

Exploring Virtual Reality as a Complementary Tool for Film Education in Rwanda: A Case Study of East African University Rwanda

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Abstract

The integration of emerging technologies into higher education has created new possibilities for improving practical and experiential learning. Film education requires continuous opportunities for students to practise cinematography, camera operation, lighting, sound recording, directing, editing, and visual storytelling. However, limited access to production equipment may restrict students' opportunities to practise independently and develop technical competencies. Virtual Reality (VR) offers a potential complementary approach by providing immersive and simulated environments in which students can explore cinematographic concepts, practise camera positioning, understand framing and composition, and rehearse production decisions before using physical equipment. This study explored lecturers' perceptions of VR as a complementary tool for film education at East African University Rwanda. A qualitative research approach and case study design were adopted. The study involved all six lecturers in the Film Making and Film Production programme. Data were collected through semi-structured interviews and analysed thematically. Three major themes emerged: limited access to practical equipment, perceived pedagogical value of VR for student self-practice, and requirements and challenges associated with VR adoption. All six lecturers expressed positive views regarding the potential use of VR as a supplementary learning tool. Participants indicated that VR could provide additional opportunities for independent practice, visualization of film-production concepts, experimentation with camera placement, repetition, and preparation for practical sessions. Nevertheless, lecturers emphasized that VR should complement rather than replace physical equipment and real production activities. The study concludes that VR has potential to strengthen practical film education in Rwanda, particularly where access to physical equipment is limited. Successful implementation, however, requires

institutional investment, lecturer training, suitable film-specific content, technical support, curriculum integration, and appropriate student access.

Keywords: *Virtual Reality, film education, cinematography, practical learning, self-practice*

1. Introduction

Technological developments have significantly transformed teaching and learning in higher education. Among emerging technologies, Virtual Reality (VR) has attracted increasing attention because it enables learners to interact with simulated three-dimensional environments through immersive and experiential activities. Unlike conventional classroom instruction, VR can create learning situations in which students explore, manipulate, observe, and practise activities within a controlled digital environment. Research indicates that immersive technologies can support engagement, conceptual understanding, spatial awareness, and experiential learning when they are appropriately integrated into educational activities (Radianti et al., 2020; Wohlgenannt et al., 2021).

The potential value of VR is particularly relevant to practical and professionally oriented programmes. Film education, for example, requires students to develop both theoretical knowledge and practical competencies. Students studying filmmaking and film production are expected to acquire skills in cinematography, camera operation, lighting, sound recording, directing, editing, production design, and visual storytelling. These competencies cannot be fully developed through theoretical instruction alone because learners need repeated opportunities to practise, make mistakes, receive feedback, reflect on outcomes, and apply production principles in realistic situations. Experiential learning theory emphasizes the importance of concrete experience, reflection, conceptualization, and active experimentation in meaningful learning (Kolb, 1984).

Despite the practical nature of film education, access to production equipment can present an important challenge. Cameras, lenses, tripods, lighting kits, microphones, sound recorders, editing computers, and studio spaces can be expensive and limited in number. When several students depend on the same equipment, opportunities for individual practice may be reduced. Students may understand cinematographic principles theoretically while having insufficient

opportunities to practise independently with real equipment. Such limitations may affect confidence, technical development, and preparedness for professional production environments.

The challenge is particularly relevant to cinematography because students need repeated practice to understand the relationship between camera position, lens choice, framing, perspective, lighting, and subject movement. A student may understand the meaning of a high-angle shot, shot size, or three-point lighting in theory but still experience difficulty applying the concept during production. Repeated experimentation is therefore important for developing practical competence.

VR may provide a complementary opportunity for addressing some of these challenges. In a virtual environment, students can explore simulated production spaces, practise camera positioning, examine shot sizes, experiment with lighting arrangements, understand spatial relationships, and rehearse production decisions without requiring continuous access to physical equipment. VR can also allow students to repeat activities and experiment with different approaches. Such possibilities make it potentially relevant to self-directed and preparatory learning (Radianti et al., 2020; Wohlgenannt et al., 2021).

