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From Passive Viewing to Active Learning: Evaluating an Interactive Video Teaching Model in Higher Education

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ABSTRACT

The increasing use of digital technologies in higher education has created new opportunities for moving students beyond passive consumption of instructional content toward more active forms of learning. This study examines an interactive video teaching model designed to support self-directed learning, inquiry, and collaboration among university students. The model is considered as a learning environment in which students, instructors, digital devices, and instructional activities interact continuously rather than functioning as separate elements. Attention is given to the ways interactive video resources can be incorporated into instructional design, classroom activities, assessment, and post-class learning.

The study explores the pedagogical value of interactive video resources in developing meaningful teaching scenarios, encouraging student participation, supporting inquiry-oriented activities, and introducing greater flexibility into conventional teaching practices. It also considers the role of interactive functions in modifying assessment approaches and maintaining digital learning resources that students can revisit according to their individual learning needs. In addition to classroom practice, the study examines the broader conditions required for successful implementation, including curriculum planning, assessment systems, technological infrastructure, teacher preparedness, and institutional supervision.

The findings and discussion highlight the importance of designing interactive video activities around clearly defined learning objectives rather than treating technology as an end. Teachers can use interactive features to accommodate differences in students' learning preferences, encourage participation, and create a more supportive learning environment. The availability of recorded and reusable learning materials can also extend learning beyond classroom hours by allowing students to review difficult concepts and consolidate previously acquired knowledge. At the institutional level, regular professional development, adequate technical support, and collaborative teaching and research initiatives are recommended to strengthen the effective use of interactive video in higher education. The study suggests that thoughtfully designed interactive video instruction can provide a practical pathway for shifting university teaching from passive viewing toward more active, reflective, and student-centred learning.

KEYWORDS: Interactive Video Teaching; Higher Education; Student-Centred Learning; Active Learning; Self-Directed Learning; Inquiry-Based Learning; Collaborative Learning; Digital Learning Resources; Instructional Innovation; Student Engagement; Educational Technology; University Teaching.

INTRODUCTION

The rapid evolution of information and communication technologies has significantly influenced the development of university education, creating new possibilities for teaching, learning, and academic interaction. In China, the advancement of educational informatization has been supported by national initiatives aimed at modernizing education and integrating digital technologies into teaching practices. The Ministry of Education of the People's Republic of China introduced the *Action Plan for Educational Informatization 2.0* to accelerate educational modernization through information technology. The initiative emphasizes the transformation of conventional educational approaches through the deeper integration of information and intelligent technologies throughout the teaching and learning process, with the goal of developing new educational forms, instructional models, and learning environments suited to the information age [1]. In the

post-pandemic educational context, this transformation has become increasingly important as universities seek to accommodate the continuing integration of online and face-to-face learning. The growing convergence of education and technology has consequently reshaped university teaching practices and encouraged institutions to explore more flexible and interactive approaches. With the emergence of artificial intelligence and other advanced digital technologies, higher education is increasingly expected to develop learning environments that support intelligent, interactive, and personalized learning while improving the overall effectiveness of instruction [2].

The concept of interaction has its origins in computing, where it describes the exchange of information between a user and a technological system through processes of input and feedback. Its application in education, however, extends well beyond interaction between individuals and computers. In 1982, American educational psychologists A. L. Brown and A. S. Palincsar introduced the concept of Reciprocal Teaching, emphasizing structured communication and shared participation between teachers and learners in the process of addressing learning problems [3]. This approach challenged conventional classroom relationships by encouraging greater learner participation and reducing the reliance on one-directional transmission of knowledge. Through changes in teacher and student roles, instructional organization, and classroom interaction, reciprocal teaching sought to strengthen students' motivation, participation, and capacity to take responsibility for their own learning. As educational technologies have developed, the meaning of interactive teaching has expanded further. Interaction can now occur among teachers, students, digital devices, learning platforms, and multimedia resources, creating a more interconnected instructional environment [4].

