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EXPLORING THE ROLE OF VIDEO CONTENT MANAGEMENT IN TEACHER EDUCATION: STRATEGIES AND CHALLENGES

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ABSTRACT

The integration of Video Content Management (VCM) in teacher education has revolutionised instructional methodologies, offering dynamic and flexible learning experiences. This study examines the significance of VCM, the strategies employed in its adoption, and the challenges hindering its effective implementation in teacher education programs. Using qualitative research approach, the study incorporates content analysis along with interviews with 25 teacher educators to assess technological, pedagogical, and organisational barriers to VCM utilization. The findings highlight key challenges, including inadequate infrastructure, limited faculty training, financial constraints, and resistance to technological change. The study underscores the need for enhanced IT infrastructure, targeted faculty training, and clear policies for content management to optimize VCM's benefits. By promoting accessibility, engagement, and innovative teaching strategies, institutions can leverage VCM to improve teacher education programs and foster an enriched digital learning environment. This research calls for strategic investments in digital education technologies to ensure effective and sustainable VCM implementation in teacher training.

Keywords: Video Content Management, Technological Pedagogical Content Knowledge, Video Structure Parsing, Video Abstraction

1. INTRODUCTION

In the modern era, information exchange has evolved significantly from static, text-based websites to dynamic, video-rich content that is accessible in real time or on demand. The increasing use of video content in education, supported by technologies such as PowerPoint presentations, flash demonstrations, and virtual learning environments, is transforming teacher education. Hence Teacher education systems are under increasing pressure to equip the teacher educators with the knowledge and skills of 21stCentuary. With the evolution of teaching practices from lecture-based instruction to computer-assisted learning, and now to innovative technology-mediated learning, teacher education programs must adapt to these technological advancements. Developing and implementing Information and Communication Technology (ICT)-enabled teacher education programs is imperative, as these programs play a pivotal role in shaping the future of education. Structured and systematically curated learning materials support better knowledge retention and learner engagement. Research by Kay (2012) highlights that video-based resources should be categorized and tagged properly to ensure easy navigation and effective learning experiences. Teacher educators must acquire 21st-century digital skillsto create, edit, and manage video-based instructional materials. According to Laurillard (2012), digital tools, including video content management, help educators engage in meaningful teaching and learning

processes. "If you are a teacher educator, you cannot afford to leave it (the integration of computers) to the professor who teaches a class on technology" (Leu,2000). A well-designed VCM system provides the necessary support for teacher educators to develop digital literacy, which is crucial for modern classrooms. The increasing demand for online and blended learning underscores the importance of web-accessible video content. According to Guo, Kim, and Rubin (2014), well-managed video content contributes to effective online learning experiences, making education more inclusive and flexible.

2. NEED AND SIGNIFICANCE OF THE STUDY

The rapid digital transformation in education has significantly impacted teacher education, necessitating the adoption of Video Content Management (VCM) systems to effectively organize, store, retrieve, and analyse instructional videos. Research suggests that video-based learning enhances engagement, promotes critical thinking, and improves comprehension among learners (Hansch et al., 2015). Given the increasing reliance on multimedia instructional materials, structured video content management has become essential for ensuring seamless access and utilization. According to Koehler and Mishra (2009), the Technological Pedagogical Content Knowledge (TPACK) framework emphasizes the necessity for teachers to integrate technology effectively into their teaching practices. Video-based instructional strategies help enhance engagement and facilitate remote learning, making it imperative for teacher educators to be proficient in video content management. Studies indicate that effective video content management systems (VCMS) improve instructional efficiency by providing tools for easy content retrieval, organization, and sharing (Giannakos et al., 2016). Without proper content management, video resources risk being underutilized, leading to inefficiencies in teaching and learning. With the growing trend of flipped classrooms and blended learning, video content should be easily accessible to enhance the teaching and learning experience. The ability to create self-made instructional videos fosters collaborative learning among teacher educators (Greenberg &Zanetis, 2012). A well-integrated VCMS enables efficient content sharing, structured organization, and collaborative authoring, which in turn enhances pedagogical strategies. Research supports the effectiveness of video-based learning in improving engagement and knowledge retention (Mayer, 2021). By leveraging video-content analysis techniques, educators can analyse learning behaviours, assess content effectiveness, and refine instructional strategies accordingly. While video content production may initially require significant resources, an effective VCM system enhances long-term cost efficiency by streamlining access and reducing redundancy (Snelson, 2018). This ensures that instructional materials remain relevant and reusable across multiple courses.

3. OBJECTIVES

- To analyse the significance of Video Content Management (VCM) in teacher education.
- To examine the strategies of Video Content Management (VCM)
- To explore the challenges faced by teacher educators in practising video content management in educational institutions.