However, VR should not automatically be regarded as a replacement for physical film-production training. Real filmmaking requires students to interact with cameras, lenses, lighting instruments, microphones, actors, locations, cables, and production teams. Therefore, the pedagogical value of VR in film education is more appropriately considered in terms of how it can complement physical practical training.

Recent research has shown growing interest in immersive technologies in African higher education. Ngiruwonsanga and Habimana (2026), for example, reported generally positive perceptions of extended reality and VR among postgraduate students in Rwanda, although technical and usability challenges were also identified. Other research indicates that successful VR adoption depends not only on the availability of devices but also on institutional readiness, pedagogical relevance, user confidence, technical support, and curriculum integration (Hamilton et al., 2021; Radianti et al., 2020).

Nevertheless, limited research has examined VR specifically within film education in Rwanda. Much of the existing literature has focused on medicine, engineering, science, teacher

education, and general higher education. Film education presents particular learning requirements because it involves spatial composition, visual framing, camera movement, lighting, scene blocking, continuity, and practical production workflows. Consequently, there is a need to understand whether VR could provide meaningful complementary support within this specific educational context.

At East African University Rwanda, students in the Film Making and Film Production programme require opportunities to develop practical competencies through direct engagement with production equipment. However, the available equipment may not always provide sufficient opportunities for every student to practise independently. This creates a need to explore complementary approaches that could support students' learning before and between physical practical sessions.

Therefore, this study explored lecturers' perceptions of VR as a complementary tool for film education at East African University Rwanda. Specifically, the study examined lecturers' experiences of practical film education and equipment access, their perceptions of the potential usefulness of VR for film education and student self-practice, and the requirements and challenges associated with adopting VR within the programme. The study was guided by three research questions:

1. What challenges do lecturers experience in practical film education, particularly regarding students' access to film-production equipment?
2. How do lecturers perceive the potential usefulness of VR in supporting film education and students' self-practice?
3. What requirements and challenges are associated with adopting VR as a complementary tool for film education at East African University Rwanda?

2. Literature Review

2.1 Virtual Reality in Higher Education

Virtual Reality is a computer-generated environment that allows users to interact with simulated spaces and objects, often through head-mounted displays and motion controllers. VR can provide a sense of immersion and presence, enabling learners to experience environments

from a first-person perspective. In higher education, VR has been used to support simulations, laboratory activities, field experiences, professional training, and experiential learning.

Radianti et al. (2020) found that immersive VR applications in higher education can support authentic learning experiences, particularly when activities are carefully designed around educational objectives. Their systematic review emphasizes that effective VR learning environments require clear learning goals, interaction, feedback, appropriate levels of immersion, and alignment with curriculum requirements. This suggests that the educational value of VR depends not simply on the technology itself but on how it is incorporated into teaching and learning.

Merchant et al. (2014) similarly found that VR-based instruction can positively influence learning outcomes, although effectiveness varies according to instructional design and the characteristics of the learning activity. VR is therefore not automatically effective simply because it is technologically advanced. Its usefulness depends on whether the technology supports the learning process and provides students with meaningful opportunities to engage with the intended concepts and skills.

Deuchler et al. (2025) further observed that immersive VR research in higher education continues to develop and that studies do not always employ consistent theoretical and methodological frameworks. This highlights the importance of evaluating VR according to specific educational purposes rather than adopting it solely because it represents technological innovation.

For film education, this distinction is important. A VR system may be technologically sophisticated but have limited educational value if it does not address the actual competencies students need to develop. Film-specific applications should therefore be designed around learning activities such as framing, camera positioning, lighting, composition, scene blocking, and production planning.

2.2 Virtual Reality and Experiential Learning

Experiential learning provides an important theoretical basis for understanding the potential contribution of VR to practical film education. Kolb (1984) argues that learning develops through a cycle involving concrete experience, reflective observation, abstract

conceptualization, and active experimentation. Learners therefore develop knowledge not only by receiving information but also by performing activities, reflecting on their experiences, developing explanations, and testing alternative approaches.

