Virtual Reality (2024) 28:110
https://doi.org/10.1007/s10055-024-01012-0

ORIGINAL ARTICLE

Using attentional guidance methods in virtual reality laboratories reduces students' cognitive load and improves their academic performance

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Received: 28 July 2023 / Accepted: 6 May 2024

Abstract
Learning in virtual reality laboratories (VR labs) has become an important method in experimental teaching but can increase individuals' cognitive load compared with traditional laboratories. This study analysed the effect of introducing an attentional guidance mechanism into a VR lab on students' cognitive load and academic performance. We designed and developed two VR labs, one with and one without this attentional guidance stimulus (a 3D yellow arrow). A quasi-experimental design was adopted, and the data obtained were analysed using one-way ANOVA and linear regression. The experiment was conducted with 80 students majoring in digital media art at two universities. The results indicated that the students in the VR lab with the attentional guidance mechanism included exhibited lower cognitive load and higher academic performance than the control group. The regression analyses revealed that cognitive load negatively predicted learning outcomes; that is, academic performance improved as cognitive load decreased. In conclusion, as VR labs are increasingly used in education, supplementing them with attentional guidance stimuli can improve students' academic performance by reducing their cognitive load.

Keywords Virtual reality lab · Attentional guidance · Cognitive load · Academic performance

1 Introduction

Learning invirtual reality laboratories (VR labs) has become an important method in experimental teaching (Achuthan et al. 2020; Grivokostopoulou et al. 2020). VR labs have a positive impact on the learning experience, while also bringing more entertainment value and engagement to the learning process (Höhner et al. 2020; Janonis et al. 2020). VR labs are characterised by the three main features of interactivity, immersion, and imagination (Mikropoulos and Natsis 2011; Skulmowski and Xu 2022; Yang et al. 2022). Such virtual environments enable learners to engage at a deeper level (El Kabtane et al. 2020). In particular, they develop a sense of immersion owing to the multi-sensory stimuli they experience via VR (Park and Lee 2020), while the tracking of their head and hand positions enables them to explore and increase their perception of the virtual environment through body movements (Shin 2017; Wenk et al. 2023).

Despite these advantages and theoretical support, the three characteristics of VR labs can also increase individuals' cognitive load compared with traditional laboratories (Juliano et al. 2022; Makransky et al. 2019; Parong and Mayer 2018; Skulmowski et al. 2016). For example, the characteristic of immersion, while presenting novel and attractive experiences, raises participants' cognitive load (Frederiksen et al. 2020). Moreover, to make the scene more realistic, VR labs may present details that distract learners from their intended objective (Brucker et al. 2014). Simultaneously, the high level of interactivity leads to further distractions, which can quickly drain cognitive resources (Skulmowski and Rey 2018).

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The design of VR labs is considered to be the main factor influencing users' cognitive load (Albus et al. 2021; Du et al. 2022; Kehrwald and Bentley 2020; Skulmowski and Xu 2022). Therefore, an effective design of VR labs used for teaching is the main way to reduce cognitive load. In particular, attentional guidance mechanisms can be incorporated into the design to reduce the excessive distractions found in VR labs (De Koning et al. 2009).

1.1 VR labs and cognitive load

According to cognitive load theory (Paaset al. 2003a, b; Sweller 2011), the main function of teaching is to store information in long-term memory. Knowledge is stored in long-term memory in the form of a schema; however, to construct a schema, information must be processed in working memory, which has a limited capacity (Paas et al. 2004; Pollock et al. 2002; Sweller 2010, 2011; van Merriënboer and Sweller 2005), whereas long-term memory is regarded as infinite (Gathercole et al. 2008). In other words, because of its impact on engagement and attention, there is an optimal load for information learning. Therefore, teaching must be designed to present information efficiently to reduce the load on working memory and facilitate the transfer of information from working memory to long-term memory (Guadagnoli and Lee 2004; Kirschner 2002; Sweller 2016). Consequently, the factors influencing cognitive load must be examined when considering the design of VR labs.