Within this changing educational landscape, interactive teaching is fundamentally concerned with strengthening students' role as active participants in the learning process. Rather than simply receiving information from an instructor, students are encouraged to explore concepts independently, investigate questions, communicate with peers, and construct understanding through active engagement. Interactive video resources provide an important means of supporting this approach because they can combine instructional content with opportunities for response, exploration, feedback, and reflection. Integrating interactive activities into teaching videos can therefore create additional opportunities for students to control aspects of their learning while allowing teachers to design instructional experiences that are more responsive to learners' needs [5].

Interactive video teaching has consequently attracted increasing attention in university education, including vocational and professional learning contexts. Compared with conventional instructional videos, interactive resources can introduce learner participation into the viewing process and connect video content with questioning, discussion, assessment, and other learning activities. Their value, however, depends not only on the availability of technological tools but also on how effectively those tools are incorporated into instructional design. Appropriate integration requires consideration of learning objectives, student characteristics, teaching strategies, assessment practices, and the technological environment in which learning takes place [6].

Against this background, the present study examines the use of interactive video as a teaching model in higher education, with particular attention to the transition from passive viewing toward active learning. It considers how interactive video resources can support self-directed, inquiry-based, and collaborative learning while contributing to changes in instructional organization and assessment. The study also considers the practical conditions required for effective implementation [7], including teacher preparation, technological infrastructure, institutional support, and the development of appropriate teaching practices. By examining these dimensions together, the study seeks to provide a broader understanding of how interactive video can contribute to the modernization of university teaching and the development of more engaging student-centred learning environments.

DESIGN OF THE INTERACTIVE VIDEO TEACHING MODEL

The interactive video teaching model adopted in higher education is built around multiple forms of interaction, including communication among learners and educators and exchanges between users and digital devices. Rather than treating video as a one-way channel for delivering information, the model positions technology as a medium through which learners can access content, respond to instructional activities, communicate with others, and progressively develop their understanding. The model can be understood through three closely connected components: interactive devices, interactive subjects, and interactive behaviors. Each component contributes to the creation of a learning environment in which students can participate more actively in the teaching process [8].

Interactive Devices

Interactive devices provide the technological foundation through which teaching materials are delivered and learning activities are conducted. They function as a common platform for accessing instructional content and facilitating information exchange between educators and learners. Universities have developed educational portals and digital platforms that support the sharing of learning materials and provide teachers and students with convenient access

to interactive video resources [9]. These platforms can accommodate a broad range of educational materials, including teaching cases, instructional videos, question banks, key knowledge points, supplementary readings, and other digital resources. Making such materials available through a shared platform can improve resource accessibility and encourage more effective use and circulation of educational content [10].

The same digital environment can also support teachers in organizing and monitoring learning activities. Educators can upload learning objectives, teaching tasks, key instructional points, and supporting materials while using platform-based functions to observe student participation and provide feedback. Such functions create opportunities for teachers to evaluate learning activities more continuously and maintain communication with students throughout the instructional process [11]. The interactive platform therefore serves not merely as a repository of teaching materials but as an extension of the classroom in which teaching, learning, communication, and assessment can occur.

For learners, these devices reduce some of the traditional limitations associated with time and location. Students can access instructional videos at suitable times, complete embedded learning activities, check their understanding through questions or exercises, and explore additional course materials within the same learning environment. They can also return to previously viewed content when clarification or revision is required. Communication functions enable students to raise questions and exchange ideas with teachers and peers, supporting a more continuous learning process. Over time, the accumulation of digital resources can help learners develop individualized collections of learning materials and organize their own learning plans. The development of such interactive learning platforms has consequently expanded access to educational resources while providing additional opportunities for university students to develop knowledge and skills relevant to their future academic and professional activities [12].

Interactive Subjects

The interactive subject component comprises three closely related elements: learners, educators, and the teaching environment. Within this structure, students remain at the centre of the learning process because instructional activities and interaction patterns are ultimately designed to support the achievement of their learning objectives [13]. Their participation is not limited to receiving information; they are expected to respond to questions, explore learning materials, communicate with others, and make decisions during different stages of the learning process.