VR can potentially support this learning cycle by allowing students to perform simulated activities, observe the consequences of their decisions, reflect on outcomes, and repeat activities with modifications. For example, a cinematography student could position a virtual camera, observe how the composition changes, reflect on the visual result, and reposition the camera to improve the shot.

Wohlgenannt et al. (2021) argue that VR offers opportunities for holistic experiential learning because it can combine action, immersion, feedback, and reflection within simulated environments. This is particularly relevant to film education because students need to understand the relationship between technical decisions and visual outcomes. A learner may know the definition of a camera angle but develop deeper understanding by actively changing the camera position and observing the resulting image.

However, simulated experience should not be treated as identical to physical experience. Experiential learning in filmmaking also involves physical interaction with equipment, collaboration with other production personnel, communication with actors, and responses to unpredictable real-world production conditions. VR can therefore support parts of the experiential learning cycle while physical practical training remains essential.

2.3 Virtual Reality for Spatial and Visual Learning

Film production contains strong spatial and visual components. Students must understand relationships among the camera, subject, light sources, background, foreground, movement, and screen direction. These concepts may sometimes be difficult to communicate through verbal explanations or static diagrams alone.

VR can support spatial learning by allowing students to move around virtual environments and observe production arrangements from different viewpoints. Students may explore how changing the camera position affects perspective, how lighting direction creates shadows, and how the distance between the camera and subject influences framing.

Within cinematography education, VR could potentially be used to demonstrate camera angles and camera height, shot sizes, framing, rule of thirds, visual composition, camera movement, lens perspective, depth of field, lighting direction, three-point lighting, scene blocking, continuity, screen direction, and spatial relationships between actors and cameras.

These possibilities may allow students to develop visual understanding before they use physical equipment. They may also allow students to repeat activities and compare alternative production decisions. Nevertheless, the effectiveness of such activities would depend on the quality and relevance of the VR content.

2.4 Technology Acceptance and Adoption of VR

The adoption of educational technology is influenced by users' perceptions of its usefulness and ease of use. Davis's (1989) Technology Acceptance Model (TAM) identifies perceived usefulness and perceived ease of use as important factors influencing technology acceptance.

Perceived usefulness refers to the extent to which a person believes that a technology can improve performance or assist in accomplishing a task. Within this study, perceived usefulness concerns lecturers' views regarding whether VR could improve film teaching, support student practice, assist visualization, and respond to limitations in access to physical equipment.

Perceived ease of use refers to the extent to which a person believes that a technology can be used without excessive effort. In the context of this study, this includes lecturers' views regarding the simplicity of operating VR equipment, availability of technical support, lecturer training, appropriate content, and institutional infrastructure.

TAM is particularly relevant because positive perceptions of VR do not necessarily mean that implementation will be straightforward. Lecturers may recognize the pedagogical potential of VR while simultaneously identifying barriers such as cost, lack of training, inadequate technical support, limited equipment, and curriculum integration. Hamilton et al. (2021) similarly emphasize the importance of instructor attitudes and institutional conditions in implementing immersive VR in higher education.

The present study therefore uses TAM as a sensitizing framework rather than a statistical model. It helps to interpret lecturers' perceptions of VR's potential usefulness and the conditions that may influence its practical adoption.

2.5 Synthesis of the Literature and Research Gap

The literature indicates that VR can support immersive, experiential, spatial, and visual learning when it is appropriately designed and integrated into educational activities. Existing research also shows that VR adoption depends on more than the availability of hardware. Curriculum alignment, instructor preparedness, technical support, appropriate content, and institutional readiness are important considerations (Hamilton et al., 2021; Radianti et al., 2020).

There is, however, a relative lack of research examining VR specifically in film education within Rwanda. Existing research on VR in education has concentrated more heavily on areas such as medicine, science, engineering, teacher education, and general higher education. Film education differs because students must develop competencies involving visual composition, camera operation, spatial relationships, lighting, scene blocking, and collaborative production.

