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### Educational Advance Organizers: A Bridge to Effective Learning

**Background:** Instructional advance organizers are tools that help learners to learn and understand educational materials better. This study aimed to investigate the role of explanatory and visual advance organizers on the learning of health workers working in the Shirvan city health center.

**Method:** This study was conducted as an interventional (quasi-experimental) study in health houses covered by the Shirvan County Health Center in 2023. The required sample was 120 staff entered the study using the census of the entire population and were randomly divided equally into three groups. In the two intervention groups, education was provided by the method of explanatory and visual advance organizers, and in the control group, education was provided in the form of lectures. Post-test questions were reviewed by five specialists in medical education, general practitioners, and infectious diseases.

**Results:** Demographic variables in pre-test and post-test scores were not statistically significantly different except for marital status which had a statistically significant relationship with pre-test scores and educational status of individuals with diplomas with pre-test and post-test scores. There was a statistically significant relationship and difference in post-test scores in all three groups ( $P=0.00$ ).

**Conclusion:** Advance organizers help learners activate their prior knowledge and connect it with new knowledge. In addition, they can lead to meaningful learning, facilitate and increase motivation in learning. The group that was trained using visual advance organizers had significantly higher average learning scores than the other two groups.

**Keywords:** Advance Organizer, Visual Advance Organizer, Explanatory Advance Organizer, Learning

### منظمو التقدّم التعليمي: جسر إلى التعلّم الفعّال

**الخلفية:** تعتبر منظّمات التقدّم التعليمي أدوات تساعد المتعلّمين على تعلّم الموادّ التعليميّة وفهمها بشكل أفضل. تهدف هذه الدراسة إلى دراسة دور منظّم التقدّم التوضيحي والمرئي في تعلّم العاملين الصحيّين العاملين في المركز الصحيّ بمدينة شيرفان.

**الطريقة:** أجريت هذه الدراسة كدراسة تدخلية (شبه تجريبية) في البيوت الصحيّة التي يغطّيها المركز الصحيّ لمقاطعة شيرفان في عام 2023. وكانت العينة المطلوبه 120 موظّفًا دخلوا الدراسة باستخدام تعداد السكان بالكامل وتمّ تقسيمهم عشوائيًا بالتساوي إلى ثلاث مجموعات. وفي مجموعتي التداخل، تمّ تقديم التعلّم بأسلوب منظّم التقدّم التوضيحي والبصري، وفي المجموعة الضابطة، تمّ تقديم التعلّم على شكل محاضرات. تمّت مراجعة أسئلة ما بعد الاختبار من قبل خمسة متخصصين في التعلّم الطبي، والممارسين العاملين، والأمراض المعدية.

**النتائج:** المتغيّرات الديموغرافية في درجات الاختبار القبلي والبعدى لم تكن مختلفة ذات دلالة إحصائية باستثناء الحالة الاجتماعية التي كان لها علاقة ذات دلالة إحصائية مع درجات الاختبار القبلي والحالة التعليميّة للأفراد الحاصلين على الدبلومات مع درجات الاختبار القبلي والبعدى. كانت هناك علاقة ذات دلالة إحصائية والفرق في درجات الاختبار ما بعد في جميع المجموعات الثلاث ( $P = 0.00$ ).

**الاستنتاج:** تساعد المنظّمات المتقدّمة المتعلّمين على تفعيل معارفهم السابقة وربطها بالمعرفة الجديدة. بالإضافة إلى ذلك، يمكن أن تؤدي إلى تعلّم هادف، وتسهيل وزيادة الدافع في التعلّم. حصلت المجموعة التي تمّ تدريبها باستخدام منظّمات التقدّم البصري على متوسط درجات تعلّم أعلى بكثير من المجموعتين الأخرين.

**الكلمات المفتاحية:** المنظّم المسبق، المنظّم المسبق البصري، المنظّم المسبق التوضيحي، التعلّم

### پیش‌سازمان‌دهنده‌های آموزشی: پلی به سوی یادگیری مؤثر

**زمینه و هدف:** پیش‌سازمان‌دهنده‌های آموزشی ابزارهایی هستند که به یادگیرندگان کمک می‌کنند تا مطالب آموزشی را بهتر یاد بگیرند. این مطالعه با هدف بررسی نقش پیش‌سازمان‌دهنده‌های توضیحی و تصویری بر یادگیری به‌روزان شاغل در مرکز بهداشت شهرستان شیروان انجام شد.