When designing a VR lab, realistic graphics are often used to create an authentic digital environment. Since such graphics may contain small distractions (Brucker et al. 2014), realistic visualisation can be considered to be the opposite of simplified schematics (Höffler 2010). A VR lab's increased realism is a source of its higher cognitive load (Brucker et al. 2014; Skulmowski and Rey 2020a). Meanwhile, comparative studies on different types of immersion show that stronger immersion increases cognitive load (Frederiksen et al. 2020). Therefore, immersion may actually drain learners' cognitive resources instead of positively contributing to their learning (Frederiksen et al. 2020; Makransky et al. 2019).Moreover, under high levels of interactivity, cognitive resources are easily exhausted because of excessive distractions (Skulmowski and Rey 2018), with some studies finding that moderate interactivity results in the strongest learning effects (Kalet et al. 2012). Therefore, the design of the interactivity element should consider users' cognitive load (Skulmowski and Rey 2020b).

The above discussion shows that the characteristics of a VR lab both help and hinder learning, with the main obstacle being their effect on individuals' cognitive load. Therefore, studying the impact of cognitive load on a VR lab's effectiveness necessitates considering these problems from the perspective of working memory. Working memory, as noted earlier, has a limited capacity to temporarily store and process information (Baddeley and Hitch 1974; Baddeley 1992) and is paramount in several advanced cognitive activities (e.g. learning, reasoning, and information search) (Baddeley 2003). Working memory is also involved in selecting the underlying information, which can influence the information selection of cognitive systems through attentional guidance (Downing 2000; Olivers et al. 2006; Soto et al. 2005). Hence, it plays an important role in the learning process in VR labs. In virtual chemistry labs, using arrow-text assistance can reduce cognitive load and improve students' performance in terms of completing experiments, reducing time, and generating fewer errors (Ali et al. 2022). Hence, cognitive load and learning performance are the focus of research in VR labs. Therefore, the focus of attention can be guided by the design of VR labs to enable the management of cognitive load.

1.2 Attentional guidance

A VR lab's characteristics of immersion and interactivity mainly affect the storage of information in working memory; thus, they affect cognitive load (Skulmowski and Xu 2022). An excessive focus on attention will lead to an excessive storage of information in working memory, ultimately negatively affecting learners' cognitive load and learning results (Frederiksen et al. 2020; Parong and Mayer 2021). Thus, guiding learners' attention in a VR lab may be an effective solution to this issue. Desimone and Duncan's (1995) biased competition theory can be used to analyse attentional guidance. This theory states that the neural representations of different objects in visual scenes compete to obtain higher levels of processing while inhibiting each other. The activation of working memory towards specific visual features promotes biased neural activity in the corresponding brain areas, which gives the features matching the memory storage information in the visual scenes a competitive advantage; thus, the phenomenon where memory storage representations guide attention may be observed.

What type of attentional guidance can attract perceptual attention in VR labs? Humans' visual perception is highly selective. Some studies have indicated that learners can focus their visual attention on only a few visual elements displayed simultaneously and only process a small amount of information in their working memory (Baddeley 1992). Therefore, the most prominent characteristics of VR labs conducive to perceiving information on the features of their visual elements must be identified. Previous research on the identification of visual perceptual features in real space can be used as a reference to identify the perceptual features of the elements in a VR lab. Schnotz and Lowe (2008) proposed two features that affect the perceptibility of different elements: visual/space contrast and dynamic contrast. First, according to visual/space contrast, an element stands out among others because of its unique visual features such as size or colour. Second, dynamic contrast occurs when the movement and temporal changes of an element establish a difference between the graph and background, which attracts learners' attention.

