Practical Analysis of Virtual Reality 3d Modelling Technology for Animation Majors Based on Predictive Correction Method

Tianfeng Li, Zhaoxia Guo*
Nanyang Institute of Technology, Nanyang, Henan, 473000
E-mail: longyust_001@163.com, ZZlongyust@163.com
*Corresponding Author

Keywords: virtual reality, 3-dimensional animation, teaching, predictive correction method.

Recieved: April 26, 2024

With the advancement of communications technologies and hardware technologies, animation creation can only continue to innovate to keep up with the times. Special education has recently shown considerable interest in animations. Novel types of presentations, such as animations, multimedia, and virtual reality, have been made available by technological advances in teaching. A significant mainstream media, communications, and education platform is animation software. There has been a rise in both the diversity and the rate of creation of new cartoon products because of the development of new techniques and the accumulation of new information. In this research, we suggest a virtual reality system based on a predictive correction method (VR-PCM). The widespread adoption and implementation VR-PCM technology has prompted researchers to examine VR-potential PCM's impact on the field of animation education. To carry out the design of the lessons themselves, the existing VR technologies are merged to carry out teaching, including a multitude of environmental modeling, real-time 3D graphic production, simultaneous display, and sensor technology. Research on these four facets of the major teaching process has been conducted in light of the present state of affairs. When paired with a 3D animation course, VR-PCM technology may be utilized to enhance the effectiveness of instruction for classes focused on professional skills. The percentage of students in the experimental group whose design proposals were judged unsatisfactory by experienced teachers drops from 15% in the control group to 7%. Students in the experimental group expressed satisfaction with the virtual reality technology in their classrooms at 73, 60, and 80% percentages, respectively. The proposed technique has provided an accuracy of 95%. The study evaluates and contrasts the impact of various pedagogical strategies, including student feedback, overall quality assessment, and professionals' core curriculum. Students in the VR technology group showed considerable improvement in their overall quality assessments. The analysis provides valuable insights that can guide the development of curricula, instructional methodologies, and technology improvements that are specifically designed to address the changing demands of animation education in the digital age.

Povzetek: *Prispevek analizira uporabo virtualne resničnosti za 3D modeliranje pri poučevanju animacije z metodo prediktivne korekcije. Rezultati kažejo, da VR-PCM tehnologija izboljšuje učinkovitost poučevanja, zmanjšuje število neuspešnih predlogov in povečuje zadovoljstvo študentov.*

1 Introduction

A computer simulation system that can generate an artificial environment is referred to as virtual reality (VR). Users can engage with the three-dimensional world created by the computer. To effectively depict crime or incident scenarios to the audience and aid in comprehension and memory of complicated spatial information, computer-generated animation is a suitable medium. Since simulation crime does not entail bodily motion in the same manner as, say, a murder, visual reconstruction of such a crime would be of little use [1]. Figure 1 represents the implementation of virtual reality technology.

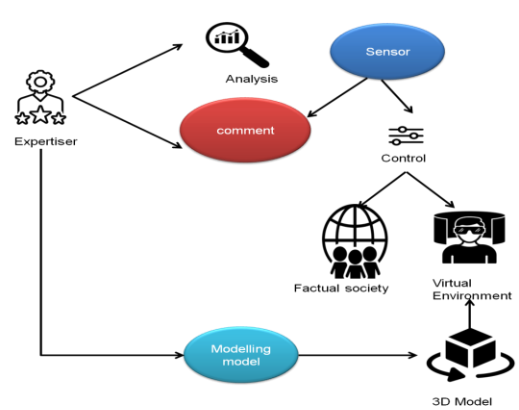

Figure 1: Implementation of virtual reality technology

Computer-generated animation can only play a small part in the investigation of computer-related crimes and forensic investigation; at best, it may be used to show jurors technical information. For example, rather than giving the judge and the jury a technical discussion of how hard drives work and how they store data, it is possible to illustrate these concepts visually. Based on factual information, forensic animations may recreate the scenario and show the movement and positioning of the cars, items, and involved people at different times. After the animation has been created, it is simple and affordable to examine the incident from many angles, including that of the driver, the victim, as well as the witnesses. In modern forensics, modern computer methods are replacing conventional graphics, pictures, and verbal accounts to recreate forensic evidence [2].