**روش:** این مطالعه به صورت مداخله‌ای (نیمه تجربی) در خانه‌های بهداشت مرکز بهداشت شیروان در سال 1402 انجام شد. نمونه مورد نیاز 120 نفر بود که با استفاده از سرشماری کل جامعه وارد مطالعه شدند و به صورت تصادفی به طور مساوی در سه گروه قرار گرفتند. در دو گروه مداخله، آموزش به روش پیش‌سازمان‌دهنده‌های توضیحی و تصویری و در گروه کنترل به صورت سخنرانی ارائه شد. سوالات پس‌آزمون توسط پنج نفر از متخصصان آموزش پزشکی، پزشکان عمومی و بیماری‌های عفونی بررسی شد.

**یافته‌ها:** متغیرهای دموگرافیک در نمرات پیش‌آزمون و پس‌آزمون به جز وضعیت تأهل که رابطه آماری معنی‌داری با نمرات پیش‌آزمون و وضعیت تحصیلی افراد دارای دیپلم با نمرات پیش‌آزمون و پس‌آزمون داشتند، از نظر آماری تفاوت معناداری نداشتند. نمرات پس‌آزمون در هر سه گروه رابطه و تفاوت آماری معنی‌داری وجود داشت ( $P=0.00$ ).

**نتیجه‌گیری:** پیش‌سازمان‌دهنده‌ها به یادگیرندگان کمک می‌کنند تا دانش قبلی خود را فعال کرده و آن را با دانش جدید مرتبط کنند. علاوه بر این، می‌توانند به یادگیری معنادار، تسهیل و افزایش انگیزه در یادگیری منجر شوند. گروهی که با استفاده از پیش‌سازمان‌دهنده‌های تصویری آموزش دیده‌اند، به‌طور معنی‌داری دارای میانگین نمرات یادگیری بالاتری نسبت به دو گروه دیگر بودند.

**واژه‌های کلیدی:** پیش‌سازمان‌دهنده، پیش‌سازمان‌دهنده تصویری، پیش‌سازمان‌دهنده توضیحی، یادگیری

### ایجوکیشنل ایڈوانس آرگنائزرز: مؤثر سیکھنے کا ایک پل

**پس منظر:** اسٹرکچرل ایڈوانس آرگنائزرز ایسے ٹولز ہیں جو سیکھنے والوں کو تعلیمی مواد کو بہتر طریقے سے سیکھنے اور سمجھنے میں مدد کرتے ہیں۔ اس مطالعہ کا مقصد شیروان سٹی ہیلتھ سنٹر میں کام کرنے والے ہیلتھ ورکرز کے سیکھنے کے بارے میں وضاحتی اور بصری پیشگی منتظمین کے کردار کی چھان بین کرنا تھا۔

**طریقہ:** یہ مطالعہ 2023 میں شیروان کاؤنٹی ہیلتھ سینٹر کے زیر احاطہ صحت کے گھروں میں ایک مداخلتی (نصف تجرباتی) مطالعہ کے طور پر کیا گیا تھا۔ مطلوبہ نمونہ یہ تھا کہ 120 عملہ پوری آبادی کی مردم شماری کا استعمال کرتے ہوئے مطالعہ میں داخل ہوا اور تصادفی طور پر یکساں طور پر تقسیم کیا گیا۔ تین گروپ۔ دو مداخلتی گروپوں میں، تعلیم وضاحتی اور بصری پیشگی منتظمین کے طریقہ کار سے فراہم کی گئی تھی، اور کنٹرول گروپ میں، تعلیم لیکچرز کی شکل میں فراہم کی گئی تھی۔ طبی تعلیم، جنرل پریکٹیشنرز، اور متعدی امراض کے پانچ ماہرین نے پوسٹ ٹیسٹ کے سوالات کا جائزہ لیا۔