4. METHODOLOGY

This study employed a dual approach, integrating both theoretical analysis and qualitative research. The theoretical analysis focused on examining various strategies of video content management in teacher education. This involved a comprehensive review of existing literature, instructional methodologies, and the technological frameworks supporting video content management.To supplement the theoretical analysis, a qualitative study was conducted using Semi-structured interviews administered to 25 teacher educators. Random sampling was used for selecting the sample. The data was collected using a semi-structured interview schedule prepared by the Investigator.

5. VIDEO CONTENT MANAGEMENT

Video Content Management is meant for organising, managing and editing video contents. It provides the necessary tools, methods, skills and strategies needed to manage, store and edit the video content. Integrating video content management applications include the ability to:

- Track content access andfind content easily
- Make self-made video contents if required
- Analyse the video contents

- Organize content into structured form
- Share content among authoring groups
- Provide a managed content review process

Video-Content Analysis Techniques is used for generating or using large volumes of video and multimedia data. Though it is time consuming and thus more costly, it is cost effective and provides relaying information. The process of generating Web-accessible content usually involves using one of several existing Web-authoring tools to manually compose documents consisting of text, images, and possibly audio and video clips. This process usually consumes considerable amounts of time.

6. CONTENT-BASED VIDEO ANALYSIS

A video program can be conceptualized as a structured document, where video indexing parallels the process of text document indexing. Just as a text document is decomposed into paragraphs, sentences, and words for indexing, a video should be segmented into shots and scenes to facilitate content organization. By structuring a table of contents for video content, key frames or sequences can be extracted to serve as index entries for specific scenes or narratives.

Effective Video Content Management (VCM) necessitates the development of technological skills to analyze and process multimedia elements, including video, audio, and text. This involves implementing automated parsing techniques to identify meaningful structural components, extract relevant content attributes, and organize video sources efficiently. By leveraging these techniques, VCM can enhance content retrieval, improve accessibility, and optimize the overall management of educational and instructional video resources.

7. VIDEO STRUCTURE PARSING

Video structure parsing is a fundamental step in video content analysis, involving the extraction of temporal structural information from video sequences or programs. This process segments a video into individual scenes, much like paragraphing in text document parsing. From a narrative perspective, a scene comprises a series of consecutive shots grouped together to convey a coherent storyline. However, unlike text parsing, video scene detection requires a more advanced level of content analysis to accurately identify and categorize segments.

By parsing video content based on temporal structures and relationships, it becomes possible to systematically organize video data and construct a table of contents. This process includes detecting temporal boundaries and identifying meaningful video segments, which can be arranged hierarchically, similar to traditional film storyboards. At the highest level, sequences or stories serve as overarching categories, composed of multiple scenes. These scenes, in turn, are divided into shots, with each shot representing a continuous action in time and space through a sequence of frames recorded contiguously.

With this structural framework, a video table of contents can be automatically generated, improving content organization and accessibility. Shots, akin to words or sentences in text documents, serve as the fundamental units for video content indexing, forming the basis for efficient content retrieval and management.

8. VIDEO ABSTRACTION

Video abstraction is the process of generating a concise representation of visual information, significantly reducing the length of the original video while preserving its essential content. This process is analogous to extracting keywords or summaries in text document processing, where only the most relevant portions of information are retained. In video abstraction, a subset of video data—such as keyframes or highlights—is extracted to serve as representative entries for shots, scenes, or stories. This transformation condenses vast amounts of video data into a shortened version, often lasting only a few minutes, forming the foundation for video content representation and content-based video browsing.

By integrating structural information from video parsing with keyframes extracted during video abstraction, a visual table of contents can be constructed, enhancing the navigation and retrieval of video content. Several methodologies exist for video abstraction, including skimming, highlights, and summaries:

- Video skimming produces a condensed representation of a video that includes keywords, frames, visual sequences, and audio elements.

- Highlights focus on identifying and extracting significant events within a video.
- Summaries retain essential structural and semantic information, offering a compressed version of the video composed of key audio, video, frames, and segments.

A critical component of video abstraction is the identification of keyframes—still images extracted from the original video that best encapsulate the content of individual shots. Keyframes often supplement video logs by providing a visual reference to textual descriptions. One of the primary challenges in video abstraction is determining which frames are most representative of the content. An even more complex task involves extracting a hierarchical set of keyframes, where each subset represents a different level of granularity in the video content. This hierarchical approach is essential for content-based video browsing, allowing users to interact with varying levels of video detail.

Additionally, extracting video highlights presents an even greater challenge, as it requires high-level content analysis to detect and emphasize the most significant moments of a video. This advanced analysis is a key research area, with ongoing efforts to improve automated techniques for identifying and presenting meaningful video segments effectively.

9. STEPS INVOLVED IN VIDEO CONTENT MANAGEMENT

The steps mainly involve

1) INITIAL PLANNING

The details are written in three coloums namely Objectives, Content and Treatment.

2) DEVELOPING AN OUTLINE FOR INSTRUCTIONAL DESIGN

In this step the following fundamental design aspects are finalised.

