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The Effect of Three Instructional Methods (Reading-Based, Visual, and Auditory) on Undergraduate Students' Academic Performance in the Research Methods Course, Considering Gender and Learning Style

Amin Hessam Seif Zargar Naieej[1], Hassan Pasha Sharifi[2], Hamzeh Ganji[3]

1. Department of Psychology, Ro.C., Islamic Azad University, Roudhen, Iran
2. Department of Psychology, Ro.C., Islamic Azad University, Roudhen, Iran, hapssr@yahoo.com
3. Department of Psychology, Ro.C., Islamic Azad University, Roudhen, Iran

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ABSTRACT

Objective: Considering the importance of educational methods as a key factor influencing students' academic performance, and the need for thoughtful and effective instructional approaches, this study aimed to examine the effects of three instructional methods—reading-based, visual, and audio instruction—on students' academic performance in an undergraduate research methodology course, with respect to gender and learning style.

Methods: This study employed a causal-comparative (ex post facto) design with a pre-test. The research instruments included a standardized questionnaire assessing college students' learning styles and their performance on a course assignment. The statistical population consisted of undergraduate students enrolled in the Research Methodology course at the Islamic Azad University, Roudhen Branch. From this population, 80 students were selected through voluntary, non-random sampling. Data were analyzed using SPSS software.

Results: The findings indicated that the main effect of gender on assignment performance was not statistically significant. However, the main effect of learning style on assignment performance was significant. In addition, the main effect of instructional method on assignment performance was statistically significant. Furthermore, the interaction effect of instructional method, gender, and learning style on students' performance was also found to be significant.

Conclusions: The results suggest that instructional methods and students' learning styles play an important role in academic performance. Moreover, the significant interaction among instructional method, gender, and learning style highlights the importance of considering multiple learner characteristics when designing effective educational strategies.

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Introduction

One of the important challenges in educational systems is the lack of compatibility between teaching methods and students' characteristics. Among these issues is the mismatch between instructional methods and students' learning styles (McKenna, Cappel, Bolter, & Lu, 2018; Murphy, Gray, Straja, & Bogert, 2004). Since the late 1970s, the discussion of learning styles has gained considerable attention. Various definitions have been proposed for learning styles. Although this concept has been defined in different ways, it is generally emphasized that learning styles include the beliefs, preferences, and behaviors individuals use to assist themselves in learning situations (Saif, 2013).

Learning style has been defined as a combination of cognitive, affective, and physiological characteristics that serve as relatively stable indicators of how individuals perceive information, interact with it, and respond to the learning environment (Hejazi et al., 2015). Scholars believe that although students possess diverse learning styles, instructors' teaching methods are often predominantly based on the lecture method (Keefe, 1987). Recognizing that each student has a preferred learning style can help instructors employ flexible and effective teaching methods and instructional media. In other words, students use different learning styles, and academic success at the university level is greatly influenced by these styles (Friedel & Rudd, 2006). Familiarity with these styles and aligning specific instructional techniques with them plays an effective role in facilitating learning (Murphy et al., 2004). Learning style theorists emphasize that students whose learning styles are compatible with their learning environments tend to achieve greater success (Omar, Muhammad, Paimin, & Aini, 2015). For example, Vizeshfar and Torabizadeh (2018), as well as Ghadampour et al. (2020), showed that there is a relationship between learning styles and academic achievement. Therefore, understanding these styles and adapting specific instructional techniques to them can play an effective role in facilitating individuals' learning.

Individuals perceive and acquire knowledge in different ways; they think differently and act in different manners. Moreover, individuals require specific cognitive strategies that help them make meaning from new information. The term learning style refers to individuals' preferences for making meaning and, more specifically, the ways they gather, interpret, organize, and think about new information (Franzoni & Assar, 2009). Learning styles refer to individuals' preferences for effective study methods (Rogowsky et al., 2014). Various learning styles have been identified and

categorized by researchers in different frameworks and classifications. One of the models of learning styles was proposed by David Kolb and Ron Fry between 1984 and 1989, and its latest revision was presented in 2005. By proposing the theory of experiential learning, these scholars emphasized the role of experience in learning and defined learning as an active process of interaction between the individual and the environment and life situations. Kolb's learning theory consists of a cycle of four sequential stages, illustrated in Figure 1.