**نتائج:** پری ٹیسٹ اور پوسٹ ٹیسٹ کے اسکورز میں آبائی تغیرات اعدادوشمار کے لحاظ سے نمایاں طور پر مختلف نہیں تھے سوائے ازدواجی حیثیت کے جس کا پری ٹیسٹ کے اسکورز اور پری ٹیسٹ اور پوسٹ ٹیسٹ اسکورز والے ڈیپلومہ والے افراد کی تعلیمی حیثیت کے ساتھ شماریاتی لحاظ سے اہم تعلق تھا۔ تینوں گروپوں ( $P = 0.00$ ) میں پوسٹ ٹیسٹ کے اسکورز میں شماریاتی لحاظ سے اہم تعلق اور فرق تھا۔

**نتیجہ:** ایڈوانس آرگنائزرز سیکھنے والوں کو اپنے سابقہ علم کو فعال کرنے اور اسے نئے علم سے جوڑنے میں مدد کرتے ہیں۔ اس کے علاوہ، وہ بامعنی سیکھنے کا باعث بن سکتے ہیں، سیکھنے میں آسانی پیدا کر سکتے ہیں اور حوصلہ بڑھا سکتے ہیں۔ جس گروپ کو بصری پیشگی منتظمین کے ذریعے تربیت دی گئی تھی اس کے سیکھنے کے اسکورز دوسرے دو گروپوں کے مقابلے میں نمایاں طور پر زیادہ تھے۔

**مطلوبہ الفاظ:** ایڈوانس آرگنائزرز، بصری ایڈوانس آرگنائزرز، وضاحتی ایڈوانس آرگنائزرز، لرننگ

## INTRODUCTION

An advance organizer is a cognitive strategy proposed by Ausubel, allowing learners to recall prior knowledge and transfer it to new information presented. This theory is based on the idea that if a learner can find meaning in new information, learning is facilitated and leads to a learning experience. Mayer believed that an advance organizer aids in organizing new material by outlining, structuring, and ordering the main ideas of the new content (1). An advance organizer is an initial learning strategy that is abstract and designed to prepare a conceptual framework that learners can use to gain a clear picture of what they will learn. It also serves as a cognitive strategy to enhance learning and facilitate memory retention when acquiring new information and acts as a tool to strengthen the learner's cognitive structure, thereby fostering meaningful learning experiences. Ausubel states that organizers are specifically designed to enhance the learner's mental framework regarding a specific topic while helping to organize, clarify, and retain this knowledge (2). Although advance organizers relate to passive learning, a well-organized presentation can act as a cognitive scaffold to enhance the retention of new information. An advance organizer can facilitate thought processes while organizing and classifying new concepts. Furthermore, it can provide a tool for practice by the learner (3). Ausubel stated that organizers provide a subset for the learner, giving them an overview of the material before they actually encounter it, and also presents organizational elements that include specific content in the material and related concepts that encompass the most relevance and efficiency in cognitive structure (4). It also serves as a cognitive bridge between new and prior material, aiming to activate relevant prior knowledge and acting as frameworks that allow learners to acquire new ideas or information and meaningfully relate these ideas to their existing cognitive structure. According to Ausubel, an advance organizer is a tool presented before introducing unfamiliar content to facilitate its acceptance (5). According to Mayer's theory, learners receive knowledge and information from the outside world and store it in short-term memory, with the amount of information in long-term memory affecting the transfer of information from short-term to long-term memory. One of the effective factors in the transfer and connection of information is the presentation of advance organizers (6). The term advance organizer is defined as an educational activity that helps create or enhance learning. It is a bridging strategy for connecting new knowledge to previous material (7). Advance organizers also help reduce the cognitive load on learners, as increased cognitive load leads to inefficient learning outcomes (8). According to Hebb's psychology theory, the left hemisphere processes textual stimuli, while the right hemisphere processes visual stimuli. For effective learning, both hemispheres must be used harmoniously to reduce cognitive load in each hemisphere. Teaching concepts is not only essential for transferring concepts from short-term to long-term memory but also crucial for creating better connections between them to activate