Virtual reality (VR), sometimes known as virtual environments (VE) has been a popular subject in recent years as technology advances and develops. Since 1965, the fundamental idea behind VR technology has been in existence. Yet, the device's high price is a barrier to its general adoption. Also, the deployment of VR technology has reached a low point as a result of the long-lasting overhype and hype around it. Because of this, many experts have been pessimistic about the widespread adoption of VR technology [3]. The users are therefore able to travel about the virtual environment, pick up virtual things, and interact with them while doing so via computer-generated visuals or animated characters and avatars [4]. As technological and scientific developments continue to advance, a new production technique for filmmaking is being made possible by virtual reality (VR) technology. To expand the possibilities for creating animation using Virtual reality technology, a greater discussion of the human-computer interface (HCI) technique under AI is required [5]. VR technologies are a broad and multidisciplinary area that allows for the creation of virtual systems that mimic real-world physiological and visual impacts. As the idea of connected communities and interactive virtual technologies become increasingly well-known technologies [6]. VR may be done utilizing virtual simulation technology, which allows for the creation of realistic replicas of urban landscapes and the in-depth analysis of many kinds of spatial data (VR). This may provide effective decision-making assistance for problems like urban distribution, and architectural and structural designing [7]. The 3D virtual animator technology, a crucial subset of computer animation, primarily makes use of computer graphical fidelity processing techniques to imitate actual people and things and create virtual and abstract material independent of spatial constraints. It is extensively employed in many industries, including education, the military, medicine, and entertainment [8]. As we proposed, by investigating the 3D modeling technology for virtual reality animation using the predictive correction technique. The foundation of several methodological approaches is the conditional independence assumption.

2. Application of virtual reality in animation

The research preferred a secure cloud platform which was made available for the importation of digital photography and communications in medicine pictures, and new algorithms were used to automatically segment certain anatomical components, which advances the findings of previous studies [9]. The article evaluated the study that was carried out to compare the recommended VR solution to conventional training techniques [10]. The case study viewed the future growth of VR immersion as a guide; the study examines the merits and downsides of spaces and examines how multi-immersive perception functions, considering conversion forms [11]. The research described a dramatic change in discrete event modeling and simulation, as well as the introduction of novel modeling techniques based on virtual reality (VR) and three-dimensional (3D) visualization technology [12]. Table 1 shows the summary of literature review.

Table 1: Summary table

Reference	**Methods**	**Results**
[13]	The article synthesized the actual costs and advantages of 3D and VR simulation and design while separating claims from reality (myths).	The findings demonstrate that 3D and VR approaches provide greater advantages in the main simulation and design jobs than practitioners in the simulation field had previously predicted
[14]	The distinction between meta-analytic integration at the patient- and trial-level is becoming less clear, which emphasizes the significance of hybrid multi-scale Model-based meta-analysis (MBMA) approaches.	The MBMA approaches are thought to represent the future frontiers of data science and quantitative pharmacology research.
[15]	The study showed that parallels between 3D technological applications, 3D space, creative considerations.	Cultural aspects lead to the conclusion that 3D character animation and digital sculpture are related
[16]	The article integrates the process of creating three-dimensional animation with virtual reality equipment and conducts simulation research via the digitization of characters' motions	To look into how three-dimensional animation has changed over time.
[17]	The article improves the animated image model, which uses controlled vertices to control the skin of the model.	The article offered a data structure that stores the data of the controlled vertices to control the managed vertex
[18]	The study enhanced the urban environment and may advance further with t he application of systematic planning and design using digital technology (DT)	The results can be significantly influenced by external factors when the dependability is low, even while the external influence for image processing focused on user interface is minimal and the identification speed is high.

The research concluded that the three-dimensional animation production method suggested in this research uses virtual reality creation technology, which has a positive impact and may help advance both virtual technology and animation technology [19]. The article suggested a novel strategy for using digital landscape in urban development was discovered, combining virtual processes, reconstruction techniques, digital construction, virtual interactive roaming technologies, and digital construction [20]. The article implemented the Iterated Function System (IFS) method to mimic the motion effect of swinging plants in their natural habitat [21]. The research verified the algorithm's efficiency as suggested. It overcomes the limits of interactive control and cuts down on rendering time as compared to conventional approaches [22]. The article showed that the accuracy, quantity, and rate of motion of models have all been significantly enhanced by the 3D modeling technique based on depth photographs [23]. The study examines that, whenever the bottom characteristics, such as overfitting or regression problems, cannot accurately reflect the animating characteristics, the texture learning model makes the model adequately parallelized, meaning that the top model variables may be left unaltered and only the bottom model has to be reassigned [24]. The research suggested a designoriented learning approach, the Advanced Animation Teaching Model. Design-based learning involves implementing cross-curricular difficulties and coming up with innovative solutions. The strategy adapts as needed to satisfy the demands of the contemporary market [25].

2.1 Contributions of the study

The study contributes by illuminating the use of a learning strategy to boost the performance of a predictive correction method (PCM) for 3D modeling technology. The advances in this study are summarized as follows:

- Based on an analysis of the results of prior research, this study develops the theoretical approach of 3D animation and the intervention model of the structure.

- To analyze virtual reality, suggested VR-PCM modeling technology for animation, and apply certain methods and theories to more applied aspects.

