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A Comparative Analysis of Point-of-View Modeling for Industrial and Technology Education Courses

Enrollment in technology education at the college level has been declining (Isbell & Lovedahl, 1989; Volk, 1997; Daugherty, 1998; Hill, 1999; Ndahi & Ritz, 2003; Moye, 2009). It is essential for technology teacher educators to investigate ways to increase the enrollment in their programs, or the profession may fail to provide technology teachers in the future (Ndahi & Ritz, 2003). A solution that several institutions with technology education programs have adopted is the offering of the program via distance learning. Distance learning “allows participants to collapse time and space” (Cole, 2000, p. ix). According to Flowers (2003) technology education programs “with a history of hands-on learning at the undergraduate level” have been slow to implement distance learning techniques and strategies (p. 64). Therefore, it is important to explore the extent to which distance-learning technologies such as video modeling can be used by industrial and technical teacher education faculty. The intention of this study is to add to the body of knowledge on effective video modeling procedures and, in particular, the point of view used when recording instructional videos.

Purpose

The purpose of this research was to identify which point of view—reportorial, subjective, or objective—better promotes content understanding and learning for hands-on activities in a technology education and industrial technology context.

The hypotheses that guided this study were:

H₀: There is a significant difference among the reportorial, subjective, and objective instructional points of view for industrial and technology education courses.

H_A: There is not a significant difference among the reportorial, subjective, and objective instructional points of view for industrial and technology education courses.

Review of Literature

Video modeling involves making a video of someone performing a specific task or application (Cannella-Malone et al., 2006). It can be described as a technique used to model a target skill by another individual whose actions and language are videotaped. A person watching the videotape of the targeted skill is expected to imitate behavior of the model as it is observed in the video

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(D'Ateno, Mangiapanello, & Taylor, 2003). The video is then shown in its entirety to the individual at the beginning of each teaching session. After viewing the entire video, the individual is given the opportunity to perform the task in its entirety. Video modeling and prompting have been successfully used to teach a variety of functional skills such as withdrawing money from an ATM (Alberto, Cihak, & Gama, 2005), purchasing items in a store (Alcantara, 1994; Haring, Kennedy, Adams, & Pitts-Conway, 1987), daily life skills such as brushing teeth (Charlop-Christy, Le, & Freeman, 2000), setting the table (Cannella-Malone et al., 2006), cooking (Shipley-Benamou, Lutzker, & Tauman, 2002), and vocational skills (Mechling & Ortega-Hurndon, 2007). According to Ayres and Paas (2007), there is growing extant literature on the use of video instruction for functional skills and trying to integrate technology (e.g., Mechling, 2004; Mechling & Cronin, 2006; Mechling & Gast, 2003; Norman, Collins, & Schuster, 2001).

Instructional video has been categorized based on the different points of views used while filming the video. McCoy and Hermansen (2007) defined point-of-view modeling as “the visual image that would be seen if the participant was engaged in the behavior including, images of hands demonstrating a specific skill, for example” (p. 185). Point-of-view video models are visual images that allow the participant to see a skill as if they were engaged in the behavior, including images of hands demonstrating a specific skill (McCoy & Hermansen, 2007). The three main points of view used for instructional videos are: (a) subjective, (b) reportorial, and (c) objective (Burrows and Wood, 1986). For the purposes of our study, we explain each of these points of view below.

The *subjective* point of view is often recommended as the dominant perspective. In the subjective point of view the student sees everything from the *instructor's eyes* point of view (see figure 1). “It has the potential to enhance a feeling of viewer participation, in contrast to the objective ‘eavesdropper’ perspective” (Willis, 1994, p. 179). To capture the subjective point of view, a camera would need to be mounted on top of the instructor's head, facing the work being performed.

The *reportorial* point of view was often referred to as the view that comes from a non-biased source, in this case, from *next to the instructor's eyes*. For this specific point of view the student sees everything as if he/she were standing to the side of the instructor (see figure 2). A camera needs to be positioned to the left or right of the instructor, facing the students, to represent the reportorial view for the instruction.