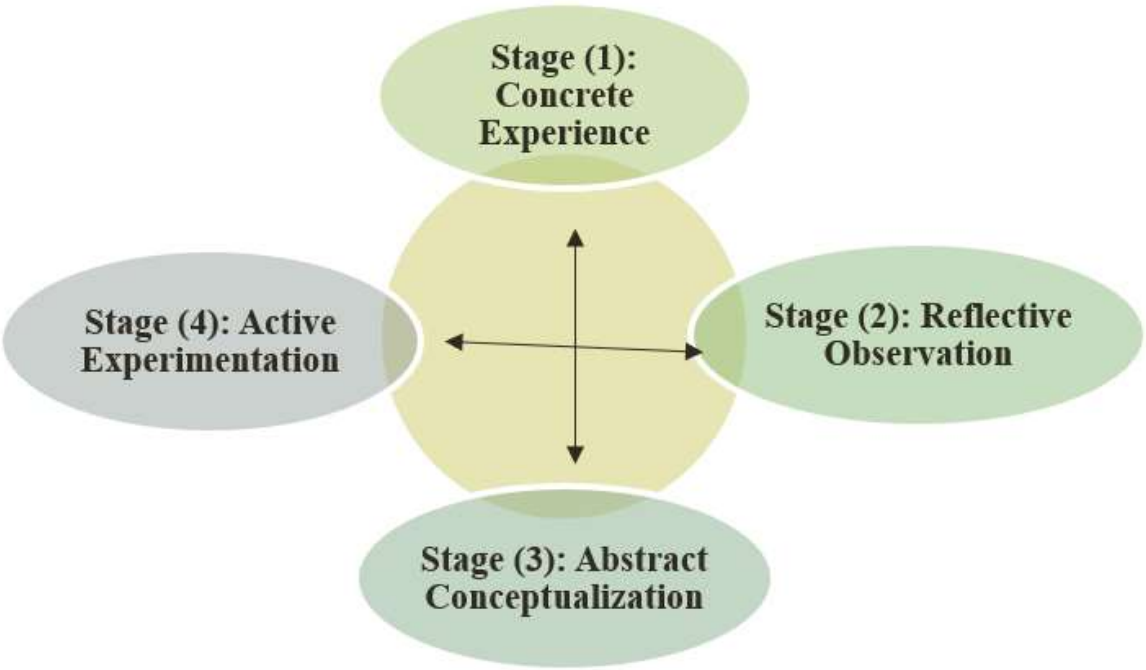

Figure 1. Kolb's Experiential Learning Cycle and Learning Styles

Kolb's experiential learning theory is the result of the integration of three models of experiential learning processes: Lewin's model of action and laboratory experiments, Dewey's learning model, and Piaget's model of cognitive learning and development. Kolb and Fry (1975, cited in Saif, 2013) introduced a learning cycle consisting of two dimensions and four stages. The first dimension includes two learning modes: concrete experience versus abstract conceptualization. The second dimension includes two learning modes: active experimentation versus reflective observation. They viewed learning as a cycle that begins with experience, continues with reflection, and then leads to action. By combining these four modes, learners are classified into

four learning styles: converging, diverging, assimilating, and accommodating (Kolb, 1984; Manolis et al., 2013).

According to Kolb (1984), for learners to function effectively they need four different abilities: the ability for concrete experience, the ability for reflective observation, the ability for abstract conceptualization, and the ability for active experimentation. In other words, learners must be able to fully and willingly engage themselves in new experiences without bias, observe these experiences from different perspectives and reflect upon them, construct concepts that integrate their observations with logically sound theories, and apply these theories in decision-making and problem-solving (Meyari et al., 2009).