3 Proposed method

Technical expertise, ability requirements, and quality criteria should all be important to this model's pedagogical aims. Instruction is reorganized to be more project- and task-based. To optimize instructional value and effect, learn by doing, integrate the production chain with the teaching process, and use education collaboration agreements to turn the teaching aim into a production goal. Some institutions' 3D animation modeling design courses just prepare students to use software, rather than teach them the fundamentals of animation as an art form. Several pupils' 3D animation models suffer from this lack of aesthetic flair. The model is a work in progress for 3D animation software. The training program for the course is designed to foster students' practical and imaginative skills by guiding them through in-depth learning focused on projects, from the acquisition of specific skills to the development of more abstract ones. This section provides a comprehensive overview of virtual reality technology and the predictive correction approach and how they may be used to help students learn. The last step in assessing performance analysis is to compare it to a benchmark. Figure 2 displays the proposed method framework.

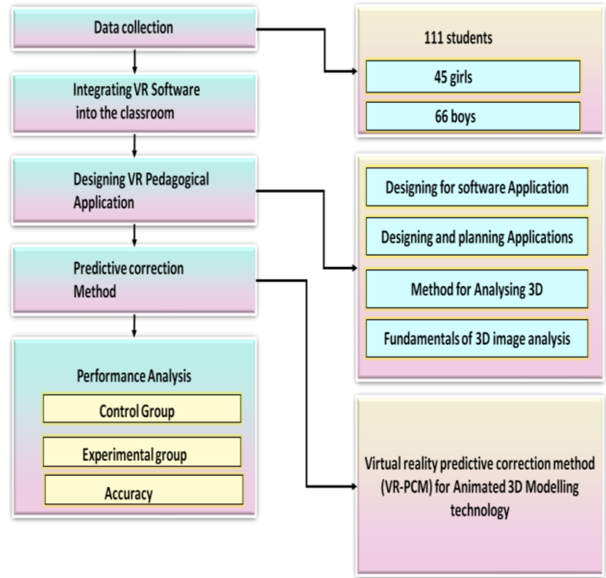

Figure 2: Framework of the proposed method

3.1 Data collection

The study included 111 students from a Chinese digital media design program, 45 of whom were girls (40.5%) and 66 of who were boys (59.5%). The ages of the pupils ranged from 19 to 21.

3.2 Integrating virtual reality (VR) software into the classroom

Virtual reality technology represents a new level of human-computer interaction. It's not just a realistic simulator; it enables users to experience the power of previously inaccessible scenes as well as the immediacy of objective reality by transcending time and place. To foster corporate reform, creativity, and progress, the conventional method of teaching main subjects in a classroom requires the assistance of modern technology. People are dedicated to incorporating virtual reality technology into the five established educational systems (art foundation, 2D animation production, 3D animation production, and 4D animation as part of the process of professional coursework setting. VR technology is mostly utilized in the 3D animation system, functioning as a link between earlier and later lessons. By putting on VR goggles, students may get a first-person perspective of a subject, making the information they read about in books seem more tangible, dynamic, and real to them.

3.3 Designing virtual reality pedagogical applications

3.3.1 Designs for software applications

Understanding the application's central goal, expected outcome, and engaging learning material is a must. Disparities in student thought are learned and fostered over time in the classroom. The primary goal of education should be the development of a visual way of thinking. According to proponents of the visual thinking idea, the two processes are inextricably linked. Vision is not only taking descriptions at face value but making broad, subjective inferences about the nature of objects. As a result, assisting pupils in better organizing their information and encouraging their sense-making is crucial. Then, the abilities, applicability, usability, and expertise of educational content design must be emphasized by combining the features of the educational system and the requirements of market positions.

3.3.2 Designing and planning applications

The current complete application system for the VR method is fully integrated with components, specialized skill coursework, and actual training classes of majors. Secondly, using VR technology in professional foundation courses can enhance teaching methods and pique students' interests. The following are the key areas in which it is applied in vocational skill training for animation. Teachers create modeling skill training environments using Virtual reality technology educators' skills needed, promote mutual use of Derived units to carry out relevant professional learning skills, and layout specialized training projects with professional skills. Teachers also encourage students to think critically and come up with solutions to issues on their own. Throughout the complete training course, it is crucial to provide students with as much exposure to genuine corporate production processes and enterprise environments as possible because the major has a significant practical component. To enhance the student's overall performance capability and practical operation ability, it is crucial to use virtual practice related to the study as the primary line and to continuously develop the educational arrangement line.

On the one extreme, virtual reality technology has been incorporated into professional foundational education. Courses aimed at developing marketable skills can benefit greatly from integrating 3D learning materials and VR technology. But, to implement the all-encompassing application of the curriculum system, the school-enterprise collaboration, industry anchoring, and other programs are introduced into execution and instruction, and the project is fragmented into many tasks. Virtual reality (VR) technology has the potential to immerse students in a sea of information by emulating several different sensory experiences, including real-world situational exposure, time and space travel, and the sensation of interacting with media. Students' interest and desire in learning are boosted, and they are given authentic possibilities to witness and participate in the process of building knowledge. To fully grasp a topic, it helps to visualize its components. To study in the conventional approach, one must confront one's textbook and conjure up images from the past, present, or future. They have trouble acting out their intellectual persona and quickly forget what they've been taught. Students learn best when they are engaged, and the immersive environments, fresh approaches, extensive material, and engaging interactions made possible by virtual reality technology all contribute to this.