The *objective* point of view is one in which the students receive *face-to-face* instruction (see figure 3). “most closely emulates face-to-face conversation and enables the instructor to maintain eye contact, through the lens of the camera, with the distant learner” (Willis, 1994, p. 179). In addition, Mechling (2005)

stated that “the video camera moves as if it were the viewer and shows what is supposed to be seen through his/her eyes” (p. 29).



Figure 1. Subjective Point of View



Figure 2. Reportorial Point of View



Figure 3. Objective Point of View

Stahmer, Ingersoll, and Carter (2003) suggested that video modeling may succeed when other methods have failed. Hammond, Whatley, Ayres, and Gast (2010) noted that video gives the learner an opportunity to view the content repeatedly at any time, provides the instructor with easy editing ability to customize footage for the learner, and provides an authentic environment that mirrors real world experiences. Video modeling can also be an effective intervention for reducing problem behaviors, increasing play actions, and teaching functional living skills. Researchers have used video modeling to teach individuals such skills as purchasing (Alcantara, 1994; Haring et al., 1987), conversation (Charlop & Milstein, 1989; Sherer et al., 2001), perspective taking (Charlop-Christy & Daneshvar, 2003; LeBlanc et al., 2003), spelling (Kinney, Vedora, & Stromer, 2003), and daily living (Shipley-Benamou, Lutzker, & Taubman, 2002).

While most of the video instruction literature relates to research in special education (specifically autism), its applicability to groups of college students in the field of industrial and technology education seems like a perfect fit. Bowie (1986) found that film is very effective in teaching observational skills and in training learners on important details. In addition, Bowie (1986) indicated that using this method for problem-solving activities, skills of inquiry, and discovery may be an effective vehicle for delivering instruction. Mechling and Ortega-Hurndon (1997) reported the value of video technology in simulating "settings, events, and scenarios... that will generalize from the school to community environments" (p. 25). In addition, Moore and Anderson (2010) noted that point-of-view video modeling may be effective in the "[reduction] of problem

behaviors, increasing play actions, and teaching functional living skills” (p. 208).

Some other advantages and disadvantages in video modeling may include (but are not limited to):

Advantages

- Easily duplicated, reusable, and portable
- Convenience of use by the trainee
- Can be used anywhere/anytime (distance learning, etc...)

Disadvantages

- Trainee can control the process of learning in more complex material where the instructor should be present
- Trainee may fast-forward through critical parts of film
- May not be as effective for students who have high aptitudes in math and linguistics (Bowie, 1986)

Video modeling can also be an effective intervention for reducing problem behaviors, increasing play actions, and teaching functional living skills. Schreibman, Whalen, and Stahmer (2000) conducted several experiments using point-of-view modeling in which problematic behaviors were reduced and maintained during post treatment and during 1-month follow-up visits. A study performed by Hine and Wolery (2006), revealed that during play action, actions were increased based on the video modeling condition presented. Children were shown a video where a pair of hands properly manipulated toys in a bin, and once the children viewed this video they were instructed to play with the toys based on what had been shown in the video. During baseline children performed two types of actions; however, the video modeling implementation showed the number of actions doubled to four. Follow up with video modeling revealed the number of actions to remain high from four to six actions.

According to Moore and Anderson (2010), point-of-view video modeling research is a relatively novel approach with little published research. Prior to Moore and Anderson’s study, only six studies on the subject had been published: Alberto, Cihak, and Gama (2001); Hine and Wolery (2006); Norman, Collins, and Schuster (2001); Schreibman, Whalen, and Stahmer (2000); Shipley-Benamou, Lutzker, & Taubman (2002); and Sigafos, O’Reilly, and Cannella (2005). Scheibman et al. (2000) described their model as *priming*, while Sigafos et al. (2005) described their model as *prompting* (Moore & Anderson, 2010).

However, there is much to be learned about the elements of the model and of the processes and contexts in which it is presented, which leads to differential effectiveness of the point-of-view modeling process. According to Moore and Anderson (2010), very little published research is available on this variant of video modeling. First studied in 2000, point-of-view video modeling was recorded using the subjective perspective. Since 2000, four additional studies have been conducted using video footage from the perspective of the viewer. In

this footage, only hands were visible to the viewer (McCoy & Hermansen, 2007). “One of the theoretical foundations of video instruction relates to observational learning” (Bandura, 1969, 1977; as cited in Hammond, Whatley, Ayres, & Gast, 2010, p. 525). Specifically, Bandura noted that student engagement in observational learning (or learning skills) is related directly to their observation of others performing those skills (Bandura, 1969, 1977; as cited in Hammond et al. , 2010).

