

November 3



17th annual

Northwest Missouri State University
Maryville, Missouri



Friday, November 3, 2017

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Using 360-Degree Cameras for Self-Assessment in Skills-Based Courses

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Abstract

The proliferation of digital photography, which can capture and process high-resolution images with low-cost consumer cameras, brought panoramic imaging technology to the mass very quickly. Today's 360-degree cameras are capable of capturing the entire surrounding environment and provide an immersive experience to the viewers on web-browsers and virtual reality headsets. While these new cameras are often advertised to sport and outdoor enthusiasts, their functionalities, portability, and price make them an ideal tool to capture interactive and high-paced exercises in a learning environment setting.

In this paper, the author shares his experience using 360-degree cameras for self-assessment in legal education. Skills-based courses such as Advocacy Trials, are often hard to capture using regular cameras. Having a panoramic video of a student interaction in the courtroom can provide an unprecedented viewpoint for critique purposes and self evaluation.

The University of Missouri – Kansas City School of Law is located in the middle of a vibrant legal community with close ties to multitude of court systems in the Kansas City metro area, including administrative tribunals, Missouri Circuit Courts, the Missouri Court of Appeals Western District, and the United States Courts for the Western District of Missouri. Students enrolled in the Advocacy Emphasis learn the skills and practical knowledge necessary for today’s litigation, including administrative, pre-trial, trial and appellate work.

In addition to the courses provided, the school offers students the opportunity to take part of multiple externships, clinics, and a Mastery Advocacy course providing them with real word cases in a commitment to train advocates ready for trial work upon graduation.

Another aspect of this commitment, to improve the experiential learning of the students, is manifested in the achievements the UMKC School of Law continues to accomplish in regional and national negotiation and advocacy competitions. The school advanced to the national finals of the American Bar Association Law Student Division Negotiation Competition 20 times out of the past 26 years. The advocacy team has also made it to the final four four times and placed third in the nation twice. In addition, the school ranks 12th in the nation in the National Jurist’s “Best Schools for Practical Training” published in the magazine’s spring 2016 issue (The National Jurist, 2016).

Self-Assessment for Skills-Based Courses

Prior to each competition or Mock Trial, students spend extensive time researching and preparing for the cases they are presented with. In addition to their understanding of the legalities surrounding the cases, which most the students learn as they practice, they are also required to demonstrate a high level of communication and persuasion skills. Students are expected to complete several practice sessions with their instructors as well as additional sessions outside of the structured class time.

Videotaping practice sessions for critique purposes and self evaluation in skills-based courses such as trial advocacy, counseling and negotiation has long proven its utility (Johnson, 1987). Self-assessment, using videotaping or any other form, provides students with an opportunity to reflect on their performances to help them recognize their strengths and weaknesses and to take more responsibility and ownership over their learning outcomes (M.S. Yoo, 2009). Self-assessment using video is especially effective in that it allows students to see things that cannot be conveyed by the written word such as behavior and non-verbal communication that students have developed but are unaware of. The realistic presentation of video and its immediacy is an excellent preparation for law students as they are expected to be familiar with video and other audiovisual media which are highly used in deposition and trials (Kovach, 1996). The other benefit of using video as self-assessment tool is the dramatic increase in learning and retention of material when it is seen, 85 percent, compared to ten percent when it is heard and only five percent using other senses (Johnson, 1987).

Educators have relied on video and other multimedia forms to supplement their teaching for decades. Kimberlee Kovach (1996) used videotaping for self-reflection and evaluation of her students to provide a realistic learning experience, which she described as “Virtual Reality”. Her goal was to provide students with a constructive one-on-one feedback based on positive reinforcement as students are more willing to listen if they see an opportunity to improve (Kovach, 1996).

Video in Advocacy Classes

At the UMKC School of Law, Professor Michaelle Tobin-relies on videotaping to prepare her students for competitions by improving their communication and public speaking skills. For

Trial Advocacy courses, Professor Tobin uses videotaping as a self-assessment tool only, as self-assessment is not part of the final grade. However, students are encouraged to review their presentations to identify unconscious activities and mannerisms that might affect their communication skills.

When preparing for competitions, Professor Tobin uses videotaping of entire mock trials and watch it with her team while they review and identify their weaknesses and work toward improving their persuasive and advocacy skills. While the video camera is often focusing on the speaker only, their teammates, quickly learn that they also need to remain focused on their role as it may negatively impact the entire team performance. In addition, being able to observe the audience reaction during a Voir Dire for example and quickly adjust the delivery if needed, is very important.