memory dynamics that can plan and guide learner behavior. Since the use of images and sounds with graphic organizers activates both hemispheres of the brain simultaneously, it aids in encoding information in long-term memory (9). Organizers are primarily used to activate the learner's prior knowledge for better understanding of its similarity to the new information being studied. Additionally, they are used to stimulate the learner to practice the learning task while creating meaning for them, as their use can clarify the learning objective and provide a context for motivating the learner to learn how to perform tasks. The use of organizers provides commendable benefits to learners that can positively impact the acquisition of concepts and includes a set of procedures that create clear links between prior and new knowledge by presenting prior knowledge (10). Concept maps, a proven form of advance organizers, were created by Joseph D. Novak in 1972 and served as a graphical tool for organizing and presenting knowledge in a structured manner, including concepts and clarifying their relationships through clear communications. These concepts are structured hierarchically as much as possible, with a more general concept at the top and more complex and specific concepts at lower levels. Therefore, concept maps can ensure the formation of a pattern for organizing knowledge and assist in the structure of knowledge based on it, preventing the emergence of misconceptions among learners. On the other hand, learning with concept maps can ensure cumulative learning (11). Given the importance of advance organizers in meaningful learning, this research aims to examine the role of explanatory and visual advance organizers on the learning of health workers employed at the Shirvan County Health Center.

## METHODS

This study was conducted as an intervention (quasi-experimental) after the approval of the plan by the Ethics Committee of Mashhad University of Medical Sciences (IR.Mums.Medical.REC.1402.326) in the health houses covered by the Shirvan County Health Center. The target group included 120 health workers employed at the Shirvan County Health Center. Eligible participants for the study included those employed as health workers with various employment statuses (temporary, quasi-contractual, contractual, official, and company-based), a willingness to cooperate in the research, participation in educational sessions, and not attending similar sessions. Exclusion criteria included being absent for more than one hour in educational sessions and leaving the employment status. Participants were allocated to three groups as follows: 40 individuals in the explanatory advance organizer intervention group, 40 in the visual advance organizer intervention group, and 40 in the control group receiving lectures. The scientific content for all three groups was the same and based on the new guidelines issued regarding brucellosis, tuberculosis, and measles by the Ministry of Health, Treatment, and Medical Education, developed using scientific resources and under the supervision of the disease control unit. Initially, a pre-test assessment was conducted

for all three groups using a 60-item multiple-choice questionnaire covering the three disease topics. Subsequently, training was provided for 6 hours over three consecutive days to prevent information leakage: the first intervention group received training on the first day using explanatory advance organizers, the second intervention group on the second day using visual advance organizers, and the control group on the third day using only the lecture method, conducted in-person by a disease expert (Figure 1).

The visual advance organizer was designed in collaboration with a graphic expert. The pre-test and post-test questions were sent to five specialists in medical education, general practitioners, and infectious diseases for feedback and validity determination. Based on their comments, revisions were made, resulting in a Content Validity Index (CVI) of 0.74. To determine the reliability of the questions using the test-retest method in the health worker group, a reliability coefficient of 0.83 was obtained.