This study addresses this gap by examining lecturers' perceptions within the Film Making and Film Production programme at East African University Rwanda. The study therefore connects the broader literature on immersive learning and technology acceptance with the specific practical requirements of film education in a Rwandan university context.

2.6 Theoretical and Conceptual Framework

2.6.1 Technology Acceptance Model

The study was partly guided by the Technology Acceptance Model developed by Davis (1989). The model emphasizes perceived usefulness and perceived ease of use as key considerations in technology acceptance. In this study, perceived usefulness relates to whether lecturers believe VR can improve film teaching and support student self-practice. Perceived ease of use relates to the availability of training, technical support, appropriate content, and institutional infrastructure.

The model provided a framework for examining why lecturers might support VR while also identifying conditions that could influence implementation. Because the study was qualitative, TAM was used to sensitize the research rather than to test statistical relationships.

2.6.2 Experiential Learning Theory

The study was also informed by Kolb's (1984) Experiential Learning Theory. The theory proposes a cycle involving concrete experience, reflective observation, abstract conceptualization, and active experimentation. VR may support this cycle by allowing students to experience simulated production situations, observe visual outcomes, understand the principles behind those outcomes, and experiment with alternative approaches.

The combination of TAM and Experiential Learning Theory provides a suitable framework for examining both the potential pedagogical value of VR and the conditions influencing its adoption in practical film education.

2.6.3 Conceptual Framework

The conceptual framework developed from the literature connects three major areas. The first is the existing challenge of limited access to physical film-production equipment. These challenges include limited cameras and lenses, limited lighting and sound equipment, large numbers of students sharing equipment, restricted access outside scheduled practical sessions, short practical sessions, and limited opportunities for individual practice.

The second area is the perceived pedagogical value of VR. This includes improved visualization of film concepts, opportunities for self-practice, simulation of camera positions and framing, practice in lighting and scene blocking, repetition without risk of damaging equipment, and preparation before physical production.

The third area concerns the conditions required for adoption. These include availability of VR headsets, suitable film-specific content, lecturer training, technical support, institutional funding, curriculum integration, adequate learning space, maintenance, and equipment management.

The framework assumes that the contribution of VR depends on whether it responds to actual teaching challenges and whether the institution can provide the conditions necessary for implementation. The expected complementary contribution includes increased opportunities for student practice, better preparation for physical practical sessions, improved understanding of spatial and visual concepts, greater learner confidence, and more effective use of limited physical equipment.

3. Methodology

3.1 Research Approach

The study adopted a qualitative research approach. A qualitative approach was appropriate because the study sought to understand lecturers' experiences, perceptions, opinions, expectations, and concerns regarding the possible use of VR in film education. Qualitative research is useful when researchers seek to understand how participants interpret a phenomenon within its real-life context (Creswell & Poth, 2018).

3.2 Research Design

A qualitative case study design was used. The case was the Film Making and Film Production programme at East African University Rwanda. Case study research enables researchers to investigate a contemporary issue within its natural institutional setting and obtain detailed information from participants who have direct experience of the issue (Yin, 2018).

The design was suitable because the potential adoption of VR cannot be understood separately from the university's equipment availability, teaching practices, curriculum, staff expertise, and institutional conditions. Examining the issue within the programme therefore provided an appropriate context for understanding lecturers' perceptions.

3.3 Study Population and Participants

The study population consisted of six lecturers involved in teaching Film Making and Film Production at East African University Rwanda. Because the population was small and clearly defined, all six lecturers were included in the study.

The participants had experience teaching practical and theoretical film-related courses. Their areas of teaching included cinematography, film production, editing, sound recording, directing, lighting, and practical training. To maintain confidentiality, participants were identified using the codes L1 to L6.

3.4 Sampling Technique

Total population sampling was used. This technique involves including every member of a small and clearly defined population in the study. The approach ensured that the views of all available lecturers in the programme were represented.