In research on attentional guidance and visual search and cues, various suggestions on which object features may attract attention and facilitate object or event recognition have been provided. First, objects with unique features show significant differences in the visual/space contrast of their properties (e.g. colour and shape). In various visual search paradigms, the distinct features of an object, which hold greater significance in vision, expedite the identification process by creating a contrast with one or more perceptual attributes (Treisman and Gelade 1980; Treisman and Gormican 1988). For example, using such features can reduce the time spent on detecting a green number among several red numbers (i.e. the colour of the target distinguishes it from the red distractors). This pattern has been found to be task-related (Yantis and Egeth 1999). In particular, unique colours (Nagy and Winterbottom 2000; Turatto and Galfano 2000, 2001; Turatto et al. 2004) and brightness levels (Enns et al. 2001) seem to be effective in attracting learners' attention. Attentional guidance methods can sift through large amounts of information to select the key portions. Focusing helps process key information faster, which increases processing efficiency.

Lee et al. (2021) added visual stimuli into a VR lab to guide users to participate in learning and proved that visual stimuli affect learning in VR labs. However, while their results showed that visual attentional guidance does not affect users' performance, they did not explain its effect on cognitive load. Conversely, Moon and Ryu (2021) used animation teaching agents to perform immersive VR video teaching and the conversational gestures of animation teaching agents to guide visual attention. Their results showed that learners exhibited lower learning comprehension scores despite easily perceiving information, while cognitive cues helped reduce the external cognitive load.

Wallgrün et al. (2020) studied the mechanisms of visual attentional guidance (e.g. arrows) and proved that adding these to VR methods improves users' target-seeking performance. However, whether the application of such mechanisms in education impacts students' learning outcomes and cognitive load needs more data and empirical support. Harada and Ohyama (2022) analysed the mechanisms of attentional guidance in VR and compared attentional guidance with cognitive load. They performed a visual search task in an immersive environment, setting the guidance mechanism as a moving window, 3D arrow, radiation, spherical gradation, or 3D radar to measure the search time for the target and time spent identifying the guidance design. In different orientations, the effects of various guiding mechanisms vary. The 3D arrows are positioned at a central level in all orientations, which may not only facilitate attention guidance but also enhance perspective acquisition.

In summary, VR labs not only broaden the field of vision and enhance students' immersion but also increase their cognitive load, as learners must find useful learning content from among several useless details (Makransky et al. 2021). Therefore, it is important to help students find useful learning information in an immersive environment, and this must be considered in the design of VR labs.

1.3 Present study

Previous research has discussed the potential cognitive load of using VR labs in education (Achuthan et al. 2015; Mayer 2005). Further, studies have proposed that guiding learners' attention can raise their understanding and problem-solving skills and thus improve their academic performance (Canham and Hegarty 2010; Ge et al. 2017). However, few experimental studies have investigated the impact of attentional guidance mechanisms on students' cognitive load and academic performance in digital camera courses. It is thus important to study the functions and effects of the increased use of attentional guidance methods in VR labs. Through attentional guidance, learners can first be guided to pay attention to key information on learning tasks and simplify their visual search process. Second, they can be guided to find important information and make space for their working memory to integrate information and construct psychological representations, thereby improving students' academic performance.

To extend the extant literature, this study tests whether adding attentional guidance stimuli into a VR lab influences cognitive load and students' academic performance. Specifically, the research questions (RQs) are as follows:

RQ1 Is there a significant difference in cognitive load in a VR lab with and in one without attentional guidance?

RQ2 Is there a significant difference in academic performance in a VR lab with and in one without attentional guidance?

RQ3 In VR labs, under conditions of attention guidance, is there a significant relationship between cognitive load and learning performance?

2 Methodology

2.1 Participants

The research participants comprised 80 students from the schools of art and design of two universities; they were in the fourth semester and majoring in digital media art. The students were aged between 19 and 22 years. The participants were not randomly assigned to each group; a quasi-experimental design was adopted and each class was considered a group of 40 students. One class was the control group, and the other one was the experimental group. One group of students from each university took part in the study, and each group had an experimental class in a digital camera course using a VR lab in a controlled laboratory environment. In addition, students from the two universities had similar levels of academic achievement tests at the time of admission. Before the research began, the participants were given the application instructions of the VR lab and measurement instruments. Consent was obtained from all the participants.