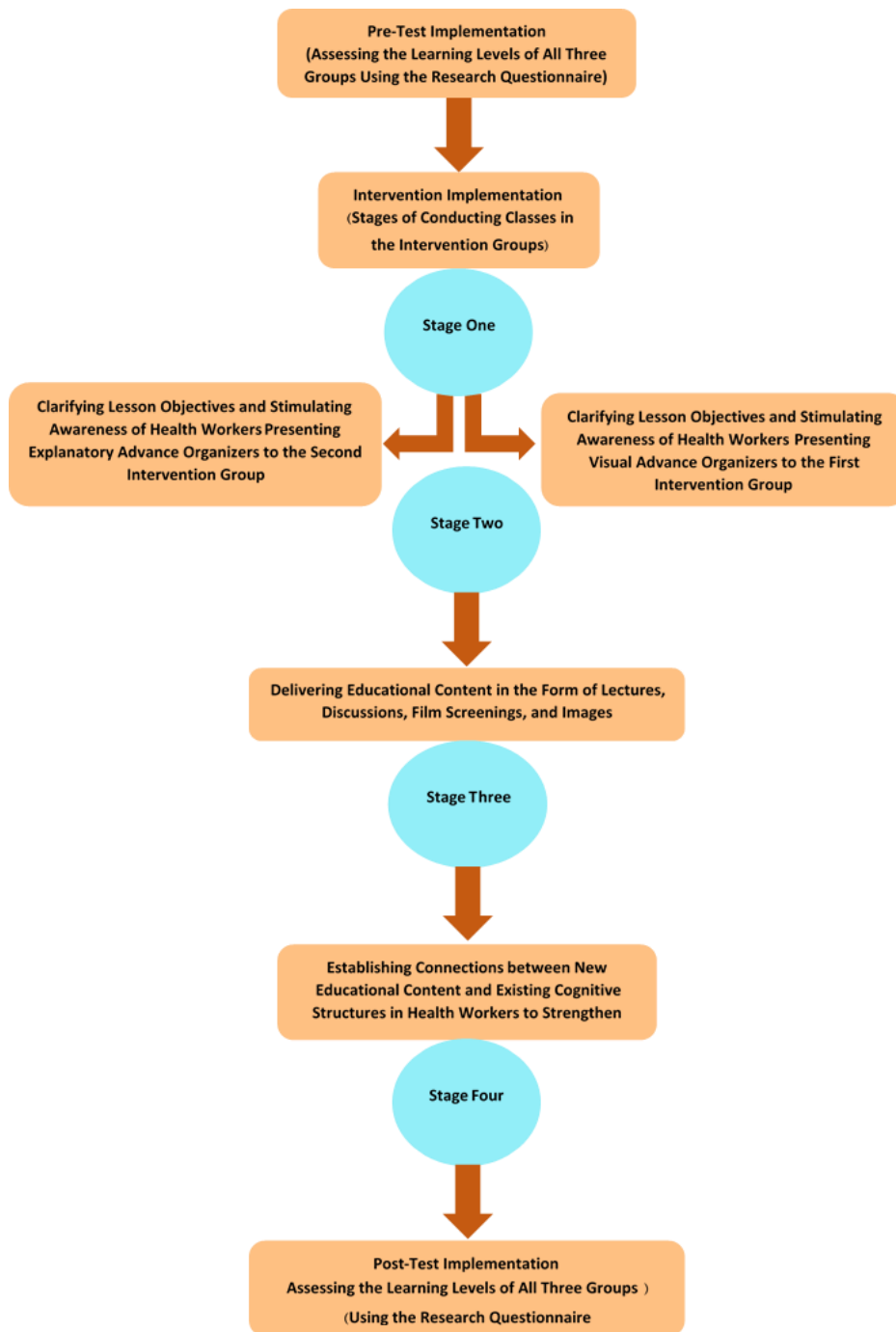


Figure 1. Intervention method

After data collection, the research data were analyzed using SPSS version 22. In this study, the Kolmogorov-Smirnov test was used to assess the normality of the data, the paired t-test was used to compare the results before and after the training period, and the Mann-Whitney and Kruskal-Wallis tests were used to examine the relationship between various factors such as education, gender, work experience, and marital status of the health workers. A significance level of 0.05 was considered for all tests in this study.

