instructional videos

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INSTRUCTIONAL VIDEOS TO PROMOTE SELF-DIRECTED LEARNING IN ENGLISH LANGUAGE TEACHING

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Abstract
Videos are powerful teaching media. Having the capability to transmit visual and auditory inputs, videos effectively build students' visual and auditory representations, making memory retention longer and guiding them to understand what to consider and do. Students' working memory capacity is increased when both their visual and auditory channels are used. This process shows how learning takes place: videos help students integrate new knowledge into their schema. This paper is aimed to provide a sketch of how videos enhance learning quality and promote knowledge transfer. Although videos have supporting features to improve instructional delivery, their use has proven complex and controversial. Thus, it is necessary to explain under which conditions videos positively impact learning. This paper concludes with some pedagogical implications for instructors regarding improving quality instructional videos.

Keywords: Learning, videos, cognitive load, teaching, knowledge.

Introduction

Technology has complemented traditional teaching methods. Instructors use technology applications to enrich students with various information and knowledge. For example, several game-based applications such as *Kahoot, Quizzes,* and *Formative* are also helpful in stimulating students' motivation to learn the lessons with fun. These technology-enhanced educational media are not a substitute for traditional classroom learning, but they serve as complementary facilities that can be used by both students and teachers in the learning process. In short, technology leads to significant gains in learning and teaching skills when appropriately implemented.

The emergence of video as a technology-based learning media has been a powerful tool to enhance the quality of teaching and learning. Having the capability to transmit visual and auditory inputs, videos effectively build students' visual and auditory representations, making memory retention longer and guiding them to understand what to consider and do (Van Es & Sherin, 2002). Students' working memory capacity is increased when both their visual and auditory channels are used. This process shows how learning takes place: videos help students integrate new knowledge into their previous cognitive system.

The use of videos in teaching and learning benefits students and teachers. Videos replicate authentic life settings recorded to enrich students with a much richer context than text or lecture (Bransford et al., 1990). They can learn at their own pace, watching and even replaying such recorded teaching events as they like. They slow down events: freeing them from real-time so they can revisit and review them, allowing for a deeper analysis of events (Hollingsworth, 2005). This learning process creates opportunities for students to focus on encouraging problem-solving patterns (Bransford et al., 1990; Wang & Hartley, 2003). Thus, video has a unique ability to provide powerful learning opportunities (Bransford et al., 1990; Ginting et al., 2020; Brophy, 2003).

Nowadays, many instructors upload their videos on the YouTube channel so that students may have easy access to the materials. Chen (2013) says that universities often use video-sharing techniques to strengthen language learning. Other researchers (Abendroth et al., 2012; Bauer, 2009; Chen, 2013; Clifton & Mann, 2011; Jackman & Roberts, 2014; Krauskopf et al., 2012; Libera-

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tore et al., 2012; Snelson, 2011) mention that the videos appeal to learners and accommodate different learning styles, particularly audio-visual learners. Jones and Cuthrell (2011) mention that videos can stimulate discussion in any subject, offer step-by-step guides to problems, deliver multimedia support for language learning, and provide a way for teachers to get ideas for lesson plans. Thus, these digital media reinforce the constructivist and collaborative aspects of learning by encouraging students to post videos of their acquired knowledge and share it with their classmates (Abendroth et al., 2012; Vogt-Schuller, 2014).

Even though videos have been used in EFL classrooms since the 1970s, researchers found different research findings for teaching and learning. Tomalin (1990) mentions that video is an excellent aid that helps students with a richer and more varied language environment within which learning can occur. The combination of variety, interest, and entertainment from video increases students' motivation. Over the last two decades, films and videotapes have become increasingly important tools in second and foreign language instructions.