Methodology

A quasi-experimental study was selected as a means to perform the instructional point-of-view study during the spring semester of 2012. The study was conducted in a materials process course, STEM221, offered at Old Dominion University as a part of the STEM program. The population of the study was the course participants, and since STEM221 contains several hands-on projects where instruction through demonstration is common the researchers felt that the group was appropriate. The study’s goal was to identify which point of view—reportorial, subjective, or objective—better promotes content understanding and learning for hands-on activities in a technology education and industrial technology context.

This materials process course introduced the students to basic content and skills needed to process common materials and produce functional products using woods, metals, plastics, and composite materials. This course also included laboratory safety, use of hand tools, and operation of machinery. Course content was reiterated to students through laboratory discovery experiences in materials testing and construction of multi-material projects. Pedagogy and learning outcomes were based on the creation and demonstration of physical products.

Three instructional films demonstrating facing, turning, and drilling on a lathe were created by the researchers and validated by instructional technology faculty at the college. To prevent bias all films were of the same length and used the same narrative piece of activity explanation. The first film was created using a subjective point of view using an overhead camera. The students in this case were able to receive instruction through the instructor’s eyes. The second film was created using an objective point of view. The students in this case were able to receive face-to-face instruction. The third film was created using the reportorial point of view. The students in this case were able to receive instruction from a point of view next to the instructor’s eyes, more specifically, to the right side of the instructor, as if they were standing next to him.

All three films share the same narrative instruction, which were filmed at the same time, with the only difference being the point of view. All groups watched the same films. After viewing the films, the student participants were divided in three groups ($n_1=14$, $n_2=15$, and $n_3= 14$ with an overall population of $N= 43$ and completed a written content quiz related to the demonstration. The

groups were then sent into three different rooms according to the three different instructional views to demonstrate the three lathe applications, turning, facing and drilling, on the lathe. Each group only watched the assigned point-of-view modeling. During the demonstration on the lathe, the instructor, with the help of a teaching assistant, completed a direct observation instrument to identify activity completeness. Prior to the experiment, the instrument was validated using graduate students during lab activities, and a positive correlation was observed. The instrument measured time that it took to complete activity, comfort level, and overall completion results. Using a 1–5 Likert scale, the researchers were able to document the results. Using both the written quiz and direct observation instrument, analysis of the data began.

Data Analysis

The first method of data collection involved direct observation of the participants as they physically replicated the instruction. The instructor and teaching assistant scored the participants on a scale of 1–5 on their ability to complete the activity. The instrument had three categories: (a) time to complete activity, (b) comfort level (hesitation in between different steps of the process), and (c) overall completion of the activity. As shown in Table 1, the group that received instruction via subjective means ($n = 14$) had a mean observation score of 4.07. The groups that received instruction via objective ($n = 15$) and reportorial ($n = 14$) views had higher observation scores of 5.86 and 5.14 respectively. A one-way ANOVA was run to compare the mean scores for significant differences among the three groups. The result of the ANOVA test, as shown in table 2, was significant, $F(2, 40) = 14.54, p < 0.01$. The data was dissected further through the use of a post hoc Tukey's honestly significant difference (HSD) test. As it can be seen in table 3, the post hoc analysis shows a statistically significant difference between the subjective and objective points of view ($p < 0.001, d = 2.08$) and the subjective and reportorial points of view ($p = 0.008, d = 1.54$), with the subjective point of view being significantly lower in both cases.

After viewing the instructional videos, a quiz was given to the participants. The quiz was given to each of the three groups of Reportorial, Subjective, and Objective, based on the instructional exposure of the participants. As shown in table 4, the groups that received the instruction via subjective views ($n = 14$) and objective views ($n = 15$) had similar quiz scores of 30.57 and 28.66 respectively. The group that received instruction via reportorial views ($n = 14$) achieved a higher mean score of 36.21. A one-way ANOVA was run to compare the mean scores for significant differences among the three groups. The result of the ANOVA test, as shown in table 5, was not significant. However, it should be noted that the group who received instruction with reportorial views was the only group to score well with both hands-on demonstration and written comprehension.

