Review: Swivl, Inc. *Swivl CX3/CX5 Robot.*

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Swivl, Inc. has responded directly to the long-time practice in teacher education of filming teachers in action. Their technology seeks to capture more of the conditional factors that impact teaching and learning in the classroom than traditional audio/video recording equipment available to educators has been able to in the past. The company, founded by Vladimir Tetelbaum and Brian Lamb in 2010, produces hardware and software intended to improve the use of video for conducting teacher observations, hybrid and hi-flex learning scenarios, and pre-service teacher education. Swivl, Inc.'s main product is an integrated video and audio recording system that works with an existing tablet or mobile device. Two different kits are currently available, one with a total of three wireless microphones (CX3) and another with five (CX5). Each kit comes with the base, wireless microphones, wrist and neck lanyards, connection and charging cords for both Apple and Android devices, and a Quick Start Guide all neatly packaged in a handy protective carrying case.

A teacher's mobile device is harnessed into a circular base embedded with an infrared sensor, which identifies a wireless microphone/remote/tracking device hung around the neck with the included lanyard. As the teacher moves around the room, clear audio is recorded from the teacher's local microphone and the base "swivels" 360 degrees as the infrared sensor follows the tracking remote, keeping the teacher near center frame. Recording occurs through a companion app, which connects to the device's camera and syncs the video with the audio input received from all microphones. A Swivl online account automatically analyzes the percentage of input through each microphone when the video is uploaded to the cloud and allows the user to edit the video and discuss it collaboratively with peers online by timestamping written comments within the video.

Based on my use of the technology, Swivl provides many helpful features for observing classroom teaching. The audio recording from all microphone targets has always been crystal clear. At times, some students near a secondary microphone spoke so softly that they could not be understood. However, the Swivl app contains microphone setting options that allow the adjustment of each microphone's sensitivity to ambient noise. This feature seems to be more effective if the teacher adjusts these settings before recording with a specific use in mind. Once uploaded, the video playback is integrated with the audio from

all microphones. One excellent feature of Swivl's online video playback is that one or multiple audio recordings can be selected to play or be muted with the video for focused review.

Other online features have proven useful in observing teacher lessons. The speech analysis feature breaks down the amount of input from each microphone by percentage, including silence, with the purpose of dividing teacher- versus student-talk time in class. Nevertheless, when a student's voice is recorded over both the teacher's and a student's microphone, that input may be calculated twice as teacher input and/or student input. The Swivl website suggests that more microphones used in recording improves the accuracy of the calculations.

Helpful playback features also make reviewing video convenient. For instance, the time bar can indicate when silences occur and where collaborative comments were made by colleagues. Different video pixilation modes are available as well as playback speeds ranging from 0.5x to 10x. Editing features include trimming and cutting of video and adding additional clips from other videos. A final feature worth mentioning is the ability to download the video and audio tracks as well as the statistics, comments, and speech analysis for future review and storage on third-party software. However, users cannot isolate audio tracks in downloaded videos. Isolated audio tracks are only downloadable as audio files.

To use the product effectively and avoid potential frustrations, I recommend some best practices here. First, choose a device with a sufficient camera resolution because video quality is heavily dependent on the device used. Second, charge the base and infrared tracker fully before recording; otherwise, the base does not swivel as smoothly and has a delay in its rotation time. Lastly, carefully place the Swivl so that teacher proximity is not an issue. A teacher standing immediately in front of the base will likely not be fully in frame because the device's vertical movement is limited.

Inasmuch as the technical aspects of Swivl are at the forefront of video technology for teacher education, the design has some critical issues that have yet to be given deeper inspection. For example, device design is teacher centered: although multiple microphones are used to capture student engagement and participation, such engagement are not always manifest through verbal means. Thus, while Swivl is designed to capture the teacher's movement around the room, we can very often miss the nonverbal participation of students outside of the camera frame. This, at moments, can be modified by giving the main marker to a student or by controlling the angle of the camera using the directional pad on the marker. Still, the engagement of all students is not capturable synchronously.

Swivl technologies do, however, provide useful opportunities for teachers to record much of the teaching conditions that exist within their classroom. In other words, teachers can more effectively reflect on their teaching practices if the complexities of the classroom environment are better captured for their

review. I also believe technology is advanced enough to include even closer approximations of the classroom practices, such as 360-degree simultaneous video capture or automatic microphone input sensors. Only time will tell how Swivl, Inc. integrates such upgrades. Nevertheless, at its current stage, Swivl is an important tool for any in-service teacher or pre-service teacher evaluation where budgets are large enough to provide it.