Willis (1986) mentions several functions of the instructional videos for teaching English. First, videos display new language items, well-contextualized situations, illustrate meaning and use, give listening practice, and change for selective controlled oral practices. The second function shows 'target' situations that students can re-enact using their own words, e.g., simple role-play. Its purpose is to introduce a wider variety of settings and interactions. This method allows students to practice recognizing different realizations of similar functions. The third function of the video is to illustrate the target language used in a far wider variety of relevant situations. Video offers longer episodes that can stimulate simulation. The fourth function exposes students to larger chunks of language that they may not initially understand. Videos illustrate typical text structures and allow practice in comprehension skills and strategies. The fifth is to provide material of which the content is relevant to students' needs and interests. In this way, videos provide information retrieval (real-life activities) that stimulate students to imagine the context. Finally, they can make oral/written reports. The sixth function is that video provides material to act as a stimulus for more accessible classroom activities (problem-solving, games) not necessarily based on the intended message of the program.

Allan (1991) says that video has more advantages over textbooks or audio recording. The video presents realistic slices of life. Students will spend much time studying examples of good spoken English when learning spoken English. Students focused on the use of dialogues or a narrative to practice the language of the unit. When a video is used, students realize that the examples are more comprehensive after watching because they show the ways people communicate visually and verbally.

Terrell (1993) found that video positively affects listening comprehension and productive abilities. Furthermore, Weyers (1999) examined the effects of authentic video exposure on effective speaking skills. Authentic videos, such as episodic Spanish-language telenovelas, have helped students learn listening comprehension and practice communicative competence. When students were exposed to authentic videos, they became more confident and willing to take risks. Weyers (1999) found that students familiar with original videos showed greater lexical access and could narrate the story in greater detail.

However, other researchers have found different findings when videos are used for teaching. Wang and Hartley (2003) argued that videos are widely used in teacher preparation for various purposes. However, they found no evidence that video instruction could be used to develop competent professional judgment for novices. They could not determine whether videos succeeded in changing student-teacher beliefs or whether videos enabled student-teacher to translate their learning experiences into effective practice. However, Wang and Hartley (2003) added that video instruction appeared to provide context effectively, connect theory and practice, and model alternative methods and perspectives.

Despite pros and cons regarding the effectiveness of videos for teaching English, videos have proven complex and controversial (Clark, 1983, 1994; Jonassen et al., 1994; Koehler & Misran, 2005; Kozma, 1994). It is unclear under which conditions videos can positively impact learning quality. Researchers have found inconsistent findings, although many studies lean towards the effectiveness of videos for the instruction delivery. Videos developers should consider several factors such as individual experiences, level of expertise, quality of instructional design, and task complexity. This paper attempts to fill in the prevailing research inconsistency by seeking to explain the impacts of varied factors of cog-

nitive load as a mediating variable. It is hoped that the presentation of the review of video research can help readers understand how videos can benefit learners in the teaching and learning context.

Teaching English with video technology is a necessity for English teachers. Whether it is a three-minute clip or an entire ten-minute segment, a good video has a powerful capability to convey a message. With videos, teachers can preview and deliver their pre-teaching instructions to the students. Pre-teaching is the crucial step in introducing the students to the basic concepts they need to learn. This step is crucial. It provides a great scaffold through good language models and, at the same time, serve as an excellent review later. Moreover, teachers can make their videos effective by personalizing their instructions. For example, they teach using an informal language style so that their students feel the teacher's presence with them. Simplified language styles will accelerate students' language inputs into comprehensive intakes, resulting in their English proficiency enrichment.

Theoretical Framework of Cognitive Load Theory (CLT)

Cognitive Load Theory (CLT) provides a comprehensive explanation of the relationship between the media quality with the human cognitive ability to process the information. CLT views that good teaching media are designed according to the way humans exert their cognitive abilities in processing information. The model of human information processing involves several devices, namely sensory memory, working memory, and long-term memory. Humans receive input information (visual and sound) through their sensory motors, and then the human brain processes it. Human beings are equipped with visual and auditory channels to process the information received through the sensory apparatus (Mayer, 2001; Mayer & Moreno, 2002).