Today, universities increasingly feel pressure to reduce traditional lecturing, create interactive learning environments, integrate technology into the learning experience, and employ universal learning strategies (Franzoni & Assar, 2009). One of the most popular recommendations of psychologists is that students' learning styles should correspond with teachers' instructional styles, often referred to as the "matching hypothesis." At first glance, it seems reasonable that such alignment would enhance learners' performance. According to Kolb, learning styles are shaped by hereditary factors, previous life experiences, and the demands of the current environment, and they are rooted in individuals' neurological structures and personalities. Although learning styles are relatively stable, qualitative changes may occur due to development, maturation, and environmental stimuli (Sutcliffe, 1993). Learning style preferences may change over time, and researchers believe that attention by instructors and educational planners at different levels of education to learning styles can facilitate teaching and learning processes (Pazargadi & Tahmasebi, 2010).

Based on Mayer's multimedia learning theory, the use of diverse instructional methods—such as visual, auditory, and reading-based approaches—can facilitate more effective information exchange and contribute to the development of improved teaching and learning environments (Neo & Neo, 2004). The effectiveness of multimedia instruction in increasing students' motivation and satisfaction, improving learning outcomes, enhancing students' attitudes toward the course (Fathi et al., 2014), and improving learning and retention among students (Moghami et al., 2014; Salehi et al., 2015) has been confirmed in previous studies.

Research has shown that multimedia-based instruction can improve students' reading comprehension and retention. Mayer (2002; translated by Mousavi, 2005) defines an instructional multimedia message—referred to as visual instruction in the present study—as communication through words and images that promotes learning (p. 21). The rationale for using multimedia lies in its ability to utilize the full cognitive capacity of the human information-processing system. Mayer's cognitive theory of multimedia learning is based on three fundamental assumptions: the dual-channel assumption, the limited-capacity assumption, and the active-processing assumption. According to the dual-channel assumption, humans possess separate channels for processing visual and auditory information. The limited-capacity assumption suggests that individuals can process only a limited amount of information in each channel at a given time. The active-processing assumption proposes that learners actively engage in cognitive processing in order to construct coherent and meaningful mental representations of their experiences. By employing both visual and auditory sensory channels, multimedia environments can facilitate active information processing and enhance learning (Zarei Zavaraki & Jafarkhani, 2013).

Mayer (2002; translated by Mousavi, 2005) further identifies two primary channels of information processing: the visual channel and the auditory/verbal channel, each of which has a limited capacity within working memory. According to this perspective, learners generally learn more effectively from a combination of words and images than from words alone.

The effectiveness of auditory instruction depends largely on listening comprehension. Listening comprehension refers to the ability to recognize or interpret what is heard and is considered a fundamental skill in the learning process. It consists of several sub-skills, including phonological awareness, auditory discrimination, auditory memory, auditory sequencing, auditory attention, auditory recognition, and auditory integration (Vatandoost et al., 2013).

Reading has long been a central focus of research (e.g., Cain, 2003; Cain et al., 2009) and is considered a fundamental requirement for learning across all academic disciplines. Findings from these studies indicate that the reading process involves visual word recognition, identifying and extracting meaning at the phrase or sentence level, and overall text comprehension.

The constructivist model of reading comprehension includes three core assumptions related to inference generation: the goal of reading, coherence, and explanation. The goal-of-reading assumption suggests that the type of inferences readers draw from a text depends on their purpose

for reading it. Readers typically focus on specific aspects of the text according to their goals; therefore, the inferences they generate vary depending on the information they consider important. Some inferences are generated quickly and automatically, meaning that most readers tend to produce them during reading. In contrast, other inferences occur less frequently and may only arise when readers intentionally focus on specific aspects of the text. For instance, when adults attempt to understand a text, they often generate inferences related to the causal explanation of events in the narrative, while paying less attention to details such as the setting, physical characteristics of people and objects, or the specific manner in which events occur. In fact, rapidly generated inferences are usually related to explaining the overall flow of events in a text, whereas inferences about detailed aspects of the text require more time and cannot easily be produced simultaneously with ongoing reading.

The coherence assumption states that readers attempt to construct a meaningful representation of the text that is coherent both locally and globally. Readers actively establish connections between propositions in the text using explicit linguistic cues and engage in reasoning to fill informational gaps. By drawing upon their prior knowledge and experiences, they generate inferences that help interpret and reconstruct the meaning of the text. According to this assumption, readers strive to build a situational model that creates both local and global coherence among events, actions, and concepts presented in the text (Najafi Pazouki, 2013).