3.3.3 Method for analyzing 3D images

The primary function of picture identification systems is environmental signals and data gathering, followed by object classification. That is, the algorithm can identify each target category present in the scene's picture regardless of the weather or the setting. To do this, the perceiving model must be trained using a big dataset consisting of many various kinds of target pictures. After the perception model has been trained and taught, it will automatically detect various forms of target data in the picture using the targeting characteristics it has acquired.

4 The fundamentals of 3D image analysis

Reconstructing a local point cloud model of the particular field first obtains matching photos of the newly included field fragmentary pictures in the previous image set, which together make up the landscape image set. A uniform set of coordinates among the landscape cloud point cloud models is created by aligning the projecting locations of the localized polygon mesh models of various fields in the same picture. It is necessary to generate a full 3D image model of the ground to determine the optimized synchronization conversion among point cloud sets, to realize the incorporation of the profession in its entirety with the local polygon mesh model, and to finish the 3D image assessment of the reasonable dispersion of the field.

4.1 Predictive correction method

Virtual reality (VR) systems can be made more accurate and efficient by using the Predictive Correction Method (PCM), especially for training purposes. Through real-time error prediction and correction, the PCM enhances VR training systems. Better learning outcomes result from this method's increased training precision and efficiency, particularly in challenging courses like 3D animation.

Steps in predictive correction

Prediction

Given the current values of m and b, the model forecasts the value of $\hat{y}$ is shown in equation (1)

$$\hat{y} = mx + b \quad (1)$$

Error Calculation

The difference between the actual value, y, and the anticipated value, $\hat{y}$, is used to determine the error, e is shown in equation (2).

$$e = y - \hat{y} \quad (2)$$

Corrected Prediction

The forecast is adjusted using an adjustment function, which may be as straightforward as a proportionate adjustment depending on the error is shown in equation (3):

$$\hat{y}_{t,corrected} = \hat{y}_t + \beta \,.\, e_t \quad (3)$$

Let's describe the Lagrangian connected to the issue and the multiplier R n(H+1),

$$\mathcal{L}(\mathrm{v(l)}, \bar{\mathrm{v}}, \bar{\mathrm{w}}, \lambda) = \mathrm{I}(\mathrm{v(l)}, \bar{\mathrm{v}}, \bar{\mathrm{w}}, \lambda) + \lambda^{\tau}\, \mathrm{d}(\mathrm{v(l)}, \bar{\mathrm{v}}, \bar{\mathrm{w}}) \quad (4)$$

Assume the vector,

$\mathrm{z} = [\bar{\mathrm{v}}^{\tau}, \bar{\mathrm{w}}^{\tau}, \lambda^{\tau}]^{\tau} \in \mathbb{R}^{\mathrm{G(2m+o)+2m}}$to condense the notation. The answers to the issue are supplied by

$$\nabla_{\mathrm{y}} \mathcal{L}(\mathrm{v(l)}, \mathrm{y}_{\mathrm{l}}^{*}) = 0 \quad (5)$$

So, our main attention will be on solving the aforementioned equation. Not just local minima, but also other stationary sites are solutions (13). As previously mentioned, the objective is a virtual reality for 3D animation that can calculate a solution quickly (2). When the iterates are situated in the quadratic convergence zone, Newton's technique converges quadratically — on a logarithmic scale. Technically, the iterate satisfies$\left\|\nabla_{\mathrm{y}} \mathcal{L}\left(\mathrm{v(l)}, \mathrm{y}_{\mathrm{l}}^{\mathrm{M}}\right), \mathrm{y}_{\mathrm{l}}^{\mathrm{M}}\right\| < \varepsilon$, $\mathrm{M} = \mathrm{P}\left(\log\log\left(\frac{1}{\varepsilon}\right)\right)$for any > 0 in N steps. The latter is a region close to the critical point that is affected by both the Lipschitz constant and eigenvalues of the Hessian of the Lagrangian. Because of the time-dependent nature of the issue that has to be solved, making sure that evolves stay in the quadratic converge zone becomes essential in this situation (2). In particular, the system development has been identified, and not assured the solution will still be in the area of quadratic convergence at the time i+ 1.

$$\nabla_{\mathrm{y}} \mathrm{y}^{*}(\mathrm{v}) = -\nabla_{\mathrm{yy}}^{2} \mathcal{L}\left(\mathrm{v}, \mathrm{y}^{*}(\mathrm{v})\right)^{-1} \nabla_{\mathrm{yv}} \mathcal{L}\left(\mathrm{v}, \mathrm{y}^{*}(\mathrm{v})\right) \quad (6)$$