Educators occupy an equally important position as organizers, resource developers, facilitators, and supervisors of learning. Their role is to determine appropriate learning objectives, select or develop instructional resources, design interactive activities, guide students through learning tasks, and monitor progress. Consequently, the teacher's role changes from primarily transmitting knowledge to coordinating learning experiences and supporting students as they work through instructional content (Figure 1).

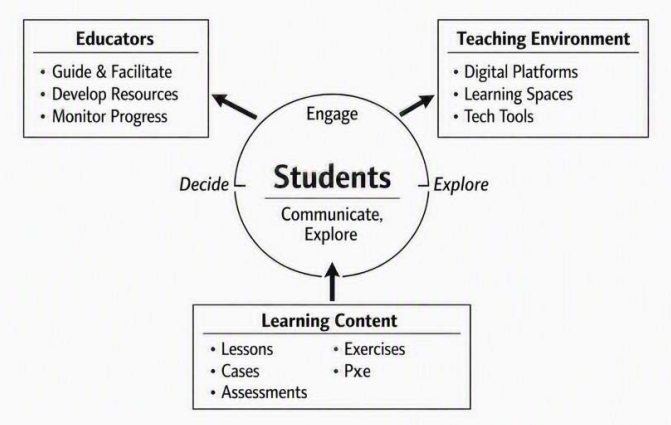

Figure 1: Conceptual Framework of the Interactive Video Teaching Model.

The teaching environment forms the third component of the interactive subject. It encompasses the technological carriers through which videos and other learning resources are delivered, the instructional content itself, and the physical or digital facilities that support learning. The video carrier may include software applications, hardware devices, learning management systems, and educational portals through which instructional videos and associated resources are accessed [14,15]. These environments allow teachers and students to communicate both synchronously and asynchronously, exchange information, and participate in individual or group learning activities through connected devices.

Teaching content also becomes an important part of the interaction. Knowledge materials, practical exercises, cases, assessment questions, and supplementary resources provide the substance around which interaction takes place. In this sense, content functions simultaneously as something to be explored and as a basis for communication, questioning, practice, and evaluation. Effective coordination among learners, educators, technological platforms, and instructional content is therefore essential to the successful implementation of an interactive video teaching model.

Interactive Behaviors

Interactive behavior represents the actual learning activities that occur when students engage with video content, digital resources, teachers, peers, and learning tasks. Visual information is particularly important in video-based learning because it allows learners to observe processes, situations, demonstrations, and other forms of information that may be

difficult to communicate through text alone. Interactive video extends this visual experience by introducing opportunities for learners to make responses, examine information, reflect on questions, and participate in activities at different points within the instructional sequence.

The nature of interaction can change according to the learning objective and the stage of instruction. Some activities may require only direct observation and recognition, whereas others demand analysis, reflection, knowledge creation, or participation in realistic situations. Based on these differences, interactive behaviors within the teaching model can be broadly organized into four forms: intuitive interaction, reflective interaction, generative interaction, and immersive interaction.

Intuitive Interaction

Intuitive interaction represents the most immediate form of engagement with instructional content. At this stage, learners primarily acquire information by observing instructional videos, identifying important concepts, and connecting visual or auditory information with previously encountered knowledge. The interaction does not necessarily require extensive analysis or complex decision-making; instead, it provides learners with a direct and accessible entry point into new subject matter [16].

This form of interaction is particularly useful when introducing fundamental concepts, procedures, terminology, or basic knowledge. By presenting information in a clear and visually accessible manner, interactive video can reduce the cognitive barriers that may otherwise discourage learners at the beginning of a topic. Simple questions, prompts, visual cues, or short activities can also encourage students to remain attentive while developing an initial sense of understanding and learning progress.

Reflective Interaction

Reflective interaction requires learners to move beyond initial exposure to information and engage in analysis, interpretation, comparison, and personal reflection. While watching an instructional video, students may encounter questions or problems that require them to pause, reconsider information, identify relationships, or discuss possible explanations. Interactive activities can encourage learners to examine knowledge from different perspectives and connect newly acquired information with what they already know [17].