The explanation assumption suggests that skilled readers tend to explain the causes of events described in the text. In other words, readers continually ask themselves why the author presents certain ideas and what the purpose of those ideas might be. To answer such questions, readers rely on their previous knowledge and experiences. These reflective questions help establish relationships between textual propositions and promote inference generation. Because meaning does not reside inherently in the text but must be actively constructed by the reader, instruction on how to apply reading strategies is essential for improving text comprehension. Instruction can provide learners with a repertoire of strategies that enhance their ability to understand written material.

Instruction based on auditory input requires listening comprehension, defined as the ability to recognize and interpret what is heard. This skill includes several sub-skills such as phonological awareness, auditory discrimination, auditory memory, auditory sequencing, auditory attention,

auditory recognition, and auditory integration. Examples of auditory media used in classroom instruction include audio files, audio conferences, and lectures. Among these, lectures are the most common form of auditory instructional media and are widely used in universities (Vatandoost et al., 2013).

Given the importance of aligning instructional methods with learners' learning styles and gender differences, and considering that few studies have examined the differences among various instructional methods in relation to students' performance in research methodology courses with respect to gender and learning styles, the present study investigates the effects of reading-based, visual, and auditory instructional methods on students' performance in a research methodology course while considering gender and different learning styles. The primary objective of this study is therefore to identify the effects of these three instructional methods, in relation to gender and learning styles, on students' learning in the research methodology course. Accordingly, the study examines the following hypotheses: instructional method influences students' performance in the research methodology course; gender influences students' performance in the course; learning style influences students' performance; instructional method and gender jointly influence performance; instructional method and learning style jointly influence performance; gender and learning style jointly influence performance; and finally, instructional method, gender, and learning style simultaneously influence students' performance in the research methodology course.

Material and Methods

This study is a pretest–posttest experimental design. Classified by purpose, it falls under applied research; and by methodology, it belongs to descriptive–survey research. The design is mixed, combining within-subjects (repeated measures) and between-subjects components. Within-subjects variable: Teaching modality, with three levels—reading (visual text), listening (audio), and viewing (visual video)—applied identically to all participants. Between-subjects variables: Gender (female, male) and learning style (diverging, converging, assimilating, accommodating), each with 10 males and 10 females per style (total: 40 females + 40 males). The study is also quantitative, with data collected via standardized questionnaires.

The target population comprised all new undergraduate students of the Department of Psychology, Islamic Azad University, Rodin Branch, in the first semester of 04–03. Sample size per group was

estimated using Cohen's table (α = 0.05, effect size = 0.5, power = 0.78), yielding 10 participants per group, for a total of 8 groups × 10 = 80 participants.

Initially, participants completed a demographic questionnaire, and Kolb's Learning Styles Inventory (LSI) (12 items; 4 response options per item, scored 1–4, with 4 = highest similarity). Based on LSI results, 80 qualified participants were selected: 10 males and 10 females for each of the four learning styles (converging, diverging, accommodating, assimilating). Groups were compared on age, handedness, high school GPA, prior academic familiarity with research methodology, and academic motivation to ensure no significant pre-existing differences.

Instruments

Kolb's Learning Styles Inventory (LSI): 12 items × 4 response options (1–4). Assesses four learning modes: concrete experience, reflective observation, abstract conceptualization, and active experimentation. Cronbach's α > 0.70 (Kaes, 2005, cited in Moradi & Pap Zan, 2014).

Task Performance Questionnaire: 5-option multiple-choice items, tailored to taught content. Content validity confirmed by 4 faculty experts.

After screening and scheduling, each participant was tested individually in the researcher's office instructions were provided; an ethical consent form was signed and a short preparatory video (non-experimental sample material) was shown to calibrate audio/video settings.

Six learning modules were presented in random order, balanced across modality:

2 reading, 2 listening, 2 viewing. For each module:

A distraction comprehension test followed (reading a short text and answering one question).