The forecasting step that we specify next is based on the prior solution, which has already been utilized in [15] to solve the MPC issue roughly around a nominal state. The chain rule states that the derivative of the optimum solution concerning the state (cf. (3)) multiplied by the condition variation results in the variation of the best solution. With this concept in mind, the forecasting process is described as

$$\mathrm{y}_{\mathrm{l+1|l}} = \mathrm{y}_{\mathrm{l}} - \nabla_{\mathrm{yx}}^{2} \mathcal{L}(\mathrm{v(l)}, \mathrm{y}_{\mathrm{l}})\left(\mathrm{v(l+1)} - \mathrm{v(l)}\right) \quad (7)$$

The process variable will change to v (i + 1). As a result, all the factors required to calculate

$\left\|\mathrm{y}_{\mathrm{l+1|l}} - \mathrm{y}_{\mathrm{l+1}}^{*}\right\| < P(\mathrm{S}_{\mathrm{T}}^{2})$Are accessible at time i + 1.

$$\mathrm{y}_{\mathrm{l+1}} = \mathrm{y}_{\mathrm{l+1|l}} - \nabla_{\mathrm{yx}}^{2} \mathcal{L}\left(\mathrm{v(l)}, \mathrm{y}_{\mathrm{l+1|l}}\right)^{-1} \nabla_{\mathrm{y}} \mathcal{L}\left(\mathrm{v(l+1)} - \mathrm{y}_{\mathrm{l+1|l}}\right) \quad (8)$$

A control law is defined by the prediction-correction method (4)–(5).

$$\mathrm{w(l)} = \mathrm{l}(\mathrm{v(l)}, \mathrm{v(l-1)}, \mathrm{y}_{\mathrm{l-1}}) \coloneqq \bar{\mathrm{w}}_{\mathrm{l,1,}}\ \forall \mathrm{l} > 0 \quad (9)$$

By using standard Newton procedures, it is possible to determine the initial control input. The complexity needed to guarantee a correct solution is manageable since this calculation may be performed offline before the system begins developing. To achieve this, we must first limit the inaccuracy of answering the problem using the prediction-correction approach, which was proposed in (4) through (5) and is employed for modeling technology. Hypothesis1: Let,

$\mathrm{y}^{*}: \mathbb{R}^{\mathrm{m}} \to \mathbb{R}^{\mathrm{(m+o+2)G}}$If y is a function, then

$$\nabla_y \mathcal{L}\left(v, y^*(l)\right) = 0 \qquad (10)$$

The eigenvalues of the gradient of the Lagrangian with regards to z at the point are denoted as

$$j = 1 \ldots \min_{(m+o+2)} \left|\left(\nabla^2_{yx}\mathcal{L}\left(v, y^*(v)\right)\right)\right| > 2n \qquad (11)$$

The function of sufficiently smooth, according to assumption 2,

$$\left\|\nabla_y \mathcal{L}(v, y)\right\| \leq D_{0,} \left\|\nabla_{yyy} \mathcal{L}(v, y)\right\| \leq D_1$$

$$\left\|\nabla_y \mathcal{L}(v, y)\right\| \leq D_{2,} \left\|\nabla_{yyy} \mathcal{L}(v, y)\right\| \leq D_3 \qquad (12)$$

As it sets a consistent constraint on the absolute value of the lowest eigenvalues of that matrix, hypothesis 1 is a more demanding condition.

Statistical analysis

Software called SPSS 20.0 was used to do the statistical analysis. The Mann-Whitney U-test was employed to assess the statistical significance of the disparities between traditional and VR tools with respect to usability, enjoyment, and acceptability for 3D model production. Additionally, an independent sample t-test was used to identify significant variations in cognitive burden.

5 Result And evaluation

The study compared and contrasted the results of two groups of students on measures of course satisfaction, quality evaluation, comparative study, professional teaching impacts, and accuracy evaluation. Table 2 shows the simulation setup.

Table 2: Simulation setup

Category	**Illustrate**	**Example**
Software Environment	Specialized instruments for VR development	Unreal Engine , Unity
	VR SDK	Kit for developing software to interface with virtual reality devices.
Hardware Environment	VR helmet	HTC Vive , Oculus Rift,
	Computers with GPUs that are optimized for performance	Verify that real-time rendering is fluid.

5.1 Course satisfaction

The detailed assessment outcomes are displayed in Figure 3 and Table 3. Twenty-eight percent, eight percent, and thirty percent of control group students are happy with the classroom environment, the teaching techniques, and the learning centers, respectively, according to the poll. Seventy-three percent, sixty percent, and eighty percent of students in the experimental group are pleased with the classroom setting that incorporates virtual reality technology. According to the results of the poll, using virtual reality (VR) in the classroom is a powerful way to pique students' curiosity about new topics and enhance the quality of instruction.