Use multimodality to maximize learning

Multimodality describes how several types of information representation influence or shape human attention, perception, interpretation, and meaning construction. Visual and aural inputs make up the multimodality in media design. This modality alters the way people perceive, pay attention to, and comprehend information.

While human working memory is limited, not all information is received. Instead, certain information is selected and thus remembered in the brain. People undergo visual and auditory information processes separately. Auditory items do not compete with visual items if they convey the same information meaning and vice versa. Efforts to remember or retain the amount of information in working memory at one time is called cognitive load. Although each channel has limited capacity, the two channels can facilitate the integration of current information into existing cognitive structures. Using both channels maximize working memory's capacity—but either channel can be overwhelmed by a high cognitive load (Mayer, 2005). Thus, it is important to design videos that manage the cognitive load in both channels to promote meaningful learning.

When the brain processes information, it constantly selects, categorizes, and integrates with knowledge structures called schemas. This integration process results in a learning experience or germane load where people use their cognitive energy to reconstruct their knowledge or reach the desired learning outcome (Mayer, 2008). The goal of these activities is for the learner to incorporate the subject under study into a schema of richly connected ideas. The more often people train the schema, the more automatically they use it for problem-solving skills. In other words, learning activities that draw upon existing knowledge expand the capacity of the working memory. Consequently, excellent instructional media should avoid cognitive overload resulting from the unnecessary additional information inputs that do not directly contribute to learning.

Avoid extraneous load while adjusting the intrinsic load to the learners' current learning progress

According to Cognitive Load Theory, effective learning occurs when an extraneous cognitive load (e.g., background music, flowery speeches) is minimized (Mayer et al., 2007; Mayer et al., 2008). The extraneous load does not help the learner toward the desired learning outcome. Extraneous loads occur due to a poorly designed lesson (e.g., confusing instructions, extra information). Meanwhile, the intrinsic cognitive loads take place because the content of the new lessons is too difficult for students to learn. Intrinsic loads are inherent to the subject under study—the more unfamiliar a topic, the more complex the material for students to learn. Thus, the level of difficulty of the new lessons must be adjusted. While learning is an activity to reconstruct knowledge whose parts are interconnected, the instructor's new topics

should always be related to the students' prior knowledge. Teachers can break down the subject content and sequence the delivery to reduce the high intrinsic load. In that way, the teacher teaches the sub-tasks individually before explaining them together. The purpose of this method is so that students do not overwhelm too early in the introduction of new work.

These theoretical perspectives give rise to several implications for educational video development. Compelling learning experiences demand some requirements: minimize extraneous cognitive loads, optimize germane cognitive loads, and manage intrinsic cognitive loads (Ginting et al., 2021). Several practical techniques of quality instructional video development are described below.

Designing Effective Instructional Videos

This research is based on contemporary cognitive psychology studies that focus on self-regulation and cognitive load theory in media design in education. A learning process is intricate and strongly reliant on brain processes. Students have a limited working memory capacity at their disposal when it comes to learning. These resources are depleted at a different rate depending on the type of load imposed by the learning materials' complexity. Factors such as subjective experiences, skill level, task difficulty, and media quality influence the available cognitive resources. CLT (Cognitive Load Theory) views that the complexity of the materials will be made much easier to understand if media are designed in such a way according to the way humans process information. When media are helpful for students to understand the material, they become confident. This condition influences their motivation, which in turn affects self-regulation. This paper concludes with several strategies for designing media for delivery instructions which the author discusses below.

Help students focus on the essence

Signalling is a technique that instructors can use to highlight important things in the video. Also known as cueing (de Koning et al., 2009), signalling can be realized using on-screen text or symbols. Some other examples of signalling techniques are displaying two or three keywords (Mayer and Johnson, 2008; Ibrahim et al., 2012), showing a change in color or contrast (de Koning et al., 2009), or displaying a symbol that point to a region of a screen (e.g., an arrow). This technique helps students pay attention to the signals. In addition, this technique can help novice students determine which elements within a complex tool are essential, thus avoiding split attention to extraneous load. When they focus on crucial details, the organization and connections within the information occur. Consequently, cognitive processes are assigned to a germane load. This technique could help students retain and transfer new knowledge from animations (Mayer & Moreno, 2003; de Koning et al.,2009).