Then, a 5-item multiple-choice test on the module content was administered.

The sequence repeated for all six modules.

Table 1. Educational Videos Used as Teaching Materials

Row	Title	Teaching Method	Time	Number of Words
1	What is Research?	Reading	10 minutes	1322
2	Tools of Psychological Research	Reading	8 minutes	1029
3	Variables and Their Role in Research	Listening	7 minutes	1230
4	Data Collection Methods	Listening	6 minutes and 9 seconds	1148
5	Difference Between Qualitative and Quantitative Measurement	Viewing	7 minutes and 5 seconds	1157
6	Measurement Scales	Viewing	7 minutes and 48 seconds	1285

Results

In this section, the research data were analyzed using SPSS version 24 at both descriptive and inferential levels. The mean age of female students was 22.05 years (SD = 1.395), while the mean age of male students was 22.23 years (SD = 1.656). Descriptive statistics for the dependent variable (task performance) across groups based on gender, learning style, and instructional method are presented in Table 2.

Table 2. Descriptive statistics of task performance by gender, learning style, and instructional method

Gender	Learning Style	Instruction Method	Mean	Std. Error	95% CI Lower	95% CI Upper
Female	Assimilator	Reading	2.850	0.254	2.344	3.356
	Auditory	3.000	0.229	2.544	3.456	
	Visual	3.050	0.236	2.579	3.521	
Converger	Reading	2.150	0.254	1.644	2.656	
	Auditory	2.750	0.229	2.294	3.206	
	Visual	2.450	0.236	1.979	2.921	
Diverger	Reading	2.200	0.254	1.694	2.706	
	Auditory	2.050	0.229	1.594	2.506	
	Visual	3.050	0.236	2.579	3.521	
Accommodator	Reading	1.900	0.254	1.394	2.406	
	Auditory	2.150	0.229	1.694	2.606	
	Visual	2.100	0.236	1.629	2.571	
Male	Assimilator	Reading	2.400	0.254	1.894	2.906
	Auditory	3.000	0.229	2.544	3.456	
	Visual	2.650	0.236	2.179	3.121	
Converger	Reading	1.800	0.254	1.294	2.306	
	Auditory	2.550	0.229	2.094	3.006	
	Visual	2.350	0.236	1.879	2.821	
Diverger	Reading	2.500	0.254	1.994	3.006	
	Auditory	2.250	0.229	1.794	2.706	
	Visual	1.750	0.236	1.279	2.221	
Accommodator	Reading	2.100	0.254	1.594	2.606	
	Auditory	2.000	0.229	1.544	2.456	
	Visual	2.900	0.236	2.429	3.371	

Based on the information presented in Table 2, noticeable differences in performance between female and male students can be observed across different learning styles and instructional methods. To examine the significance of performance differences with instructional method as the within-group variable and gender and learning style as between-group variables, a repeated measures multivariate analysis of variance (MANOVA) was conducted. The results of Levene's test for homogeneity of variances indicated that none of the dependent variables were statistically significant, suggesting that the assumption of homogeneity of variances was met ($P > 0.05$). Therefore, the dispersion of scores across groups can be considered equal. The results of Box's M

test for equality of covariance matrices also showed that the assumption of homogeneity of variance–covariance matrices was satisfied (Box's M = 59.27, F = 1.21, P = 0.163). Thus, the assumptions required for analysis of variance were met. According to the results presented in Table 3, repeated measures ANOVA indicated that: Instructional method significantly affected students' performance in the research methodology course (F = 9.97, P = 0.000), the main effect of learning style was also significant (F = 3.56, P = 0.018) and interaction effect of instructional method, gender, and learning style on students' performance was also significant (F = 8.91, P = 0.000).