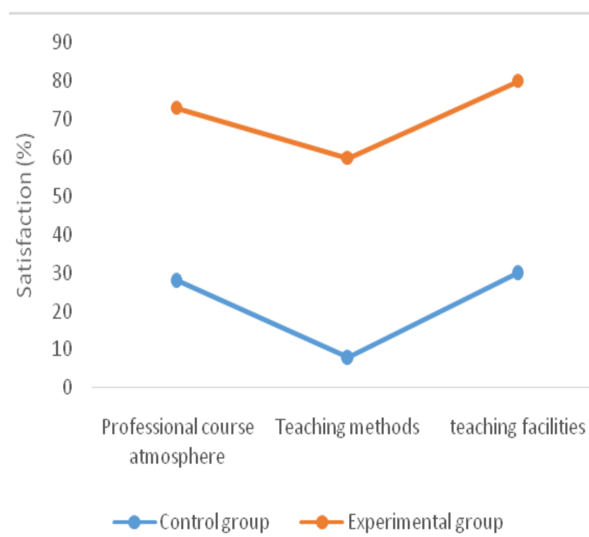

Figure 3: Satisfaction level of the course

Table 3: Course satisfaction

Types	Satisfaction (%)	
	Control group	Experimental group
Professional course atmosphere	28	73
Teaching methods	8	60
teaching facilities	30	80

5.2 Quality assessments

The method of group scoring is used in the all-encompassing quality assessment, with everyday conduct, the rate of success in professional schools, social process, and competition rewards all playing significant roles in the evaluation. The assessment team is made up of the department heads, a select number of certified classroom teachers, two sets of eyes and ears to keep an eye on things, as well as the class's designated student researchers and five top pupils to symbolize the student body. Attendance, academic standing, motivation, and assignment completion are all examples of everyday behaviors. The detailed assessment findings are displayed in Figure 4 and Table 4.

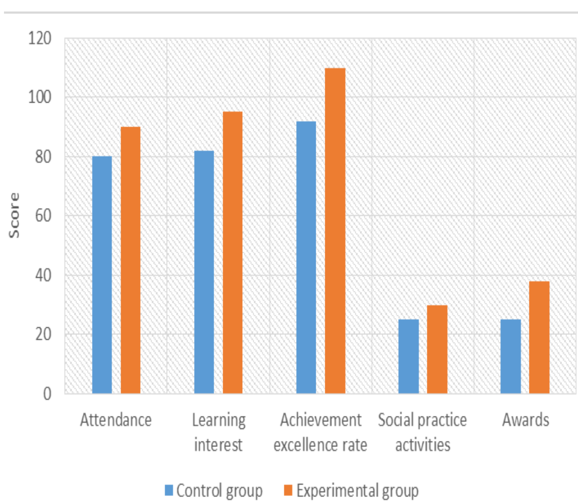

Figure 4: Quality evaluation

Table 4: Comprehensive analysis of quality evaluations

Evaluation's	Control group	Experimental group
Attendance	80	90
Learning interest	82	95
Achievement excellence rate	92	110
Social practice activities	25	30
Awards	25	38

5.3 Analysis of two groups

Participation and attention are weighted at 100%, the outstanding rate is weighted at "percent + matching score," the social assessments and reward scenario are weighted at 2 to 4% each time, and the final score is determined by the accomplishments of each participant. The results of the above effect analysis demonstrate that students in the experimental group performed better on all assessment contents than those in the control group, demonstrating the substantial role played by the incorporation of VR technology in the educational effect. Figure 5 and Table 5 depict the analysis of the two groups.

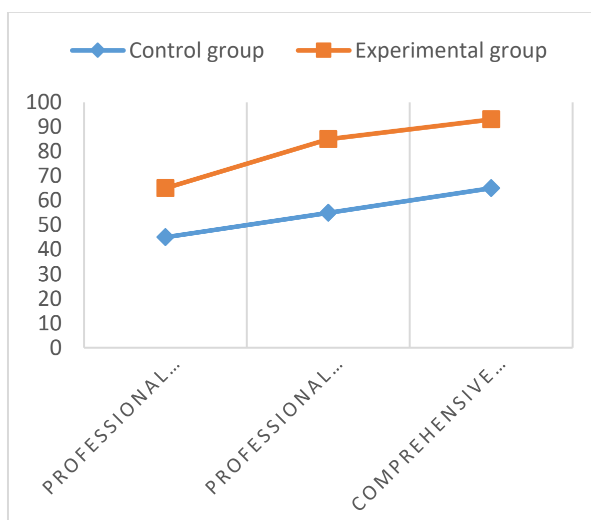

Figure 5: Analysis of two groups

Table 5: Comprehensive method for two groups

Evaluations	Control group	Experimental group
Professional basic groups	45	65
Professional skill course	55	85
Comprehensive training	65	93

5.4 Impact of professional core classes on instruction

The effectiveness of mandatory professional education courses is depicted in Figure 6 and Table 6. Throughout the procedure of animator modeling, fundamental composition skills, headgear and props, clothes, and color matching are the four most important parts of the central image of animation modeling techniques. Students get a firm grasp of fundamental composition skills during the learning experience of introductory art classes. The emphasis and complexity of the modeling course are on the other four components of learning the topic. As compared to the control group, students in the experimental group more successfully incorporated the creative design into their cartoon modeling work and produced high-quality work for the course design assignment. The results indicate that students in the control group are still attempting to draw using the knowledge they already possessed. The percentage of students in the control group whose design projects were judged to be subpar by experienced educators is 15%, but that number drops to 7% in the experimental group.