At this stage, learning becomes more cognitively demanding because students are expected to process and internalize information rather than simply recognize it. Carefully designed problems, exploratory questions, case materials, and discussion activities can stimulate independent thinking and encourage learners to take greater responsibility for their learning. Reflective interaction can therefore contribute to deeper understanding while strengthening students' confidence in dealing with challenging academic content.

Generative Interaction

Generative interaction occurs when learners begin to use acquired knowledge to produce new interpretations, solutions, ideas, or resources. After engaging with instructional content, students may exchange their perspectives with teachers and peers, discuss alternative solutions, contribute additional materials, or apply theoretical concepts to practical situations. Through this process, knowledge is not simply received but reconstructed through communication and application [18].

This form of interaction is particularly relevant to higher education because university learning increasingly requires students to analyze problems, formulate independent viewpoints, and transfer theoretical knowledge into practical contexts. Generative activities can encourage students to reorganize existing knowledge, identify new connections, develop alternative explanations, and explore unfamiliar areas. The learning environment therefore shifts toward knowledge construction, creativity, and problem solving. For this reason, interactive video activities at the generative level should provide sufficient depth and flexibility to allow learners to extend the information presented in the original instructional material.

Immersive Interaction

Immersive interaction represents a more advanced form of engagement in which learners are placed within realistic or simulated learning situations and are required to apply knowledge through contextualized activities. Interactive video, together with simulation and virtual learning technologies, can create scenarios in which students observe realistic situations, assume roles, make decisions, and respond to changing circumstances. Such experiences can help learners connect abstract concepts with practical contexts and support the transfer of knowledge and skills [19].

Universities can use immersive learning environments to provide students with opportunities for simulation-based practice, role-play, professional communication, and task-oriented learning. These activities can also create additional opportunities for teacher–student interaction and collaborative problem solving. Immersive interaction is particularly valuable when direct practical experience is limited by cost, safety, location, scheduling, or access to professional settings.

In vocational and practice-oriented university programs, for example, students may be expected to complete academic learning on campus while gaining practical experience through workplace placements or apprenticeship arrangements. Interactive video and related simulation

resources can supplement these experiences by allowing students to observe procedures, rehearse tasks, and revisit complex situations before or after entering a real workplace [20]. In this way, interactive video does not replace practical education; rather, it can complement existing teaching arrangements and help address situations in which continuous access to authentic learning environments is difficult.

CREATING CONTEXT-RICH LEARNING EXPERIENCES

Interactive video teaching offers universities a combination of technological, instructional, and pedagogical possibilities that are difficult to achieve through conventional video-based instruction alone. Its value lies not simply in presenting multimedia content, but in creating opportunities for teachers and students to communicate, respond, explore, and adapt the learning process. When digital resources are combined with established teaching practices, universities can develop learning environments in which classroom instruction, online resources, individual study, and collaborative activities complement one another. Such integration can broaden students' access to learning materials, increase their involvement in instructional activities, and support more efficient teaching practices [21].

Creating Teaching Scenarios to Enhance Learning Interest

One important application of interactive video is the creation of learning situations that capture students' attention and encourage them to participate actively. Compared with conventional text-based instruction or videos that require students only to watch, visually rich and interactive materials can present concepts through concrete situations, demonstrations, examples, and contextualized problems. This can make unfamiliar subject matter easier to approach and may increase students' willingness to explore the topic further [22].

From the learner's perspective, visual presentation can provide a more immediate way of encountering educational information. When interactive elements are incorporated into a video, students can be prompted to answer questions, examine specific details, make choices, or follow different learning paths. These activities can maintain attention and encourage learners to become involved in the instructional situation rather than remaining observers. By placing students within an appropriate learning context, interactive video can therefore contribute to a shift from passive viewing toward more purposeful participation.

The design of such scenarios should nevertheless be connected to the intended learning outcomes. Videos that contain excessive visual effects or interaction without a clear instructional purpose may distract learners rather than support learning. Effective teaching scenarios should therefore use interaction to reinforce concepts, stimulate curiosity, and encourage students to engage with the content in meaningful ways [23].