3.5 Data Collection

Data were collected through semi-structured interviews with the six lecturers. The interviews focused on lecturers' experiences of practical film education, challenges associated with students' access to production equipment, perceptions of the potential usefulness of VR, opportunities for student self-practice, and requirements and challenges associated with VR adoption.

The semi-structured approach provided an opportunity to obtain participants' views while maintaining focus on the study objectives and research questions.

3.6 Data Analysis

The interview data were analysed using thematic analysis. Thematic analysis was appropriate because the study aimed to identify recurring patterns and meanings within lecturers' accounts. The analysis resulted in three major themes corresponding to the central areas of investigation: challenges in practical film education and equipment access; perceived usefulness of VR for film education and student self-practice; and requirements and challenges for VR adoption.

3.7 Ethical Considerations

The study maintained participant confidentiality by identifying lecturers through codes rather than personal names. The findings are therefore reported using the identifiers L1 through L6. The source material available for this study does not provide additional details concerning a formal ethics approval number or institutional ethics committee procedure; such information has consequently not been added to avoid introducing unsupported information.

4. Results

4.1 Participant Profile

The study involved six lecturers from the Film Making and Film Production programme at East African University Rwanda. All participants had experience teaching practical and theoretical film-related courses.

Participant	General Role	Area of Experience
L1	Film lecturer	Cinematography and camera operation
L2	Film lecturer	Film production and directing
L3	Film lecturer	Editing and post-production
L4	Film lecturer	Sound recording and production
L5	Film lecturer	Cinematography and lighting
L6	Film lecturer	Film production and practical training

Theme One: Challenges in Practical Film Education and Limited Access to Equipment

The first theme concerned the challenges lecturers experienced when delivering practical film education. All six lecturers indicated that limited access to equipment was one of the main challenges affecting students' practical learning. Participants explained that the number of available cameras, lenses, lighting kits, sound equipment, and other production resources was not always sufficient for every student to practise individually.

Lecturers reported that students often had to work in groups because equipment was shared. Although group work was considered useful for teamwork and collaborative production, it reduced the amount of time each individual student could spend directly operating equipment. One lecturer explained:

“The main challenge is that students cannot all practise with the camera at the same time. When one group is using the equipment, other students have to wait or observe.” (L1)

Another participant emphasized the importance of repetition:

“Film is a practical discipline. Students need to repeat an activity several times, but because equipment is limited, they may only get one opportunity during a practical session.” (L5)

The lecturers also noted that practical sessions were constrained by the university timetable. Students could not always access equipment outside scheduled classes, even when they wanted to practise or revise a particular skill. L3 explained:

“A student may understand editing or cinematography theoretically but still need more time to practise. The problem is that access to equipment is not always available when the student needs it.” (L3)

Participants further indicated that limited equipment access could affect students' confidence and independence. Students who had fewer opportunities to operate cameras, adjust lighting, or practise framing could become dependent on more experienced group members.

L2 observed:

“Some students become observers rather than active practitioners. The stronger students operate the equipment while others mainly watch.” (L2)

Overall, the findings suggest that equipment limitations create a gap between theoretical understanding and individual practical experience. Although group production supports teamwork and collaboration, it does not necessarily provide every student with sufficient opportunities to repeat technical activities independently.

Theme Two: Perceived Usefulness of VR for Film Education and Student Self-Practice

The second theme focused on lecturers' perceptions of the potential usefulness of VR. All six lecturers expressed positive views regarding the potential use of VR in film education. Participants generally agreed that VR could be adopted as a complementary tool to support teaching, revision, visualization, and student self-practice.

The lecturers did not perceive VR as a replacement for physical cameras and production equipment. Instead, they viewed it as an additional learning environment that could help students prepare for practical sessions and understand concepts before using real equipment.