Present instructional video material proportionally.

The proportion of instructional video material is one of the critical factors in receiving new topics well. Videos that are too long can drain students' cognitive energy and cause them to burn out. On the other hand, the segmenting technique, providing video content in small pieces of new information, allows learners to learn. In addition, students can control the flow of further details. Make short videos for students to learn new materials. These short videos simplify connectivity between elements and thus make it easier for students to integrate added information with their prior knowledge. Segmenting is vital for student engagement with videos (Zhang et al., 2006; Guo et al., 2014) and learning from videos (Zhang et al., 2006; Ibrahim et al., 2012).

Guo and colleagues examined the length of time students watched streaming videos within four edX MOOCs, analyzing 6.9 million video-watching sessions (Guo et al., 2014). They found that the median engagement time for videos less than 6 minutes long was close to 100%. This fact means students tended to watch the whole video even though significant outliers prevailed in the videos. As videos are extended, student engagement decreases. Making videos longer than 6–9 minutes is a wasted effort. In complementary work, Risko et al. (2012) showed 1-hour videos to students in a lab setting, probing student self-reports of mind wandering four times in each lecture and testing student retention of lecture material after the lecture. They found that student reports of mind wandering increased, and material retention decreased across the video lecture (Risko et al., 2012).

Thompson et al. (2021) examine how segmented sections of instructional videos are performed and the extent to which technical segments are implemented independently to influence student learning, perception, and interaction effects. They compared the experimental design with random assignment to the control and experi-

mental groups. Participants in the control group watched a single video (14 minutes) while the experimental group watched the same content divided into three video segments. They found no significant differences between the Long Video Group (control group) and the Segmented Video Group (experimental group) in measures of learning, interacting with, or perceiving video. However, participants who engaged in multitasking activities other than texting performed worse on the learning measure. Focus group participants described various behaviors and preferences for watching instructional videos but preferred approximately 20 minutes long videos.

Grossman (2005) and Willis et al. (1999) proposed a study on examining the components of video instructions that contribute to effective teaching and learning. Both Grossman (2005) and Wang and Hartley (2003) noted the importance of research that describes and examines the types of videos that are most effective in helping beginners improve their knowledge and skills. They criticized short intervention durations in videos to influence student-teacher beliefs, and both studies recommended longer intervention durations.

Eliminate unimportant elements

The weeding technique eliminates exciting but extraneous information that does not contribute to the learning goal. This way can provide further benefits. For example, music, complex backgrounds, or animations are irrelevant and can drain novice learners' attention. On the one hand, eliminating information that does not support the learning goal results in cognitive overload. On the other hand, this technique can improve the retention and transfer of current information from video (Ibrahim et al., 2012). It should be noted that removing elements from videos, including information necessary for their processing, is detrimental to advanced learners. Advanced students who have been well trained and capable of building the schema need to be enriched with new, more complex learning elements.

Deliver learning materials using a multimodality strategy

Learning something new will be easier if it is conveyed by utilizing multimodalities: visual and auditory inputs. Video is a very suitable medium to accommodate this need. Showing an animation process on-screen while narrating it is an excellent way to promote the germane load. This technique enables the learners to function their visual and auditory channels, thus avoiding cognitive overload simultaneously. In contrast, presenting images and showing printed texts make the visual channel work. Therefore, this single modality process impedes learning (Mayer and Moreno, 2003). Using multimodality effectively increases students' retention and ability to transfer information (Mayer and Moreno, 2003). Moreover, this technique also increases student engagement (Guo et al., 2014; Thomson et al., 2014).