Organizing Teaching in a Flexible Manner

Interactive video also provides teachers with greater flexibility in organizing instructional activities. Instead of following a fixed sequence in which every learner receives identical information at the same pace, educators can incorporate functions such as prompts, reminders, branching content, annotations, embedded questions, and immediate feedback. These features allow instructional materials to respond more effectively to differences in students' prior knowledge, learning progress, and individual needs.

For example, important concepts can be highlighted at appropriate points within a video to direct students' attention to essential information. Feedback collected during learning activities can provide teachers with an indication of students' progress and help identify areas that require additional explanation. Annotation tools can assist learners in recording important observations and revisiting relationships between different concepts after completing a video. Personalized pathways can also allow students to access supplementary explanations or related materials according to their responses and learning requirements [24].

This flexibility changes the role of the teacher from simply preparing a predetermined sequence of content to designing a learning environment that can accommodate different forms of participation. Teachers can modify activities according to students' responses and introduce additional explanations or learning tasks when necessary. Consequently, interactive video can support a more adaptable approach to instructional organization while preserving the teacher's role in guiding the overall learning process.

Innovating Teaching Modes and the Learning Environment

Traditional instructional videos generally provide information through a linear sequence in which learners observe and listen but have limited opportunities to influence what happens next. Interactive video extends this model by allowing students to respond to content, make decisions, complete activities, and receive feedback during the learning process. The combination of visual, auditory, and interactive elements can consequently create a stronger connection between learners and instructional materials [25].

This approach can strengthen several forms of interaction simultaneously, including interaction between students and content, communication between teachers and students, collaboration among learners, and exchanges between users and digital systems. As students become more involved in selecting, responding to, and working with learning materials, they can gradually move from the role

of knowledge recipients to that of active participants in constructing their own understanding.

The interactive environment can also influence classroom atmosphere. When students are given opportunities to investigate problems, respond to questions, compare their ideas, and receive immediate responses [26], learning can become more participatory and less dependent on one-way explanation. Teachers can use these functions to introduce discussion, problem-solving, and collaborative activities, thereby creating a learning environment in which technology supports rather than replaces meaningful human interaction.

Transforming Assessment and Providing Timely Feedback

Interactive video can also contribute to changes in the way student learning is evaluated. Instead of relying exclusively on assessments conducted after instruction has been completed, teachers can incorporate short questions, decision points, exercises, and other forms of formative assessment directly into the learning process. This makes it possible to observe student understanding at different stages of instruction and provide feedback while learning is still taking place [27].

Feedback can take different forms depending on the instructional design. Immediate responses to questions, explanatory prompts, visual indicators, or encouraging messages can help students recognize whether they have understood a concept correctly. Such responses can make progress more visible to learners and encourage them to reflect on areas that require further attention. The resulting process supports self-monitoring because students can identify gaps in their understanding and return to relevant content when necessary.

At the same time, interactive platforms can generate information about student responses, completion rates, activity participation, and areas of difficulty. Teachers can use these data to identify common learning problems and adjust subsequent teaching strategies. In this respect [28], assessment becomes more closely connected with instruction: evaluation is not limited to measuring achievement at the end of a course but becomes an ongoing source of information for improving the learning process.

Preserving Dynamic Resources and Developing Knowledge Systems

Another important application of interactive video is its capacity to preserve the information generated throughout teaching and learning activities. Interaction among teachers and students, communication between peers, and exchanges between learners and digital platforms can produce a range of information, including questions, responses, annotations, explanations, reflections, and learning records. These materials can provide evidence of how students understand and respond to instructional content.

When such information is recorded and organized, it can become a useful resource for subsequent teaching and learning. Teachers may review interaction records to identify recurring misconceptions, improve instructional materials, or redesign activities for future groups of students. Learners can return to recorded explanations, annotations, and related resources when reviewing previously studied content. Over time, the accumulation of these materials can contribute to the development of a more structured and accessible knowledge base [29].

The dynamic nature of these resources is particularly valuable because learning is not a static process. Students' questions and responses may reveal new connections, alternative interpretations, and areas that were not anticipated during the original instructional design. Preserving these developments allows future learning activities to benefit from previous experiences. Interactive video can therefore function not only as a medium for delivering instruction but also as a mechanism for capturing and organizing the evolving knowledge generated through teaching and learning.