So far, the Advocacy team at the UMKC School of Law relies on a single camera placed on a tripod to record mock trials and other learning activities inside the courtroom. A camera operator is always needed to be able to follow the student advocate or to switch the scene between the student and the audience when needed. Usually, students take turn to record each other and the course assistant is in charge of collecting, storing, and sharing the video footage.

While the courtroom, where all advocacy courses take place, is equipped with a multi-camera recording system, students and instructors alike find it difficult to operate and it doesn't provide an immediate way to play back the recorded sessions as they need to be processed first. Students also often rely on their own mobile devices or personal video recording devices to capture their practice sessions outside of the classroom. In the past, the law school also experimented with Google Glass to record a role playing exercise. The experience was successful as it provided the students with the possibility to capture a first-person-perspective reaction of their clients during an end-of-life decision making assignment without being distracted by a full-size camera. However, due to other limitations of the wearable device such as its low battery life, heat generated during long recording sessions, and its discontinuity by Google, the author resumed his search for a better alternative that can allow us to record multiple scenes at once while also being easy to operate.

Today's Panoramic Imaging

Panoramic imaging is not new. However, the proliferation of digital photography which can capture and process high-resolution images with low-cost consumer cameras brought the technology to the mass very quickly. Today, most smart phones are capable of capturing panoramic images out of the box. This advance is also driven by commercial applications for which panoramic imaging is worth the investment such as entertainment, interactive TV, real estate, and virtual tourism (Duke Gledhilla, 2003).

Today's 360-degree cameras are capable of capturing the entire environment surrounding them using multiple cameras facing different directions, or using an omnidirectional camera. Video recorded can then be played on regular screens with the added capability to move the scene around or through dedicated Virtual Reality goggles to enter an immersive experience.

For this purpose, which is providing Advocacy students with an ideal solution to record their practice sessions from both perspectives' of the student advocate and the audience while also being able to easily review the videos for self-assessment and critiques purposes, a 360-degree camera seems to be a good device to investigate. Recently, different 360-degree cameras became available to consumers. They differ in term of image resolution, number of lenses, size, compatibility, complexity, and price. Figure 1 represents characteristics and price comparative of several 360-degree cameras available in the market as of 2016.

Brand	Price	Pros	Cons
Ricoh Theta S	\$350	Slim stick format; easy to use	Limited to 8GB internal storage only; image quality is just OK; low-resolution video
360fly 4K	\$500	Just one lens, so no stitching required; waterproof body	Single lens can't see what's underneath; image quality is just OK; one-button operation can be confusing
Giroptic 360cam	\$500	Video from three lenses stitched in real time; waterproof body; removable battery	Lower-resolution final images; slow response on hardware; stitching sometimes misaligned
Insta360 4K	\$600	Highest-resolution 4K video	Hard to see and operate the screen in outdoor settings; bulky; low 15 frame-per-second rate at highest resolution
Kodak PIXPRO SP360 4K (duo pack)	\$900	4K-resolution video; great color and image quality	Must use computer to stitch video; no included app to stitch photos
LG 360 Cam	\$200	Slim stick format; easy to use; compatible with Android and Apple devices	Image quality is just OK; video is only 2K resolution
Panono	\$1,500	36 lenses create super-high-res still images; throw into sky to shoot automatically	No video; stitching problems on up-close objects; bulky
Samsung Gear 360	\$350	Great photo (26 megapixel) and video (nearly 4K) image quality; easy to use; compatible with Samsung Gear VR headsets	Companion app only works with Samsung smartphones; awkward shape and weight for pockets

Table 1. Characteristics and Price Comparative. List of 360-degree cameras available to consumers as of 2016. (Fowler, 2016)

After reviewing several alternatives, the author settled on Kodak PixPro SP360 Action Camera due to its design, features, and price. The PixPro SP 360 provides a 360-degree view angle, 16 Mega Pixels CMOS for still photographs, 1080p HD video, Wi-Fi connectivity, and remote control capabilities from mobile devices or computers. Its cubic design enables it to stand securely on flat surfaces without the need of a tripod (figure 2) The raw video recorded in most 360-degree cameras is spherical (figure 3). It needs to be processed before it can be used and shared. The Kodak PixPro SP360 software, available for Windows and Mac, can be used to convert spherical videos to different modes such as panorama, quad, ring, dome, or as segmented mode as it is illustrated in this experiment (figure 4). The software also provides some basic

editing and video enhancement tools to trim the video, adjust orientation of the image, or brightness and colors. 360-degree videos also require specific viewers for playback. Recorded video can be played directly on the Kodak PixPro SP360 software. However, in order to share the video online, metadata representing various characteristics of a spherical video is needed. Metadata can be embedded in the video using tools such as Google's 360 Video Metadata App or the built-in feature that comes with the software.