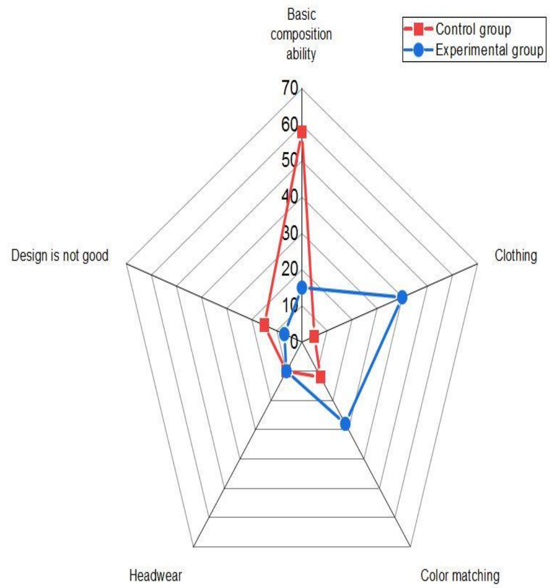

Figure 6: Professional educational courses

Table 6: Comparison of core courses

Professional core course	Percentage (%)	
	Control group	Experimental group
Basic composition ability	58	15
Clothing	5	40
Color matching	12	28
Headwear	10	10
The outcome of an all-encompassing design is negative	15	7

5.5 Accuracy

A statistical metric known as accuracy may quantify how accurate a particular result is. Accuracy is often defined as the degree to which a value obtained is representative of the amount being measured. As a result, our suggested method achieves higher accuracy when compared with other existing methods. Figure 7 and Table 7 display the accurate measurements. Accuracy is expressed by,

$$\text{Accuracy} = (\text{TP} + \text{TN})/(\text{TP} + \text{TN} + \text{FP} + \text{FN}) \quad (13)$$

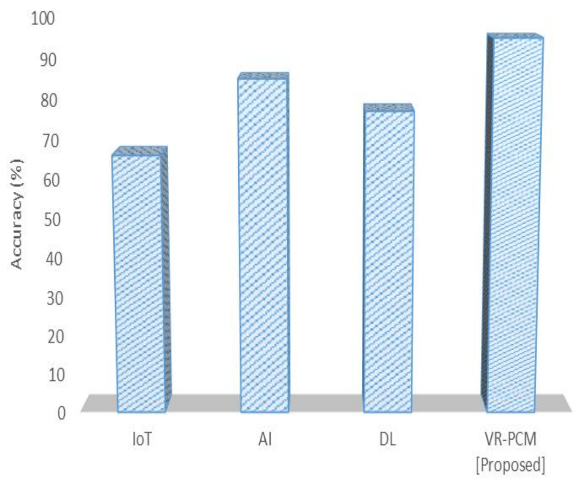

Figure 7: Comparison of accuracy

Table 7: Accuracy

Methods	Accuracy (%)
IoT [24]	66
AI [25]	85
DL [26]	77
VR-PCM [Proposed]	95

6 Conclusion

Virtual reality is advancing along with science and technology's ongoing growth. It offers a fresh approach to the production of animations. When used, a trustworthy human-computer interface technology is required to enable VR-based animation tasks. VR-PCM technology, as a cutting-edge example of today's educational technologies, has had far-reaching effects on the way we think about and approach education. The primary focus of this study is on investigating the use of VR-PCM technology in the classroom setting. Using the history of VR-PCM mankind's evolution and the present state of the industrial education system evolution as a basis for analysis, this article examines the technology's potential to improve the education of animators. By developing a computation skill scene, it dissects and showcases skill procedure content conclusively and sensitively; by removing the limitations posed by climate and air-bag factors in the past, it flawlessly implements the evaluation project and produces a clear result. With the use of virtual reality and physical computer-generated media (VR-PCM) technologies, the animation industry may better prepare its future workforce to meet the needs of an ever-changing market. Virtual reality (VR) technologies have a lot of room to grow and a lot of prospective buyers, meaning they will have a huge influence on human life and work in the future.

Reference

[1] Li, L., Zhu, W. and Hu, H., 2021. Multivisual animation character 3D model design method based on VR technology. *Complexity*, 2021, pp.1-12.

[2] Paes, D., Irizarry, J. and Pujoni, D., 2021. Evidence of cognitive benefits from immersive design review: Comparing three-dimensional perception and presence between immersive and non-immersive virtual environments. *Automation in Construction*, 130, p.103849.

[3] Ismail, W.A.F.W., Baharuddin, A.S., Mutalib, L.A. and Kahar, N.S.A., 2020. The Admissibility of Digital Document: Review on Its Current Classification from Islamic Perspectives. *INSLA E-Proceedings*, 3(1), pp.519-524.