1. Method of Instruction - Presentation
2. Style of Navigation - Linear
3. Types of media that will be used - Text, Audio, Sound, Animation (Wherever necessary)
4. Nature of Interactivity - Buttons

3) CREATING STORYBOARDS

This is the most important or critical step. Care must be taken to ensure the content presentation with relevant and complete content and instruction. While selecting the media the feasibility of implementing ideas should be noted.

4) DEVELOPMENT

In this step the ideas are finally converted into the packages. It includes the demonstration of the following

a) Graphic Style
b) Basic Navigational scheme
c) Video Content Analysis

10. CHALLENGES TO VIDEO CONTENT MANAGEMENT IN TEACHER EDUCATION PROGRAMME

The course component of technology integration of Teacher education Programme faces challenges in the practices of Video Content Management. These challenges include technological, pedagogical, and organizational barriers.

11. TECHNOLOGICAL CHALLENGES

One of the primary challenges of VCM in teacher education is the technical infrastructure required for effective implementation. Studies have shown that inadequate bandwidth, limited storage capacity, and outdated hardware can significantly impede the adoption of video-based learning systems (Greenberg &Zanetis, 2012). Furthermore, the complexity of managing large volumes of video content requires advanced indexing and retrieval systems, which are often underdeveloped in many educational institutions (Giannakos et al., 2016).

12. PEDAGOGICAL CHALLENGES

Integrating video content into teacher education programs requires educators to adapt their teaching methodologies to align with digital learning environments. According to Mayer (2021), many instructors lack the necessary technological pedagogical content knowledge (TPACK) to effectively integrate video resources into their teaching. Additionally, there is a risk that excessive reliance on video content may reduce interactive learning experiences, leading to passive rather than active learning (Kay, 2012).

13. ORGANIZATIONAL CHALLENGES

The successful implementation of VCM requires institutional support and financial investment. Research suggests that many educational institutions face budget constraints that limit their ability to invest in high-quality VCM platforms and training programs for educators (Snelson, 2018). Without adequate funding, the development and maintenance of VCM systems remain a significant challenge.

14. PERCEPTION OF TEACHER EDUCATORS ON CHALLENGES TO VIDEO CONTENT MANAGEMENT IN TEACHER EDUCATION PROGRAMME

Semi-structured interviews are conducted with teacher educators, to gain qualitative insights into their challenges with VCM. The aim was to explore the challenges they face in implementing video content management and gather recommendations for improvement. The semi-structured interview schedule focused on:

- The barriers in integrating video-based learning materials.
- Institutional support and available infrastructure.
- Training needs and areas for improvement.

The responses were analysed to identify codes on challenges to video content management in teacher education programme and are coded as

TECHNOLOGICAL ADAPTATION: Resistance to adopting new technologies among educators. Some educators are hesitant to shift from traditional teaching methods to technology-driven approaches

- **INFRASTRUCTURE LIMITATIONS**: Majority of educators reported a lack of access to multimedia equipment, high-speed internet, and updated software for video editing. They also felt the need for Multimedia studio at the institutions for creating their own contents with equipped video cameras and editing software.
- **TECHNICAL EXPERTISE**: Lack of trained personnel proficient in video editing and content management.
- **COST IMPLICATIONS**: High costs associated with developing and maintaining advanced multimedia learning resources.
- **FACULTY TRAINING**: Need for continuous professional development to ensure effective integration of video content management in teaching practices.
- **TIME CONSTRAINTS**: Many educators mentioned that video creation and editing are time-intensive processes that add to their already heavy workload.
- **COPYRIGHT AND CONTENT CURATION ISSUES**: Finding high-quality, copyright-free educational videos remains a challenge for many educators.

15. CONCLUSION

Quality of education is linked with how well the teachers are prepared for teaching. A carefully chosen text book may provide the framework for teaching and learning situations in any grade level. But these need supplementing with illustrations as well as content from the internet and other reference sources. The teacher must be able to incorporate the relevant illustrations in a relevant manner considering the concept attainment level and time management. The hesitations can be over ruled with the help of technical experts. Accepting new ways of doing things often involves a change in mind-set. Users familiarized to performing a certain task by using existing tools and methods might have a tendency to resist new tools and methods. People who use text-based information retrieval techniques may not feel comfortable with the notion of performing image and video especially its management with video content organising and editing. Some other challenges are provision in colleges to provide multimedia packages, LCD Projector, upgraded computers for Internet access and for relevant software, lack of technical experts in the field of computers, computer illiteracy of teachers etc .Well-designed prototype applications can help in bringing about the necessary change in

mindset for users to accept these applications. The NCF 2005 states that students should be given access to multimedia production equipment to mix and make their own production, to present their experiences and explore their own creative imagination. So all this points out the need to update and upgrade the course content of computer education in Teacher Education Programs.

CONFLICT OF INTERESTS

None.

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