Table 3. Results of repeated measures ANOVA (within-group and between-group effects)

Source	Measure	SS	DF	MS	F	P	Eta Squared
Instruction Method	Performance	3.952	2	1.976	9.973	0.000	0.122
Gender	Performance	0.879	1	0.879	0.658	0.420	0.009
Learning Style	Performance	14.195	3	4.732	3.556	0.018	0.129
Method × Learning Style	Performance	5.740	6	0.957	4.828	0.000	0.167
Method × Gender	Performance	0.515	2	0.257	1.298	0.276	0.018
Gender × Learning Style	Performance	3.303	3	1.101	0.828	0.483	0.033
Method × Gender × Learning Style	Performance	10.594	6	1.766	8.911	0.000	0.271
Error	Performance	95.792	72	1.330			

To perform pairwise comparisons, the Bonferroni post-hoc test was applied. The results related to instructional methods are summarized in Table 4.

Table 4. Bonferroni post-hoc comparisons for instructional methods

Method (I)	Method (J)	Mean Difference	Std. Error	Sig.
Reading	Auditory	-0.231	0.064	0.001
Visual	-0.300	0.078	0.000	
Auditory	Reading	0.231	0.064	0.001
Visual	-0.069	0.068	0.315	
Visual	Reading	0.300	0.078	0.000
Auditory	0.069	0.068	0.315	

The results of Table 4 indicate that at the 0.05 significance level, the main effect of instructional method on performance was significant. Specifically, there were significant differences between the reading method and both the auditory and visual methods, indicating lower performance in the reading instructional method. The results of the Bonferroni post-hoc test for learning styles are presented in Table 5.

Table 5. Bonferroni post-hoc comparisons for learning styles

Learning Style (I)	Learning Style (J)	Mean Difference	Std. Error	Sig.
Assimilator	Converger	0.483	0.210	0.025
Diverger	0.525	0.210	0.015	
Accommodator	0.633	0.210	0.004	
Converger	Assimilator	-0.483	0.210	0.025
Diverger	0.041	0.210	0.844	
Accommodator	0.150	0.210	0.479	
Diverger	Assimilator	-0.525	0.210	0.015
Converger	0.041	0.210	0.844	
Accommodator	0.108	0.210	0.609	
Accommodator	Assimilator	-0.633	0.210	0.004
Converger	-0.150	0.210	0.479	
Diverger	-0.108	0.210	0.609	

The results shown in Table 5 indicate that at the 0.05 significance level, the mean performance of students with the assimilator learning style differed significantly from the other learning styles. Students with the assimilator learning style obtained higher scores compared to students with other learning styles.

Discussion

The present study was conducted to examine the effects of three instructional methods—reading-based, visual, and auditory—on undergraduate students' academic performance in the Research Methodology course, considering gender and learning styles. In this study, 40 female and 40 male students participated. Participants were classified according to Kolb's learning styles, including converging (10 males, 10 females), diverging (10 males, 10 females), assimilating (10 males, 10 females), and accommodating (10 males, 10 females). The experiment was then implemented with these participants. The findings indicated that four out of the seven proposed hypotheses were supported.

Based on the results, among the main effects of the variables, gender did not have a significant effect on performance in the Research Methodology course, and no significant difference was observed between male and female students' scores. The effect of gender on academic and cognitive abilities has undergone substantial changes over time. The dominant view during the nineteenth and early twentieth centuries suggested that women had lower cognitive abilities than men. However, contemporary research has demonstrated that there is no significant difference between men and women in terms of general intelligence.

According to the results, the assimilating learning style showed a significant difference from the other learning styles in terms of task performance. Participants with an assimilating learning style obtained higher scores compared to those with other learning styles. This finding may be explained by the characteristics of assimilators, who tend to learn more effectively through thinking and careful observation. These learners organize information efficiently and rely on abstract concepts to understand situations, which can enhance their performance in completing tasks. The present findings are partly consistent with the studies of Singh et al. (2017), Balakrishnan and Lai (2015), and Willier et al. (2014).

The results of the study also showed that the instructional method was the most influential factor affecting learners' performance. Specifically, there were significant differences between the reading-based method and the auditory and visual methods, indicating lower performance under the reading-based instructional approach. These results may be attributed to the practical nature of the Research Methodology course as well as the cognitive processes involved in reading, which include visual word recognition, identifying and extracting meaning at the phrase or sentence level, and overall text comprehension. The present findings are consistent with previous studies conducted by Moghami et al. (2014), Fathi et al. (2014), Zarei Zavaraki et al. (2014), Asadi and Ghobadi (2012), and Vural (2013).