2.2 Experimental design

We designed and developed two VR labs: one with an attentional guidance mechanism and one without it (Fig. 1). We first determined the teaching objectives according to the teaching content in four ways: (i) Master the layout and plan the scene space, (ii) Master the scheduling of the characters, (iii) Master the application and scheduling of the shot sizes of the camera, and (iv) Master the lighting design. The students' task was to output the split lens and scene scheduling diagrams (e.g. top view), including the character, camera, and lighting equipment). The contents of both labs were the same; the only difference was whether this attentional guidance mechanism was used or not. The design and development of the VR labs strictly followed the principles of multimedia design. Two technical, two teaching, and two educational psychology experts participated in the evaluation and verification of the development process.

Previous studies have shown that typical attentional guidance mechanisms in education include arrows and colours. Arrows, as guiding symbols, can play an important role in guidance. Arrows are also suitable for attentional guidance in VR labs. Colour is another important cue in attention research, and many experiments have used colour as a cue to attract attention (Ansorge and Becker 2014; Burnham 2020; Harris et al. 2015). The colours of attentional guidance mechanisms tend to be striking. Since such symbols serve to remind and guide participants, striking colours can attract their attention more easily and lead them to focus their eyes on a target that requires attention more quickly.

Based on the above discussion as well as the background colour of the scene in the VR lab, a 3D yellow arrow was selected as the attentional guidance mechanism in this study. Since using 2D symbols in a VR scene hinders immersion, which is crucial (Liberatore and Wagner 2021), and because a 2D arrow cannot be seen on the Z-axis of the 3D space, it was important to use a 3D arrow. The arrow was designed to hang directly above the characters, cameras, and lights during the experiment to allow the participants to easily distinguish them from the props in the scene and serve as a reminder and guide. The arrow was suspended above the object being manipulated. When the object changed, the position of the arrow changed accordingly.

2.3 Measurement instruments

2.3.1 Cognitive load

The NASA-TLX is an important tool for developing new measures and models (Hart 2006). It contains six subscales that measure cognitive load: mental demand, physical demand, temporal demand, frustration, effort, and performance. Each subscale is scored from 1 to 100.Previous studies have analysed the reliability, validity, and sensitivity of the NASA-TLX to measure cognitive load, mainly in the field of education. The NASA-TLX is reliable, with a Cronbach's alpha coefficient of 0.73. As this is above the suggested threshold of 0.6, it suggests its inherently good reliability (Longo and Orru 2018). In particular, the NASA-TLX

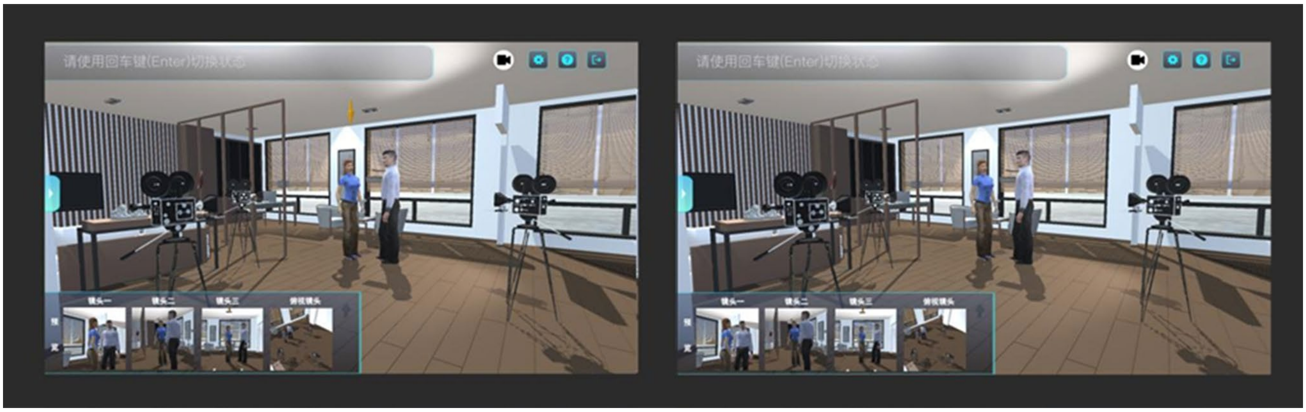

Fig. 1 VR labs with and without attentional guidance

has proven to be effective and user-friendly for measuring the effects of cognitive load on learning outcomes in several experimental studies involving VR environments (Papachristos et al. 2018; Shin and Park 2019; Zhao et al. 2020).