Olivier (2019) examines how the creation and use of short instructional videos become multimodal open educational resources in an Afrikaans language classroom at the university level. He found that the design and use of short instructional videos positively affected students' perceptions. Several variables such as social interaction, knowledge of multi modalities, technical ability, device limitations, and the topic of videos influence the nature of short videos.

Engage the students in learning using personalized strategy

To help students learn better from the explanation, the instructors should make their conversational style more personalized. They use conversational rather than formal language during the instruction. Students are likely to feel engaged in learning because this language delivery creates an aura of social ties with the instructors (Mayer, 2008). In addition, it is suggested that instructors speak as naturally as possible. In examining student engagement with MOOC videos, Guo et al. (2014) and Ginting et al., (2022) found that the narrator's speaking rate impacts student engagement as the speaking rate increases. Other features, such as including in-video questions and organizing the presentation into "chapters," allow students to control their learning. This study concludes that speaking rate is essential. When students encounter new fundamental ideas and find them difficult to comprehend, teachers must maintain their slow speaking rate. On the other hand, as the students become increasingly advanced in their learning, increasing teachers' speaking rate promotes their students' interest in learning.

Thomson et al. (2014), who analysed faculty members' experiences at the University of Australia, emphasized the importance of delivering lectures using a storytelling model. According to him, the technique of a well-planned story showing the narrator's experiences can help the learner understand the concepts with a minimum of words. Having words and pictures can be

redundant and irritating for the learner. Occasional cues are good for emphasizing key concepts. However, narrators must present materials authentically. They speak fluently, talkatively, and confidently to validate their expertise and credibility.

Schroeder et al. (2020) examine the effect of virtual humans acting as pedagogical agents on learner-paced learning environments. Using an experimental research design, they investigate the influence of three types of pacing with varying levels of learner control when learning from an instructional video with an embedded virtual human. They found that increased learner control to the most substantial learning outcome. The moderate learner control group was the most instructional efficient. The results suggest that some aspects of learner control can benefit from instructional videos with embedded virtual humans.

Conclusions

This paper concludes that quality videos should motivate students to pay attention to essential aspects of the material presented, build a mental organization in a coherent cognitive structure, and integrate with relevant existing knowledge. When appropriately designed, videos can trigger effective learning where students activate their cognitive capacity to create meaning through interaction and experience, connecting, or modifying current information in existing memory schemes. Videos can be useful for clarifying complex or incredibly hard topics. Students can repeat difficult passages in the video until they succeed in building their understanding. Thus, the presentation of the video encourages students to study independently.

In short, videos serve as effective media since they can engage learners in learning. Students effectively use their memory resources, especially when dealing with complex, interacting, and unfamiliar learning content.

In English language teaching, video is an effective mode not only for developing language skills in comparison with a single modality (text-only). Moreover, video is also for presenting content. However, to maximize learning, videos must be designed so that necessary processing (the brain's selection of essential information) and generative processing (the brain making information meaningful) can take place without unnecessarily taxing the brain's working memory capacity overload. Unfavorable processing occurs when working memory is at complete capacity processing information unrelated to the intended learning goal. Therefore, cognitive theory for multimedia learning provides an understanding of how to minimize the irrelevant processing while maximizing the essential and generative processing for the learner.

There are some criticisms of the theory itself, however. Mayer is careful not to suggest that his research should be taken as the final word for guidance in the situations he is attempting to measure. Some criticisms include that Mayer's principles apply primarily to instructional videos that understand mechanical and physical systems. Also, Mayer's research was mainly conducted in controlled, laboratory-like settings, questioning the validity of the principles in a more real-world environment. Given this theory's limitations, it is also essential to consider other design principles to provide more precise and more effective criteria for measuring the quality of instructional videos.

Apart from the videos, the learners are also demanded to become self-directed learners. They must learn how to control their learning. They must be aware of the limits of their cognition. Self-regulated learners can help to manage their cognitive load. They work their metacognition to make good decisions to learn materials efficiently. For example, they may skip such materials and find better ones once they find poorly designed lessons (too many irrelevant details or too much unfamiliar information. •

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