L1 stated:

“VR cannot replace the real camera, but it can help students understand how to position the camera, choose the angle, and organize the frame before they use the actual equipment.” (L1)

Similarly,

L4 explained:

“The importance of VR is that students can practise some decisions repeatedly without waiting for the equipment. It can help them prepare before coming to the practical class.” (L4)

All participants emphasized the potential of VR for student self-practice. Lecturers believed students could independently repeat exercises involving camera angles, framing, composition, camera movement, and scene arrangement. L5 stated:

“Students can use a virtual environment to practise camera positions and framing. They can try different angles and see how the image changes.” (L5)

L6 added:

“If the VR system is available, students can revise what they learned in class and practise on their own. This is important because practical time at university is limited.” (L6)

Participants also indicated that VR could support the visualization of abstract or difficult cinematographic concepts. Students could potentially observe the effects of changing camera height, distance, lens, lighting direction, and subject position. L2 explained:

“Some concepts are difficult to explain only through diagrams. With VR, students can enter the environment and see the relationship between the camera, subject, lights, and background.” (L2)

The lecturers also believed that VR could support safe experimentation. Students could make mistakes in a virtual environment without damaging equipment or interrupting a real production. L3 noted:

“Students can experiment with different arrangements without fear of damaging the camera or lighting equipment. They can learn from mistakes before working on a real set.” (L3)

Another perceived benefit was repetition. Participants indicated that repetition is important in technical film training and that VR could provide students with additional opportunities to repeat activities. L1 stated:

“The student can repeat the same exercise many times. That repetition can improve understanding and make the student more prepared for the physical practical.” (L1)

Participants identified several areas in which VR could potentially support film education, including camera angles, shot sizes, framing, composition, camera movement, lens selection, depth of field, lighting direction, three-point lighting, scene blocking, camera placement, continuity, production planning, and virtual studio orientation.

However, lecturers emphasized that VR would be most useful during preparation, visualization, revision, and conceptual practice. Actual physical handling of cameras, lenses, microphones, cables, lighting instruments, and other equipment would still require real-world practice. L4 summarized this position:

“VR can prepare the mind and improve understanding, but students must still touch and operate real equipment. The two methods should work together.” (L4)

Theme Three: Requirements and Challenges for VR Adoption

The third theme concerned the conditions necessary for successful VR adoption and the possible challenges associated with implementation. Although all lecturers supported the potential use of VR, they emphasized that adoption would require planning, resources, training, and technical support.

One of the main requirements identified was adequate access to VR equipment. Participants explained that the university would need an adequate number of headsets to prevent the same access problems experienced with physical cameras and other equipment. L6 stated:

“If the university buys only one headset for many students, the problem of limited access may continue. There should be a clear plan for how students will access the system.” (L6)

Lecturers also emphasized the need for relevant VR content. General VR applications might not be sufficient for film education unless they include activities related to cinematography and film production. L5 stated:

“The content must be designed for film students. It should include camera angles, lighting, framing, composition, and other production activities.” (L5)

Participant responses also identified lecturer training as an important requirement. Lecturers would need to understand how to operate VR equipment and integrate it into teaching activities.

L2 explained:

“Lecturers must be trained first. If the teacher does not know how to use the technology, it will be difficult to guide students.” (L2)

Technical support was another major concern. Participants indicated that VR equipment could experience software, hardware, connectivity, maintenance, or compatibility problems. Without technical personnel, lecturers might struggle to solve such problems during teaching. L3 stated:

“There should be someone responsible for technical support because lecturers cannot be expected to solve every software or hardware problem.” (L3)

The cost of acquiring and maintaining VR equipment was also identified as a possible challenge. Participants noted that headsets, computers, software, and content development could require substantial investment. L1 explained:

“The university must consider the cost of headsets, computers, maintenance, and updating the content. Adoption should be planned carefully.” (L1)

Participants further emphasized curriculum integration. They argued that VR should not be introduced as an isolated activity without clear links to course learning outcomes and assessment. L4 stated:

“VR should be included in the course structure. Students should know which competencies they are expected to practise through it.” (L4)

Student access and scheduling were additional concerns. If many students needed to use a limited number of headsets, the university would need an appropriate timetable or booking system. L6 observed:

“There must be a system for booking the equipment so that students can use it fairly and independently.” (L6)

Despite these challenges, all six lecturers maintained that the potential benefits could justify adoption if the technology were introduced gradually and strategically. L5 concluded:

“The university can start with a pilot project. It does not have to introduce VR in every course at once.” (L5)

The third theme therefore identified several requirements for implementation: adequate VR equipment, film-specific learning content, lecturer training, student orientation, technical support, maintenance and software updates, institutional funding, curriculum integration, scheduling and booking procedures, reliable infrastructure, and gradual pilot implementation.