2.3.2 Academic performance

The participants rated the effectiveness of the characters, cameras, and lights used in the VR labs. Ten items were measured, each on a scale of 1 to 10 (Table 1). A lecturer graded their scores and the total score (out of 100) served as the measure of the students' academic performance.

2.4 Procedure

Before the experiment, the lecturer explained to all the participants the use of the hardware and operation of the software in the VR labs. This took approximately 5 min. Each student was also provided with an operating manual. Following the lecturer's explanation, the participants operated the system manually for 10 min. Next, the participants watched a 10-min presentation on how to use the VR lab for the digital camera experiments. This presentation was prepared in advance and played on a VR laptop by each group of participants. They then performed an experiment that lasted for 30 min. After the participants had submitted their tasks, they answered the NASA-TLX questionnaire. The lecturer provided no verbal or physical guidance during the experiment. The total duration was approximately 60 min.

2.5 Data analysis

SPSS was used to analyse the data, including the descriptive statistics and inferential statistics. The descriptive statistics mainly analysed the mean and standard deviation of the cognitive load and academic performance of the two groups of participants (the experimental group with the attentional guidance mechanism and the control group with no attentional guidance mechanism). The inferential statistics used one-way analysis of variance (ANOVA) to determine whether the VR lab with attentional guidance significantly impacted the cognitive load and academic performance of the students in the experimental group. Furthermore, the relationship between their cognitive load and academic performance was analysed using linear regression.

3 Results

The results for the equality of error variances (Levene 1960) for cognitive load (F [1,78] = 0.77, $p > 0.05$) and academic performance(F [1,78] = 3.56, $p > 0.05$) revealed no significant differences. Thus, the homogeneity hypothesis was not violated, and an ANOVA could be conducted.

As shown in Table 2, the control group (i.e. without attentional guidance) had higher mean cognitive load (M = 72.16, SD = 2.2, N = 40) than the experimental group (i.e. with attentional guidance; M = 69.08, SD = 2.52, N = 40). Furthermore, the results of the one-way ANOVA showed a significant difference between the two groups (F [1,78] = 33.73, $p < 0.05$, partial eta squared = 0.30, provided that the effect size is large, according to Cohen (2013)). Taken together, these results suggest that the VR lab with attentional guidance had a significant impact on cognitive load.

The one-way ANOVA results in Table 2 show the significant difference between the academic performance of the experimental group (F [1,78] = 7.31, $p < 0.05$, partial eta squared = 0.09), showing a medium effect size (Cohen 2013), and the control group. Table 2 also shows that the experimental group had higher mean academic performance

Table 1 Data collection sheet

Criterion	Evaluation	Mark
Characters		
Does the creation of character 1 fit the script?	0–10	
Does the creation of character 2 fit the script?	0–10	
Is the relationship between the characters' positions reasonable?	0–10	
Cameras		
Is Camera 1 in a reasonable position?	0–10	
Is Camera 2 in a reasonable position?	0–10	
Is Camera 3 in a reasonable position?	0–10	
Is the overall composition appropriate?	0–10	
Lights		
Is the position of light 1 appropriate?	0–10	
Is the position of light 2 appropriate?	0–10	
Do light and natural light combine to create the right mood?	0–10	
Total	0–100	

Table 2 Results of the one-way ANOVA for cognitive load and academic performance

Variable	Group	N	Mean	SD	F	p	Partial eta squared
Cognitive load	Experimental group	40	69.08	2.53	33.73	0.00	0.30
	Control group	40	72.16	2.20			
Academic performance	Experimental group	40	81.03	4.35	7.31	0.01	0.09
	Control group	40	78.15	5.13			

