Gulboy (2021) argue that traditional instructional methods often fall short in addressing the diverse learning needs and styles of students. This highlights the importance of exploring alternative teaching strategies that can improve learning experiences and outcomes for trainees with varied educational needs. While studies conducted across different subjects in Kenya have demonstrated the positive impact of GOs on student achievement, there remains a notable gap in research specifically examining the role of graphic organizers in supporting the learning outcomes of trainees with diverse learning needs.

Traditional instructional methods often do not adequately address the unique needs and learning styles of these trainees (Dieruf, Ault & Spriggs, 2020). Furthermore, instructors' attitudes and technophobia toward the use of ICT, along with trainees' limited ability to utilize computer applications in their learning, have been identified as factors contributing to ineffective teaching and the poor transfer of knowledge among learners with diverse needs. Given these challenges, this study aimed to investigate the role of graphic organizers in enhancing the learning outcomes of trainees with diverse learning needs enrolled at the Kenyatta Industrial Vocational Rehabilitation Centre in Nairobi County, Kenya.

The remainder of the paper is organized as follows: Section 2 outlines the methodology employed in the study, while Section 3 presents the results and discussion. Section 4 provides the conclusion and policy recommendations.

METHODOLOGY

This study adopted a mixed methods approach, integrating both quantitative and qualitative data within a descriptive research design. This approach was instrumental in examining the effect of graphic organizers (GOs) on the learning outcomes of learners with diverse learning needs. The study was conducted at the Kenyatta Industrial Vocational Rehabilitation Centre (KIVRC) in Nairobi County, Nairobi, the capital city of Kenya, is located in the south-central part of the country, approximately 483 kilometers northwest of Mombasa. Its geographic coordinates are latitude 1.286389°S and longitude 36.817223°E, corresponding to GPS coordinates 1°17'11.0004"S and 36°49'2.0028"E.

The target population included all 44 learners with diverse learning needs at the KIVRC, one Centre manager, and seven instructors. The study adopted a census approach where all 44 trainees participated in the study. They were evenly divided into two groups: 22 in the experimental group and 22 in the control group. A pre-test was administered to both groups to assess their initial competencies before the instructional intervention using graphic organizers. The experimental group received instruction through Advance Organizer Treatments over a period of two weeks, consisting of 10 lessons (five lessons per week). Meanwhile, the control group received instruction from their regular instructor using traditional teaching methods during the same timeframe.

After the two-week instructional period, a post-test was administered to both groups to assess learning outcomes. In addition, questionnaires were distributed to the learners, with clear instructions provided on how to respond to the items. A structured questionnaire, focusing on the perceived impact of GOs on learning

outcomes, was administered to the seven instructors. Furthermore, a key informant interview was conducted with the Centre manager to gather complementary qualitative insights.

RESULTS

This study targeted a total of 44 trainees with diverse learning needs, one center manager, and seven instructors. A 100% response rate was achieved, largely due to the participants' availability and willingness to take part. The demographic data revealed a higher number of female trainees (56.62%) compared to male trainees (43.18%) enrolled at the Kenyatta Industrial Vocational Rehabilitation Centre. Regarding age distribution, the majority of trainees were above 18 years (72.73%), followed by those aged 16–17 years (20.45%), and finally, those aged 14–15 years (6.8%).

In terms of the instructors' gender, most were female (57.14%), while males accounted for 42.86%. Age-wise, the data showed that most instructors were above 35 years. As for academic qualifications, all seven instructors held a Diploma, indicating that they were appropriately qualified to teach learners with diverse learning needs. Finally, the instructors were asked about the source of their experience with GOs. The findings showed that the majority (57.1%) acquired their GO experience during teacher education in college, while the remaining 42.9% gained this experience through in-service training.

Graphic Organizers and Learning Outcomes of Trainees with Diverse Learning Needs

The study aimed to examine the role of Graphic Organizers (GOs) on the learning outcomes of trainees with diverse learning needs. To achieve this, the analysis began with an evaluation of test results obtained from the trainees, followed by a descriptive statistical analysis of their perceptions and engagement with GOs. The performance scores of trainees in both the experimental and control groups were assessed before and after the intervention involving the use of GOs. Table 1 provides the frequency distribution of the trainees' learning outcomes as computed from the analysis.