5. Discussion

The findings demonstrate that limited access to practical equipment is a significant concern in film education at East African University Rwanda. All six lecturers reported that students often share cameras, lighting equipment, sound equipment, and other production resources. Although group work is important in filmmaking because professional production is collaborative, excessive dependence on shared equipment can reduce opportunities for individual students to practise specific technical skills.

This finding is consistent with the broader literature emphasizing the importance of appropriate learning environments and resources for practical and experiential education (Radianti et al., 2020). Film students need opportunities to perform activities repeatedly and to learn from mistakes. When students spend substantial portions of practical sessions waiting for equipment or observing other group members, their direct engagement with technical tasks may be reduced.

From the perspective of Experiential Learning Theory, the finding is particularly important. Kolb (1984) emphasizes concrete experience and active experimentation as important components of learning. If students have limited opportunities to handle cameras, manipulate lighting, test framing, and experiment with production decisions, they may have fewer opportunities to complete the experiential learning cycle through direct action and reflection.

The lecturers' positive perceptions of VR suggest that virtual environments may provide one way of increasing opportunities for preparation and experimentation. Participants believed that students could use VR to repeat activities involving camera positioning, framing, composition, lighting, and scene arrangement. This is consistent with Wohlgenannt et al. (2021), who

identify the potential of VR to support experiential learning through interaction, experimentation, reflection, and repetition.

The potential for repetition is especially relevant to film education. Students may require several attempts to understand how changes in camera position, lens choice, lighting direction, or subject distance affect an image. If physical equipment is limited, VR could provide an additional environment in which these decisions can be rehearsed before students work with real equipment.

The findings also support research suggesting that immersive environments can help learners understand spatial relationships and complex concepts (Radianti et al., 2020). Cinematography requires students to understand relationships among the camera, subject, background, lighting, movement, and perspective. A virtual environment could make these relationships more visible because students can explore the scene from different viewpoints.

Nevertheless, the findings should not be interpreted as evidence that VR automatically improves students' practical performance. The study examined lecturers' perceptions of potential usefulness rather than measuring changes in student competence. Consequently, the positive perceptions reported in this study demonstrate perceived potential rather than measured educational effectiveness. Future research would need to evaluate actual student outcomes after exposure to a VR-based learning intervention.

A particularly important finding was the strong agreement among lecturers that VR should complement rather than replace physical practical training. This position is consistent with the practical nature of filmmaking. VR may simulate camera placement, framing, lighting arrangements, and production decisions, but it cannot completely reproduce the physical experience of handling cameras, changing lenses, pulling focus, adjusting real lights, managing cables, operating sound equipment, or communicating within a production team.

The findings therefore support a blended model of film education. Under such a model, VR could be used for preparation before practical sessions, revision after practical sessions, visualization of difficult concepts, independent practice, simulation of production decisions, and conceptual assessment. Physical equipment would remain essential for camera handling, lens changing, focus pulling, exposure adjustment, lighting setup, sound recording, equipment maintenance, and real production teamwork.

This complementary approach also addresses the concern that technology should not be introduced simply because it is innovative. Merchant et al. (2014) and Radianti et al. (2020) emphasize that educational technologies are most valuable when their design and use are aligned with learning objectives. In film education, therefore, VR should be introduced where it provides a pedagogical function that is difficult to achieve or difficult to repeat using limited physical resources.