Table 3 Results of the one-way ANOVA

Model	Sum of squares	df	Mean square	F	p
Regression	317.68	1	317.68	15.38	0.00^{b}
Residual	1,611.70	78	20.66		
Total	1,929.39	79			

Dependent variable: scores; predictors: (constant), overall workload

Table 4 Results of the regression analysis

	B	SE	β	t	p
(Constant)	129.84	12.83		10.12	0.00
Overall workload	−0.71	0.18	−0.41	−3.92	0.00

$R^2 = 0.17$, Adjusted $R^2 = 0.15$

(M = 81.03, SD = 4.35) than the control group (M = 78.15, SD = 5.13). Therefore, the attentional guidance stimulus had a significant effect on students' academic performance.

Finally, linear regression analysis was conducted to predict and analyse the relationship between cognitive load and students' academic performance. Before the regression analysis, the correlation between cognitive load and academic performance was found to be significantly negative ($r = -0.41$, $p < 0.01$). The results revealed a significant linear correlation between cognitive load and students' academic performance. The Pearson correlation analysis demonstrated a moderate correlation between variables. When the absolute value of the correlation coefficient is 0.1–0.3, 0.3–0.5, and > 0.5, it is generally considered that there is a weak, moderate, and strong correlation between the variables, respectively. Therefore, a significant moderately negative correlation was observed between cognitive load and students' academic performance.

Table 3 shows the relationship between cognitive load and students' academic performance, and a linear function is used to express the degree of deviation between them. As shown in Table 3, cognitive load had a significant effect on academic performance (F [1,78] = 15.38, $p < 0.05$). Moreover, the regression coefficient of cognitive load was $\beta = -0.41$ ($p < 0.05$), which was statistically significant, indicating that cognitive load was significantly negatively related to academic performance (Table 4). The Durbin–Watson test was applied to assess the independence of the model residuals, and the test statistic was close to 2 ($d = 2.17$), indicating that the model had a tendency not to be auto correlated. In addition, the R^2 value calculated in the analysis was 0.17. In education studies, an R^2 value above 0.1 is considered to be substantial. This suggests that about 17% of the variance in academic performance could be explained by cognitive load.

4 Discussion

Regarding RQ1, it was found that the cognitive load of the experimental group decreased significantly. The capacity and duration of working memory are extremely limited. Working memory can also be short term, with a capacity to store only five to nine basic pieces of data or data blocks simultaneously. Moreover, it can process only two or three pieces of information simultaneously because the interactions between the elements stored in it also require working memory space, thereby reducing the overall amount of information that can be processed. In our study, the intrinsic nature of the materials, their presentation, and the students' activities influenced the load on the participants' working memory; hence, introducing the attentional guidance mechanism reduced the mental effort and time that the visual search consumed, allowing the students to use working memory to process other data. The conversion of working memory into long-term memory enables working memory to be retained in the brain. Further, in contrast to that of working memory, the capacity of long-term memory is almost unlimited. Stored information can be small and fragmentary facts or large, complex, interactive, and serialised information. In other words, long-term memory is at the centre of learning. Therefore, learning content is eventually stored in long-term memory through working memory.

Regarding RQ2, we found that the academic performance of the experimental group was better than that of the control group. This is partially consistent with the findings of De Koning et al. (2009), who showed that attentional guidance can promote the selection of information in animations and sometimes improve learning. Attentional guidance can guide attention to a specific location or element in a VR environment, where a clue is set as a highlighting stimulus that guides the learner's attention to the area in which important information appears. Colour and shape are the main attentional guidance stimuli in VR lab designs. In this study, attentional guidance was achieved using a yellow arrow—a hue of yellow that does not appear elsewhere in the VR lab and an obvious colour cue that can function as a highlighting stimulus. Along with the shape of the arrow, which also acts as a reminder, colour also accomplishes attentional guidance to record the eye movement process while learning. Ozcelik et al. (2010) found that the more times subjects gaze at relevant information, the longer the total fixation time. When considering attentional guidance mechanisms, designers should thus highlight those elements of the visual space in a VR lab and clearly differentiate them from other spatial elements to direct learners' attention to the relevant elements. This result supports the implementation of attentional guidance mechanisms in the design of VR labs, which would especially suit experimental courses for digital media art majors.