Taken together, these applications demonstrate that the educational value of interactive video extends beyond the replacement of traditional instructional recordings. Its broader contribution lies in connecting instructional content with participation, feedback, personalization, and knowledge development. When appropriately designed and supported by teachers and institutional infrastructure, interactive video can help create a learning environment in which students participate more actively [30], receive timely guidance, and progressively develop greater responsibility for their own learning.

CONSIDERATIONS IN THE IMPLEMENTATION OF INTERACTIVE VIDEO TEACHING

The use of interactive video in university classrooms has developed through both teaching practice and educational research. Its application has shown potential for increasing student participation and providing greater flexibility in the learning process. At the same time, the introduction of an emerging digital teaching approach brings practical difficulties that cannot be addressed through technology alone. In the Chinese higher education context, the effectiveness of interactive video is closely related to curriculum organization, assessment practices, technical conditions, and the way teaching activities are managed [31].

Curriculum Organization and Assessment Practices

Interactive video provides a connection between teachers, students, and the learning resources used during instruction. Teachers organize and guide the use of these resources,

while students access, interpret, and apply them according to their learning needs. The educational value of the resources depends largely on how they are incorporated into the curriculum.

A curriculum designed for interactive learning needs to identify clear learning objectives and determine how video activities contribute to achieving them. Students may be asked to respond to questions during a video, examine a case, complete a task, or revisit concepts after receiving feedback. These activities need to have a clear relationship with the content and assessment requirements of the course. When interactive video is added without corresponding changes to curriculum planning, students may continue to treat it as supplementary material rather than as part of the learning process [32].

Assessment presents a similar issue. Traditional examinations may measure knowledge acquired through instruction, but they may not fully reflect students' participation in inquiry, discussion, problem solving, and independent learning. Formative assessment can be incorporated into interactive video activities to provide information about students' progress while the course is still in progress. Teachers can use students' responses and learning records to identify difficulties and provide additional instruction. A closer connection between curriculum objectives, interactive activities, and assessment can make the use of video more meaningful within university teaching [33].

Software, Hardware, and Technical Conditions

Interactive video teaching requires a technological environment that can support both the delivery of video content and the activities connected with it. Universities need appropriate devices, software platforms, network services, data storage, and technical support. These requirements can place additional demands on institutions that are still relying on infrastructure designed primarily for conventional classroom teaching [34].

The quality of the learning experience can be affected when equipment is outdated, network access is unstable, or the available platform cannot support interactive functions effectively. Teachers may also face difficulties when they have limited technical knowledge or when different systems are not compatible with one another. Such problems can interrupt classroom activities and reduce students' willingness to use digital learning resources.

Infrastructure development therefore needs to be accompanied by regular maintenance and technical assistance. Universities can assess the requirements of different courses before introducing interactive video on a wider scale and provide teachers with appropriate training in the use of the relevant platforms. Technical support is particularly important when educators are expected to create their own interactive materials rather than simply use existing videos. A reliable combination of hardware, software, network access, and user support provides the basic conditions for continued use of interactive video in university education [35].

Supervision of Teaching and Learning

The movement toward interactive and student-centred learning has changed the traditional boundaries of university teaching. Students can now watch instructional videos, complete learning activities, communicate with teachers, and review course materials outside the physical classroom. Learning may take place on campus, at home, or through other online environments. This flexibility provides greater freedom for students but also creates new requirements for the supervision of teaching and learning.

Teachers need to monitor student participation and identify whether learners are progressing through the required activities. Digital platforms can provide useful information about video access, responses to questions, completion of activities, and other aspects of learning behaviour. These records can support teachers in identifying students who require additional guidance. At the same time, supervision should not be reduced to monitoring whether students have logged into a platform. The quality of learning depends on the nature of students' participation and the extent to which instructional activities encourage meaningful engagement [36].

The involvement of universities is also important when learning extends beyond the campus. Institutions need clear arrangements concerning online teaching responsibilities, communication between teachers and students, assessment practices, and appropriate use of digital learning platforms. In situations where students participate in learning from home, cooperation among teachers, universities, and families may also help maintain suitable learning conditions.