Table 1: Frequency distribution of learning outcomes before and after the intervention

Pre-test			Post-test	
% score	Frequency		Frequency	
	Experimental	Control	Experimental	Control
10-20	0	0	0	2
21-30	2	1	0	0
31-40	1	2	0	0
41-50	3	2	0	1
51-60	0	3	0	1
61-70	9	6	2	7
71-80	7	6	2	3
81-90	0	0	6	2
91-100	0	2	12	6
Total	22	22	22	22

The frequency statistics reveal that, prior to the intervention, the learning outcomes of the experimental and control groups were nearly identical. For example, no trainee in either group scored between 10–20% or 81–90% of the possible 100 marks in the pre-test. Across other score ranges, only slight variations were observed between the two groups. This suggests that, at baseline, the academic performance levels of the two groups were comparable, thereby fulfilling a key requirement of experimental research designs. However, the post-test results show a marked divergence in performance between the groups, indicating the impact of the Graphic Organizer (GO) intervention. Notably, none of the trainees in the experimental group scored below 61%,

whereas four trainees (18.18%) in the control group fell below this threshold. Furthermore, over half (12) of the trainees in the experimental group achieved scores between 91–100%, compared to only six trainees in the control group who reached this level. Overall, the experimental group outperformed the control group in the post-test, suggesting a positive effect of GO use on learning outcomes.

These findings are consistent with prior research on the benefits of Graphic Organizers. Miranda (2011) found that GOs assist students in visualizing, organizing, and effectively understanding information. Similarly, Sakiyo and Waziri (2015) concluded that GOs help break down complex concepts, clarify relationships among ideas, and enhance memory retention—all of which contribute to improved academic performance. The subsequent section, presented in Table 2, outlines the learning outcomes of both the experimental and control groups, including the percentage change in scores.

Table 2: Learning Outcome of Trainees before and after the intervention

Experimental Group				Control Group		
Trainees	Post test score (%)	Pre-test score (%)	% Change	Post test score (%)	Pre-test score (%)	% Change
1	92	30	62	56	48	8
2	92	42	50	100	92	8
3	92	74	18	84	74	10
4	92	72	20	64	72	-8
5	92	74	18	100	100	0
6	88	74	14	12	28	-16
7	68	48	20	20	40	-20
8	88	68	20	62	56	6
9	88	74	14	70	76	-6
10	64	40	24	68	66	2
11	86	74	12	80	70	10
12	80	68	12	44	36	8
13	74	28	46	72	74	-2
14	92	70	22	64	60	4
15	86	48	38	72	66	6
16	96	62	34	68	62	6
17	96	74	22	84	70	14
18	92	70	22	96	48	48
19	88	70	18	96	66	30
20	96	66	30	96	74	22
21	92	66	26	92	76	16
22	96	62	34	68	52	16
Summation	1930	1354	576	1568	1406	162
Mean	87.72	61.54	26.18	71.27	63.91	7.36
STD. Deviation	8.8	14.98	13.08	23.56	17.19	14.61

The computed test scores for the experimental group reveal a significant improvement in learning outcomes following the intervention. The mean score increased markedly from 61.54% in the pre-test to 87.72% in the post-test. This improvement was consistent across all trainees in the group, indicating a uniformly positive

impact of the Graphic Organizer (GO) intervention. In contrast, the control group recorded only a marginal improvement between the pre-test and post-test, with a mean score increase of just 7.36%. Comparatively, the experimental group achieved a mean gain of 26.18%, suggesting that trainees who utilized GOs were nearly four times more likely to experience improved learning outcomes than their peers in the control group. Moreover, the relatively low standard deviation in the post-test scores of the experimental group suggests that the use of GOs may contribute to more consistent and standardized learning outcomes among trainees with diverse learning needs.

In summary, the findings underscore the effectiveness of Graphic Organizers in enhancing academic performance among learners with varied educational needs. The magnitude of the impact is particularly noteworthy given the brief duration of the intervention. These results align with previous research. O'Malley et al. (2013) found that Graphic Organizers can significantly enhance learning outcomes for students with special needs, particularly by improving numeracy skills. Similarly, Gonzalez-Ledo et al. (2015) reported that the use of computer-based Graphic Organizers led to increased literacy levels among students with special needs.

CONCLUSION

This study explored the impact of GOs on the academic performance of trainees with diverse learning needs. The findings revealed a notable improvement in trainees' score percentages following the implementation of GOs. Specifically, there was a significant reduction in the number of trainees scoring below average in the exit assessment, underscoring the effectiveness of GOs as a learning tool. These results align with existing literature. For example, O'Malley et al. (2013) noted that GOs can significantly enhance the learning process for students with special needs. Similarly, Jamshidi et al. (2020) reported that the use of digital graphic organizers improved literacy outcomes among learners with disabilities. Arising from this study, we recommend that the Ministry of Education should formally include GOs in the instructional design for special education programs. This should be reflected in curriculum guides and teacher handbooks. Additionally, regular in-service training should be conducted to equip instructors with practical skills on the effective use of GOs, both in traditional and digital formats. Furthermore, education policymakers should invest in digital learning tools that incorporate graphic organizers to cater to learners with varying cognitive and learning needs.

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