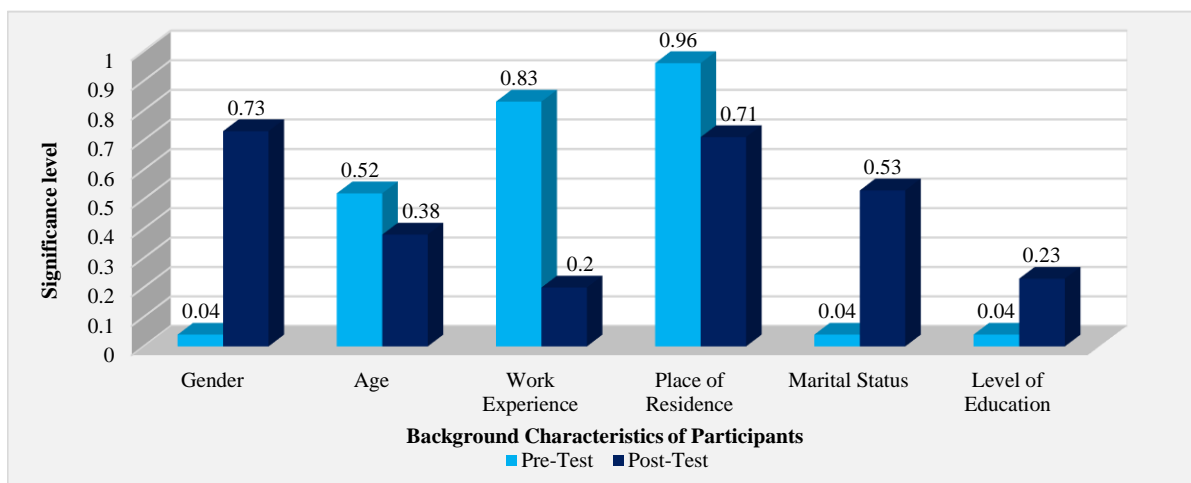
**RESULTS**

A total of 107 health workers participated in this study, with 32 in the explanatory advance organizer group, 40 in the visual advance organizer group, and 35 in the lecture group.

The variables of gender, age, length of service, place of residence, marital status, and educational level did not show a statistically significant difference among the three groups, as the significance level was less than 0.05 (Table 1). Figure 2 shows the relationship between pre-test and post-test scores in all three groups with demographic variables. To demonstrate the significance level of the average pre-test and post-test scores, the Mann-Whitney, paired t-tests, Pearson correlation coefficient, and Kruskal-Wallis tests were utilized. According to the results obtained, a significant relationship was found between pre-test scores and the variables of gender, marital status, and educational level; however, post-test scores did not show a significant relationship with any of the demographic variables.

**Table 1. Background Characteristics of Participants in the Study**

Characteristic	Sub-Characteristic	Type of Intervention			P-value	K2	Fisher	Kruskal-Wallis
		Explanatory Advance Organizer	Visual Advance Organizer	Lecture				
Gender	Women	29(90.63%)	30(75%)	26(74.29%)	0.19	3.503	-	-
	Men	3(9.38%)	10(25%)	9(25.71%)				
Age	Average Age	36.93	39	34	0.06	-	-	5.576
Work Experience	Average Age	13.4	15.95	10.74	0.05	-	-	0.949
Place of Residence	Village	20(62.50%)	27(67.5%)	21(60%)	0.82	0.475	-	-
	City	12(37.5%)	13(32.5%)	14(40%)				
Marital Status	Married	29(90.63%)	35(87.5%)	27(77.14%)	0.60	-	4.615	-
	Unmarried	3(9.38%)	5(12.5%)	(22.86%)				
Level of Education	Elementary or Guidance School	5(15.63%)	3(7.5%)	3(8.75%)	0.76	-	3.551	-
	Diploma	19(59.38%)	28(70%)	25(71.43%)				
	Associate Degree	2(6.25%)	4(10%)	4(11.43%)				
	Bachelor's Degree and Higher	6(18.75%)	5(12.5%)	3(8.57%)				



**Figure 2. Pre-Test and Post-Test Scores Based on Background Characteristics of Participants**

**Table 2. Impact of Training Using Advance Organizers**

Group	Significance Level in Pre-Test	Significance Level in Post-Test
Explanatory		
Visual	0.25	0.00
Lecture		

Table 2 shows the comparison of pre-test and post-test scores in all three groups. According to the results, there was no significant difference in learning levels among the three groups before the intervention. However, the comparison of post-test scores among the three groups showed a significance level of less than 0.05, indicating a significant difference between at least two groups, which demonstrates the impact of training with advance organizers.

To conduct a more detailed analysis, the Scheffé post hoc test was used, and the results of this test are presented in Table 3. Based on the obtained results and the significance levels (all less than 0.05) and the degree of difference, it can be concluded that the group trained with visual advance organizers had a significantly higher mean compared to the two groups trained with explanatory and lecture methods. Additionally, the group trained with explanatory advance organizers had a significantly higher mean compared to the group trained through lectures.