The continued development of interactive video teaching calls for corresponding development in educational management. Clear institutional procedures, appropriate teacher guidance, reliable learning platforms, and reasonable supervision can help create conditions in which students have greater independence without losing the academic support provided by the university [37].

PRACTICAL STRATEGIES FOR STRENGTHENING INTERACTIVE VIDEO TEACHING

The implementation of interactive video teaching requires coordinated efforts from educators, university administrators, and technical teams. The effectiveness of the approach depends not only on the availability of digital resources but also on how teachers design learning activities, how students participate in them, and how universities provide the necessary institutional and technical support.

Several practical measures can be considered to improve the use of interactive video in higher education [40].

Diversifying Instructional Design

Teachers can make greater use of the interactive characteristics of video when planning lessons. Instead of preparing a single video that delivers information from beginning to end, educators can combine explanations with questions, demonstrations, short tasks, cases, supplementary materials, and opportunities for reflection. Different types of resources can be prepared for students who have different levels of prior knowledge and different ways of approaching learning [41].

Interactive activities can also be positioned at appropriate points within the instructional sequence. A question at the beginning of a video may introduce a problem, while an activity in the middle can encourage students to examine an important concept. Additional resources can be provided when students need further explanation. Such arrangements give learners more opportunities to participate actively in the learning process.

Creating More Engaging Learning Processes

The interactive and generative features of video can be incorporated into classroom activities to create a more open learning environment. Teachers can use questions, discussion prompts, learner responses, and collaborative tasks to encourage students to communicate while working through instructional materials.

A video can be used as the starting point for classroom discussion rather than as the complete teaching activity. Students may be asked to explain an observation, compare different answers, identify a problem, or suggest a solution after viewing a particular segment. These activities can make the learning process more participatory and give students a stronger sense of involvement in the subject matter [42-47].

Adapting Teaching Strategies to Individual Learning Needs

Teaching strategies need to take account of differences in students' prior knowledge, learning progress, and academic needs. Interactive video platforms can provide access to a wider range of learning materials, allowing teachers to recommend additional explanations, examples, exercises, or advanced content according to students' circumstances.

Resource libraries can also be used to address learning gaps identified during classroom activities. Students who have difficulty understanding a particular concept can return to relevant video segments or supplementary materials, while students who have already mastered the basic content can explore more advanced resources. Teachers can use information from students' responses and participation to adjust learning objectives and modify subsequent instructional activities [48].

This approach gives educators greater scope to combine different teaching methods rather than relying on one fixed instructional pattern. It also creates opportunities for teachers to identify difficulties earlier and provide support before learning gaps become more difficult to address.

Extending Learning Beyond the Classroom

Interactive video resources can remain available after formal teaching activities have ended. Students can revisit recorded lessons, review difficult concepts, and use supplementary materials when preparing for assessments or completing assignments. This allows learners to regulate the pace of revision according to their own needs.

Teachers can also add additional materials to the resource library after a lesson. These may include related cases, demonstrations, reading materials, practice questions, or explanations of common mistakes. Students can therefore continue exploring a topic after classroom instruction rather than being limited to the material covered during a particular lesson.

Post-class activities can also include self-assessment and reflection. Students can review their responses [49], identify areas of uncertainty, and decide which materials need to be studied again. Such practices can encourage greater responsibility for learning and make the transition between classroom instruction and independent study more continuous.

Developing Teacher and Student Competence

Regular training is needed if universities expect interactive video to become a meaningful part of teaching rather than an occasional technological addition. Training programs can address both the production of interactive materials and the pedagogical principles involved in using them effectively [50].

For teachers, universities can organize open classes, teaching demonstrations, exchange sessions, workshops, and research seminars. These activities provide opportunities for educators to examine different approaches to lesson design, discuss classroom experiences, and learn from colleagues. Practical training can also introduce teachers to methods for creating interactive video, organizing digital resources, interpreting learning data, and incorporating feedback into subsequent teaching.