Figure 1: Kodak PixPro SP360. This figure illustrates a Kodak PixPro SP360 camera standing directly on any flat surface.



Figure 2: Spherical video. This figure illustrates a raw frame as capture with a 360-degree camera.



Figure 3: Unfold mode in the Kodak PixPro SP360 software. This figure illustrates different output options available in the Kodak PixPro SP360 software.

Immersive Video in Legal Education

Equipped with the new Kodak PixPro SP360, the author started a short experiment recording the Voir Dire portions of the final exam for a Trial Advocacy II spring 2016 class. Voir Dire is the preliminary examination of prospective jurors by a judge and attorneys in court. It is used to determine if any juror is biased and/or cannot deal with the issues fairly, or if there is cause not to allow a juror to serve (Gerald Hill, 2016). The goal was to use Kodak PixPro SP360 camera to record both the student advocates and the jurors at the same time. Sessions recorded were between 7 and 30 minutes each. The author recorded 32 students in 7 sessions over 4 days. A single full-charge of the Kodak PixPro SP360 can record approximately 160 minutes of high definition video at 1080p/30fps. But the camera will only support Micro SDHC cards which are limited to up to 32GB of storage space. When all recordings were done, the author used the Kodak PixPro SP360 software to trim and cut the videos, adjust the contrast and generate a segmented MP4 file for each student. The author used the segmented view as it provides a 360-degree view of the room without the need of a special viewer or device (figure 5). 360-degree-ready video files that can also generated using Kodak's software to share the videos on YouTube, Facebook, or other online platforms.



Figure 4: Segmented view. This figure illustrates a split-screen view of a 360-degree image. The goal of this experiment was not to study the effectiveness of 360-degree camera over regular ones. It was more to have a real experience with the device in the classroom. A new technology needs to add value to the learning process and not become a distraction or an obstacle to it. Both the students and their instructors were satisfied with its ease of use and the quality of the video shared with them. The students were more impressed when they watched their Voir Dire sessions using a Google Cardboard (Virtual Reality) headset. Professor Rafe Foreman, who teaches Trial Advocacy at UMKC School of Law responded to a curious student:

“It’s a camera ... it’s filming everybody in the jury and it is also filming the lawyers. We can see instantaneously your reaction to the lawyer’s questions. I think’s it’s going to be fantastic for future employers. Nobody has been able to send that to a potential law firm seeking a job.” (R. Foreman, Trial Advocacy II, April 25, 2016)

Final Thoughts

The 360-degree video will certainly have its place in skill-based education. But as with any new technology, there is still room for improvement. For the Kodak PixPro SP360, it is the fact that it has a single lens which means that the area below it will not be recorded. Kodak has a dual camera mount, to obtain a full spherical view by combining two identical cameras, along with a program to stitch the two videos together. But if there is a real need of recording a spherical video, maybe choosing a different camera equipped with dual or multiple lenses is a better alternative. Another challenge the author faced during this experiment is the time needed to render each video. Due to the large amount of data needed to create a spherical video, often dealing with large files (approximately 4GB for each 30 minutes of video). The large size of video is negatively impacting the encoding process. In fact, the ratio is 1 to 1. It takes one hour to process one hour of video footage. But, if the goal is to play back the video immediately after it

is recorded, it can be done directly from the software and in this case there is no need to wait for the video to be processed.

After this short experiment during spring 2016, the school purchased two additional 360-degree cameras for the Trial Advocacy class. Students and instructors had the option to chose the panoramic camera instead of the regular one to record their practices. However, the simplicity of a regular camera, although it provides limited features, seemed more appealing to the instructors. Going through the rendering difficulty after each recording and the need for a specialized player or device to review the videos is certainly an obstacle for an already over-stretched curriculum.

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