## DISCUSSION

Advance organizers are considered an initial and abstract learning strategy that prepares a conceptual framework for learners to obtain a clear picture of what they will learn. They also serve as a tool to enhance the cognitive structure of the learner, thereby making learning meaningful. The results of this study indicated that the provision of advance organizers led to meaningful learning, as there was no significant difference in learning levels among the three groups before the intervention ( $P \geq 0.05$ ). However, since the post-test scores had a significance level of 0.00, which is less than 0.05, this indicates the impact of providing advance organizers. Additionally, the results of the Scheffé post hoc test showed that visual advance organizers had a greater impact on individuals' learning levels ( $P \leq 0.05$ ). Advance organizers also attract learners' attention to educational content, as Dunlap found in his 2016 study that 86% of participants paid more attention to infographic advance organizers during learning (12). Similarly, the current study's results showed that among the types of advance organizers provided, the visual type had a greater effect on individuals' learning. In a study by Lin et al. in 2005, results indicated that the use of advance organizers, when not aligned with the type of instruction, did not stimulate deep learning and information processing (13). On the other hand, in the present study, considering the type of educational content, the results indicated that visual advance organizers had a greater effect on learning, suggesting that the choice of advance organizer type based on the method of instruction and content type can significantly impact learning. Lee et al. in 2014 found that

**Table 3. Results of the Scheffé Post Hoc Test**

Type of Intervention	Group	Mean Difference	Significance Level
Explanatory	Visual	-2.9±0.96	0.01
	Lecture	4±0.99	0.00
Visual	Explanatory	2.8±0.96	0.01
	Lecture	6.9±0.94	0.00
Lecture	Explanatory	-4±0.99	0.00
	Visual	-6.9±0.94	0.00

the provision of advance organizers positively influences learning but does not significantly help learners with more prior knowledge (14). However, in the present study, based on the obtained results, it can be inferred that the provision of advance organizers generally increases learning in individuals. Colliot et al. in 2018 concluded that providing advance organizers helps learners improve recall of prior knowledge and thus establishes effective connections between new and old content, which can lead to better and more meaningful learning (15). In a study by Wang et al. in 2021, results showed that the use of graphic advance organizers significantly impacted recall and understanding of material and increased learners' satisfaction with learning (16). Additionally, Vargas et al. in 2018 found that frequent use of advance organizers positively affects comprehension and assists learners in strategic studying (17). The results of the present study also indicated an increase in comprehension and meaningful learning in learners using advance organizers. In a study by Klolland et al. in 2017, it was found that learners who used visual advance organizers not only enjoyed the learning experience but also had a specialized attitude towards the learning content and were able to connect learned material to the real world (18). In the current study, results indicated that in the intervention groups where advance organizers were provided, learning increased. Based on Ausubel's and Mayer's theories, it can be said that the increase in learning is due to the establishment of connections between prior and new knowledge, which advance organizers facilitate.

## CONCLUSION

Advance organizers are a cognitive strategy and tool that aid in better learning and understanding of educational material. They particularly help learners establish connections between prior and new knowledge before presenting new



content, allowing for a more organized and conceptual understanding of information. Based on the research and studies mentioned, as well as the results obtained in this study, it can be recommended that due to the effective impact of advance organizers in activating prior knowledge and establishing connections between it and new knowledge, as well as increasing focus, motivation, and satisfaction in learners' learning experiences, the use of appropriate advance organizers based on content type can lead to meaningful learning and a better and deeper understanding of educational materials.

Among the limitations of this study is the issue that due to the limited time for conducting the course, the educational topics were presented in a condensed manner. However, increasing the number of training sessions could allow for a more extensive presentation of topics. On the other hand, the allocation of two intervention groups in this study is a strength, enabling the evaluation of the impact of using advance organizers and comparing the effects of two types of them. To enhance generalizability and also to examine the impact of other types of advance organizers on learning, it is recommended to design studies in other disciplines and

educational groups in medical sciences.

#### **Ethical Considerations:**

Ethical issues including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc. have been completely observed by the authors. This study is the result of a thesis approved by the Ethics Committee of Mashhad University of Medical Sciences with code IR.Mums.Medical.REC.1402.326.

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