Students also need opportunities to develop the skills required to participate effectively in interactive learning. Universities can organize video-production activities, digital learning competitions, or project-based exercises in which students create short instructional or explanatory videos. Such activities can strengthen students' ability to organize information, communicate ideas, reflect on their own experiences, and use digital tools for academic purposes.

Establishing Collaborative Teaching and Research Teams

Universities can establish dedicated groups that bring together teachers, educational researchers, instructional designers, and technical personnel. Such teams can examine the effectiveness of interactive video through classroom experiments, develop teaching resources, and document experiences from different courses [51].

Teachers can share lesson plans, interactive activities, assessment methods, and experiences with colleagues through these collaborative structures. A shared approach can reduce duplication of effort and make successful teaching resources available to a wider group of educators. Research teams can also examine student responses and learning outcomes to determine which forms of interaction are most appropriate for different subjects and learning situations.

The continued exchange of teaching experiences can gradually build a university-level knowledge base for interactive video teaching. This provides a foundation for further experimentation and helps move interactive video from isolated classroom practice toward a more established component of teaching and research.

DIRECTIONS FOR FUTURE RESEARCH

Future development of interactive video teaching requires attention to both educational resources and the technologies through which those resources are delivered. Universities can continue developing structured interactive video resource libraries that bring together learning materials, assessment functions, question-and-answer facilities, lesson preparation tools, management functions, and mechanisms for teaching supervision. A well-organized resource environment can make learning materials easier to access and allow students to continue learning beyond conventional classroom schedules.

Greater accessibility also raises questions concerning the ownership and use of digital educational materials. When universities provide learning resources through open or widely accessible platforms, appropriate measures are needed to recognize the contributions of video creators and protect their intellectual property. Resource sharing should therefore be accompanied by clear arrangements concerning ownership, permission, attribution, and responsible use. Such measures can encourage educators to contribute high-quality materials while maintaining an environment in which students can access useful learning resources [52].

Further development of interactive video platforms should also focus on usability. Complex interfaces can create unnecessary difficulties for both teachers and learners, particularly when users are required to operate multiple functions during a lesson. Future systems could place greater emphasis on simple interfaces, rapid response, intelligent recommendations, and personalized learning functions. The ability to record and organize individual learning trajectories could help teachers understand how students interact with content and where additional support may be needed.

The analysis of learning records also presents an opportunity for improving personalized instruction. Platforms can be developed to identify patterns in students' responses, learning progress, and resource use, while presenting this information in a form that teachers can interpret easily. Directional delivery of relevant learning materials could then be used to address areas of difficulty instead of presenting the same supplementary content to every learner.

Timely feedback is another area that warrants continued development. Interactive systems can provide immediate responses to learner activities and guide students toward additional explanations when errors occur. More responsive feedback mechanisms could support self-paced learning by helping students recognize difficulties, adjust their study strategies, and decide when previously studied content needs to be revisited.

Research in this area can also examine how interactive video functions across different disciplines, student groups, and learning environments. Comparative studies of different interaction types, assessment approaches, and levels of learner autonomy would provide a stronger basis for determining when and how interactive video produces meaningful educational benefits. Such evidence can inform the design of future platforms and help universities make more effective decisions about the role of interactive video in higher education.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

CONCLUSION

Interactive video teaching provides a practical approach to shifting university learning from passive viewing toward active participation. Its effectiveness depends on how well interactive activities relate to learning objectives, curriculum design, assessment, and students' individual learning needs. Intuitive, reflective, generative, and immersive interactions provide different opportunities for students to understand, examine, apply, and develop knowledge. Teachers can use these functions to encourage participation, provide timely feedback, support independent learning, and extend learning beyond the classroom. At the institutional level, reliable technological infrastructure, teacher training, appropriate assessment practices, and effective supervision are necessary for sustained implementation. Interactive video resource libraries can further support resource sharing, review, and continuous learning. Future development should focus on simpler platforms, personalized learning functions, learning records, and responsive feedback. When supported

by appropriate pedagogy and institutional conditions, interactive video can strengthen student engagement and create a more flexible and learner-centred higher education environment.

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