Table 1
Direct Observation Descriptive Results

Quiz	<i>N</i>	<i>Mean</i>	<i>SD</i>	<i>Std. Error</i>	<i>95% Confidence Interval for Mean</i>	
					<i>Lower Bound</i>	<i>Upper Bound</i>
Subjective	14	4.071	.2672	.0714	3.917	4.225
Objective	15	5.866	1.1872	.3065	5.209	6.524
Reportorial	14	5.142	.9492	.2537	4.594	5.690
Total	43	5.046	1.1537	.1759	4.691	5.401

Table 2
Direct Observation ANOVA Results

Quiz	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i>
Between Groups	23.531	2	11.765	14.536	< 0.001*
Within Groups	32.376	40	.809		
Total	55.907	42			

* Denotes statistical significance

Table 3
Direct Observation Tukey HSD Results

Views (1 vs. 2)	Mean Diff. (1-2)	Std. Error	<i>p</i>
Subjective vs. Objective	-1.80	0.334	< 0.001*
Subjective vs. Reportorial	-1.07	0.340	0.008*
Objective vs. Reportorial	0.724	0.334	0.090

* Denotes statistical significance

Table 4
Quiz Descriptive Results

Quiz	<i>N</i>	<i>Mean</i>	<i>SD</i>	<i>Std. Error</i>	<i>95% Confidence Interval for Mean</i>	
					<i>Lower Bound</i>	<i>Upper Bound</i>
Subjective	14	30.571	12.023	3.213	23.629	37.513
Objective	15	28.666	8.121	2.096	24.169	33.164
Reportorial	14	36.214	8.945	2.390	31.049	41.379
Total	43	31.744	10.099	1.540	28.635	34.852

Table 5
Quiz ANOVA Results

Quiz	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i>
Between Groups	441.067	2	220.533	2.295	.114
Within Groups	3843.119	40	96.078		
Total	4284.186	42			

* Denotes statistical significance

Discussion

This study was done to determine any differences among points of view with video modeling instruction and to identify if any provided better instruction for students in industrial and technology education courses. In particular, the study compared the objective, subjective, and reportorial points of view. It was found that the objective view (face to face) and the reportorial view (shot next to the instructor's head) both provided statistically significant higher scores than the subjective view (shot from where the students are standing) when the students demonstrated what they learned. While not statistically significant, the students who received instruction via the reportorial view outperformed their peers who received instruction from the other two views on a written quiz. This could indicate that students were better able to comprehend instruction given from the eyes of the instructor or reportorial view, over the objective and subjective views. If this is the case, a major question arises: Why is the subjective point of view used most often in instructional videos?

It should be noted that the majority of instructional videos created in the past and today use the objective point of view as the primary one, regardless of the academic subject and content area. Using instructional videos to teach industrial technology and technology education hands-on tasks has great potential. We have the ability to share instructional resources, such as pre-recorded videos, and provide instruction to students at a distance. However, it appears that more research is needed on the camera view used to shoot those videos. This small exploratory study provided results contrary to the commonly used method of placing a camera facing the instructor to represent the view of a student in front of the activity. Instead, a view from the instructor's eyes by placing the camera on the head of the instructor while shooting seems to give the students a better understanding of the task being taught.

The researchers suggest that the current of point-of-view database on video instructional modeling be strengthened by repeating the study with additional sections of the course. The researchers also plan to review courses outside of the materials process course that contain additional academic majors, engineering technology in particular, to determine if this course is representative of the programs in general. In addition, the researchers are interested in further exploring the optimal point of view. Further research is needed to determine if cultural differences have an effect. An assumption could be that different eastern European cultures favor a different point of view over another.

While conducting the literature review to better focus this research, it was determined that there was a lack of research undertaken on cognitive technical distance learning. By understanding the optimal point of view for distance learning in technology education and industrial technology, distance instruction can be enhanced through the use of recorded or live video feeds.

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