[4] Zhao, K. and Guo, X., 2022. Analysis of the application of virtual reality technology in football training. *Journal of Sensors*, 2022.

[5] Kim, R.W., Kim, J.G., Lee, I.B., Yeo, U.H., Lee, S.Y. and Decano-Valentin, C., 2021. Development of three-dimensional visualization technology of the aerodynamic environment in a greenhouse using CFD and VR technology, Part 2: Development of an educational VR simulator. *Biosystems Engineering*, 207, pp.12-32.

[6] Liu, X. and Pan, H., 2022. The path of film and television animation creation using virtual reality technology under artificial intelligence. *Scientific Programming*, 2022, pp.1-8.

[7] Cao, Y. and Li, Z., 2022. Research on Dynamic Simulation Technology of Urban 3D Art Landscape Based on VR-Platform. *Mathematical Problems in Engineering*, 2022.

[8] Zhang, R.X. and Zhang, L.M., 2021. Panoramic visual perception and identification of architectural cityscape elements in a virtual-reality environment. *Future Generation Computer Systems*, 118, pp.107-117.

[9] Tan, S., 2022. Animation Image Art Design Mode Using 3D Modeling Technology. *Wireless Communications and Mobile Computing*, 2022.

[10] González Izard, S., Sánchez Torres, R., Alonso Plaza, O., Juanes Mendez, J.A. and García-Peñalvo, F.J., 2020. Nextmed: automatic imaging segmentation, 3D reconstruction, and 3D model visualization platform using augmented and virtual reality. *Sensors*, 20(10), p.296

[11] Xu, Z. and Zheng, N., 2020. Incorporating virtual reality technology in safety training solutions for the construction site of urban cities. *Sustainability*, 13(1), p.243.

[12] Zeng, L. and Dong, X., 2021. Artistic style conversion based on 5G virtual reality and virtual reality visual space. *Mobile Information Systems*, 2021, pp.1-8.

[13] Kononowicz, A.A., Woodham, L.A., Edelbring, S., Stathakarou, N., Davies, D., Saxena, N., Car, L.T., Carlstedt-Duke, J., Car, J. and Zary, N., 2019. Virtual patient simulations in health professions education: systematic review and meta-analysis by the digital health education collaboration. *Journal of medical Internet research*, 21(7), p.e14676.

[14] Upreti, V.V. and Venkatakrishnan, K., 2019. Model-based meta-analysis: optimizing research, development, and utilization of therapeutics using the totality of the evidence. *Clinical Pharmacology & Therapeutics*, 106(5), pp.981-992.

[15] Zhao, J. and Zhao, X., 2022. Computer-aided graphic design for virtual reality-oriented 3D animation scenes. Computer-Aided *Design and Applications*, 19(1).

[16] Gao, Q., 2022. Design and Implementation of a 3D Animation Data Processing Development Platform Based on Artificial *Intelligence. Computational Intelligence and Neuroscience*, 2022.

[17] Hu, Z. and Liu, L., 2023. Research on the application of virtual reality technology in 3D animation creation. *Optik*, 272, p.170274.

[18] Gong, Y., 2021. Application of virtual reality teaching method and artificial intelligence technology in digital media art creation. Ecological *Informatics*, 63, p.101304.

[19] Mora-Serrano, J., Muñoz-La Rivera, F. and Valero, I., 2021. Factors for the automation of the creation of virtual reality experiences to raise awareness of occupational hazards on construction sites. *Electronics*, 10(11), p.1355.

[20] Gong, P. and Li, J., 2022. Application of Computer 3D Modeling Technology in Modern Garden Ecological Landscape Simulation Design. *Security and Communication Networks*, 2022.

[21] Tian, Z., 2022. Application of Computer 3D Modeling Technology in the Simulation Design of Modern Garden Ecological Landscape. *Mathematical Problems in Engineering*, 2022.

[22] Wang, Y., Zhang, N., Chen, D. and Vongphantuset, J., 2022. Animation design using virtual reality modeling and fractal morphing technology. *Fractal*s, 30(02), p.2240100.

[23] Gan, B., Zhang, C., Chen, Y. and Chen, Y.C., 2021. Research on role modeling and behavior control of virtual reality animation interactive system in the Internet of Things. *Journal of Real-Time Image Processing*, 18, pp.1069-1083.

[24] Liu, B., 2022. Research on Virtual Interactive Animation Design System Based on Deep Learning. *Computational Intelligence and Neuroscience*, 2022.

[25] Lulu, J., Xiuhua, L. and Wei, F., 2022. Analysis of Animation Peripheral Design Ability Based on Artificial Intelligence. *Scientific Programming*, 2022.

[26] Ho, L.H., Sun, H. and Tsai, T.H., 2019. Research on 3D painting in virtual reality to improve students' motivation for 3D animation learning. *Sustainability*, 11(6), p.1605.