Female students demonstrated better performance under the auditory method compared to the reading-based and visual methods, while their lowest performance was observed under the reading-based method. In contrast, although the reading-based method appeared to generate more interest among male students, their best performance was observed under the visual method, while the lowest performance was again associated with the reading-based method. Regarding the interaction effect of instructional method and gender on task interest, the results were partially consistent with the findings of Zamani et al. (2017) and Murphy et al. (2004).

The findings of the present study suggest that various factors influence academic performance. Among the most important factors examined in this research were instructional method, learning style, and learners' gender. Several previous studies (Kamari & Fouladchang, 2018; Alharbi et al., 2017; Singh et al., 2017; Balakrishnan & Lai, 2016; Liu et al., 1999; Willier et al., 2014) have investigated the role of learning styles in academic performance, and the results of the present study also confirm their influence. Another independent variable examined in this study was

teaching method, and the results were consistent with numerous studies (Fathi et al., 2014; Moghami et al., 2014; Zarei Zavaraki et al., 2014; Vural, 2013) that reported a significant effect of teaching methods on learning outcomes.

With the rapid expansion of information in the modern era and the development of new educational models, as well as changes in the concept of learning, the shift from traditional face-to-face instruction toward electronic learning has become increasingly important. The use of electronic resources and virtual learning environments has gained significant attention. In recent years, educational systems have undergone major transformations with the emergence of new technologies such as multimedia and hypermedia. Technology has continuously transformed teaching and learning processes. Researchers believe that paying attention to students' learning styles at different levels of education can facilitate teaching and learning processes. Oyen Wan also suggests that if teachers understand how learners process information, they can move beyond traditional lecture-based instruction toward methods that lead to deeper understanding of educational content, thereby enhancing students' learning.

Research Methodology is one of the core courses in psychology programs and is offered as both a theoretical and practical course at different academic levels to prepare students to become effective future researchers. However, previous studies have identified challenges related to teaching and learning this course. Researchers argue that when an individual's learning style does not match their field of study or profession, the individual may either withdraw from that field or experience dissatisfaction with their academic program. According to previous studies, one of the reasons for learning difficulties in the Research Methodology course is the neglect of students' learning styles. Moreover, most learners have experienced situations in which they learned better through certain teaching methods, while other teaching approaches had little impact on their learning. Teachers play an essential role in helping learners organize knowledge in their minds. Therefore, when the teaching method used by the instructor aligns with the way learners organize information cognitively, more effective learning can occur.

Limitations

Despite the efforts made in conducting this study, several limitations should be acknowledged. First, the study focused specifically on learning in the Research Methodology course and was conducted using a pre-experimental design in a laboratory setting. Additionally, because the study

was conducted as a student project without institutional financial support, the quality of the audio recordings used in the auditory instructional materials was not at a professional level.

Another limitation of the present study was the lack of multiple assessment methods for evaluating performance. In this study, performance was assessed using a multiple-choice test format. Furthermore, self-report measures were used to assess variables such as task interest and mental effort. Although self-report methods are commonly used in studies related to interest, they have several limitations, including: (a) demand characteristics, where participants' responses may be influenced by the researcher's hypotheses; (b) personal bias; (c) limitations in self-awareness; and (d) the difficulty participants may have in accurately expressing their level of interest or cognitive effort. These limitations may reduce the generalizability of the findings and the internal validity of the study.

To improve both internal and external validity, several suggestions are proposed for future research. Future studies could examine additional learning styles, consider different study strategies, and investigate other courses with theoretical characteristics. It is also recommended that future researchers conduct similar studies in non-laboratory settings and include comprehensive pre-test and post-test designs. Finally, based on the findings of this study, it is recommended that instructors use diverse teaching methods and incorporate multimedia instruction when teaching Research Methodology courses.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving human participants were reviewed and approved by the ethics committee of Islamic Azad University. The patients/participants provided their written informed consent to participate in this study.

Author contributions

All authors contributed to the study conception and design, material preparation, data collection, and analysis. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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