The findings concerning adoption requirements are also consistent with the Technology Acceptance Model. All six lecturers perceived potential usefulness in VR, but they simultaneously identified concerns about cost, training, technical support, equipment availability, content, and curriculum integration. Davis (1989) identifies perceived usefulness and perceived ease of use as central considerations in technology acceptance. The lecturers' responses illustrate that recognizing usefulness does not eliminate implementation barriers.

The need for lecturer training is particularly important. If lecturers are expected to integrate VR into their courses, they need sufficient understanding of the technology and its pedagogical applications. Training should therefore not focus only on operating headsets. It should also address lesson planning, classroom management, assessment, troubleshooting, and the relationship between virtual activities and physical practical work.

The demand for film-specific content is another significant finding. Generic VR experiences may not adequately address the learning objectives of film students. Participants specifically identified camera angles, lighting, framing, composition, and other production concepts as areas that should be represented in the learning content. This suggests that the educational value of VR will depend substantially on the relevance and quality of the applications used.

The concern about equipment access also deserves attention. VR is being considered partly because physical equipment is limited. If the university acquires only a very small number of headsets, a similar access problem could emerge. The solution should therefore include a clear system for student access, scheduling, booking, maintenance, and equipment management.

The lecturers' recommendation for gradual implementation is consequently appropriate. A pilot programme could allow the university to test VR within selected film courses, identify technical and pedagogical challenges, evaluate student access, develop appropriate content,

and determine how VR fits within existing learning outcomes. Such an approach would allow institutional decisions to be based on practical experience rather than assumptions.

The findings also relate to recent research in Rwanda. Ngiruwonsanga and Habimana (2026) reported positive attitudes toward XR and VR among postgraduate students in Rwanda while also identifying technical and usability challenges. The similarities suggest that enthusiasm for immersive learning technologies may coexist with practical concerns regarding implementation. For film education, these concerns are particularly important because successful use requires both technology and physical production resources.

Overall, the study indicates that the strongest case for VR is not that it can replace cameras and other equipment but that it can increase opportunities for preparation, visualization, repetition, and independent practice. Its contribution should therefore be understood as complementary. Such an approach may help students make more effective use of limited physical practical time by arriving at sessions with a stronger conceptual understanding of the decisions they need to make.

6. Conclusion

This study explored lecturers' perceptions of Virtual Reality as a complementary tool for film education at East African University Rwanda. The findings identified three major issues: challenges related to limited access to practical equipment, the perceived usefulness of VR for student self-practice, and the requirements and challenges associated with VR adoption.

First, all six lecturers reported that limited access to film-production equipment restricts students' opportunities for individual practical training. Students often share equipment and work in groups, while access outside scheduled practical sessions may be limited. Although collaborative production is important in filmmaking, these conditions may reduce opportunities for individual repetition and direct operation of technical equipment.

Second, all six lecturers expressed positive perceptions of the potential usefulness of VR. They believed that VR could support student self-practice, visualization, repetition, experimentation, revision, and preparation for physical practical sessions. Areas identified as potentially suitable for VR included camera angles, framing, composition, camera movement, lighting, scene blocking, camera positioning, and production planning.

Third, the findings demonstrate that positive attitudes alone are insufficient for successful VR adoption. Lecturers identified adequate VR equipment, film-specific content, lecturer training, technical support, institutional funding, curriculum integration, student access, scheduling, and maintenance as important requirements.

The study therefore concludes that VR has potential to strengthen film education in Rwanda, particularly by providing additional opportunities for students to practise and visualize production concepts when access to physical equipment is limited. However, VR should be implemented as a complementary technology rather than a replacement for real filmmaking activities. Physical cameras, lighting equipment, sound equipment, production environments, and collaborative production experiences remain essential to the development of complete film-production competencies.

A gradual and strategically planned implementation is therefore recommended. East African University Rwanda could begin with a pilot programme in selected film courses, evaluate its educational value, and expand its use based on evidence from students and lecturers. The successful integration of VR would require alignment between the technology, curriculum, lecturers' capabilities, student access, institutional resources, and the practical competencies expected from film graduates.

7. References

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