Finally, the results for RQ3 are consistent with those of Andersen et al. (2016), who posited that reducing cognitive load in VR experiments leads to improved performance and learning outcomes. In contrast to those previous studies that have found no correlation between cognitive load and academic performance (Tugtekin and Odabasi 2022), this study found a relationship, which may be due to the boundary conditions, including age, gender, and prior knowledge. Mayer (2010) found that certain boundary conditions or regulating variables in the principles are applicable to multimedia learning or the activation of instructional design techniques. In other words, adopting certain design methods or learning materials for certain learners enables multimedia learning principles to function more effectively. Therefore, discussing the boundary conditions of instructional design in a VR lab would not only ensure a more rational application of these principles but also have great theoretical and applicable value. Specific methods of incorporating interactivity can also serve as boundary conditions in VR labs. The design and control of these boundary conditions can then function as research variables; thus, measuring cognitive load can enable the study of the learning outcomes. Finally, cognitive load is not only highly correlated with the design of teaching materials, but it has also been identified as a key component in the field of usability research (De Jong 2010; Mohamad Ali and Hassan 2019).

5 Conclusion

This study examined the cognitive load and academic performance of students conducting experiments in two types of VR labs (one with and one without an attentional guidance mechanism) as well as analysed the relationship between cognitive load and academic performance. The findings indicated a significant difference between the two groups, with the students in the attentional guidance group having lower cognitive load and higher academic performance on average. The regression analysis revealed that cognitive load has a negative effect on academic performance. Taken together, these results suggested that introducing an attentional guidance mechanism into the studied digital camera course reduces cognitive load and improves students' academic performance significantly. Furthermore, the findings also highlighted the importance of cognitive load for academic performance. The empirical findings in this study reinforced the importance of designing a method of attentional guidance in a VR lab that is different from traditional multimedia teaching. Although the study's findings were based on a small sample size, which is a limitation of the study, they confirmed the effective design of the VR lab in question. Thus, supplementing VR labs, which are increasingly used in education, with attentional guidance mechanisms can improve students' academic performance.

6 Limitations and future directions

This study has some limitations. First, learners' previous learning experience and the complexity of learning tasks produce intrinsic cognitive load. Rich learning experience is associated with perceiving learning task as easy and experiencing small intrinsic cognitive loads, and vice versa. Therefore, this study did not consider learning task complexity. Future research on attentional guidance in VR labs should examine the influence of learning task complexity on learners. In addition, owing to the quasi-experimental design, the selection of samples was limited by majors and classes. Future studies could extend the object of experimental research to other majors. This would improve the universality and extensibility of the findings and provide more accurate guidance for education and teaching practice. Furthermore, this study did not test students' academic performance at the beginning of the experiment, which could have resulted in a significant gap in academic level between students in the two groups. Therefore, future research should use a pre-test to assess the learning performance of both groups of students. Finally, more variables, such as motivation and satisfaction, could be included in future studies to improve the model of attention guidance mechanism.

Author contributions All the authors contributed to the study conception and design. Material preparation, data collection, and analysis: PingpingWen, Fei Lu. Writing—review and editing: Ahmad Zamzuri Mohamad Ali. The first draft of the manuscript was written by

Pingping Wen and all the authors commented on previous versions of the manuscript. All the authors read and approved the final manuscript.

Funding The authors gratefully acknowledge the financial support provided by the Research and Social Service Project of Chongqing City Vocational College (XJSK202301008)、Education and Teaching Reform Research Project of Chongqing City Vocational College(XJJG20231003)、Annual Program of National Social Science Foundation （22BMZ168） 、Open Project for Think Tanks in Higher Education Institutions in Heilongjiang Province （ZKKF2022045).

Data availability The authors do not have permission to share the data.

Declarations

Conflict of interests We declare that there are no known conflicts of interest associated with this research.

Consent to participate Consent was obtained from all the participants.

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