Using Learner-Generated Videos to Foster Multimedia Communication Skills in Graduate Health Profession Education

Jennifer Hogg[1], Emily Thompson[2], Christopher Johnson[3] and Bengt Carlson[3]
[1]Department of Health and Human Performance, The University of Tennessee Chattanooga, TN, USA
[2]Library, The University of Tennessee Chattanooga, TN, USA
[3]Walker Center for Teaching and Learning, The University of Tennessee Chattanooga, TN, USA

Jennifer-hogg@utc.edu (corresponding author)

https://doi.org/10.34190/ejel.23.4.4279

Abstract: The advent of graduate level athletic training education programs, including those with online didactic curriculum, encourages instructors to incorporate higher level thinking strategies into their curricula. "Create" and "synthesize" are high-level verbs in Bloom's Taxonomy. Pathomechanics, the study of how musculoskeletal structure and function affect movement patterns, provides a prime opportunity to emphasize higher levels of critical thinking. Because degree programs in the health sciences are heavily "hands-on" and applied, creatively using technology in an online environment to develop transferable skills is critical for such health specialties as athletic training or physical therapy. The purpose of this experiential case study is to describe a method whereby graduate athletic training students are assessed in their ability to create and synthesize information pertaining to structural and gait anomalies. Doing so will allow for empirical work to determine the efficacy of this approach on student learning. Specifically, learner-generated videos may be used as an assessment tool, either in a traditional classroom or in an online classroom. Students report higher levels of active learning, engagement, and acquisition of competencies following creation of video content, which also fosters multimedia manipulation skills and development of 21st century communication ability. Approximately a month prior to the end of the term, the instructor provides students with the instructions for the assignment, each student's individual gait prompt, and the rubric. A collaborating multimedia librarian instructs the students in the use of technology for video creation and editing. The deliverable product is a video ~1 minute in length of a gait demonstration of the assigned gait prompt, complete with annotations and voice-over explanations of how the studied gait anomaly may influence kinematics and kinetics throughout the body. Learner-generated videos increase active learning, competency acquisition, and multimedia communication skills. Another primary advantage of this assessment is the potential for student-student and instructor-student collaboration and its ability to be a formative iterative assignment. Furthermore, mastery of pathomechanical content requires synthesis of information from anatomy, physiology, and orthopedic assessment courses. Learner-generated videos offer numerous advantages to student engagement and learning and require synthesis of information from across an athletic training curriculum, serving as a compact and comprehensive assessment.

Keywords: Gait, Synthesis, Library, Multimedia, Multimodal, Athletic training, Pathomechanics

1. Introduction

Professional athletic training (AT) education transitioned to an entry-level Master's degree relatively recently, with the final baccalaureate cohorts admitted in Fall 2022. Along with this change has come the ability for educators to employ more rigorous methods in the classroom. Although more rigorous accreditation standards did not formally accompany the higher degree requirement, graduate level education holds greater opportunity to engender more complex and nuanced thinking than is possible at the undergraduate level. In the Revised Bloom's Taxonomy of Educational Objectives (Anderson and Krathwohl, 2001), *create* is the highest level of learning. Appropriate verbs for this level of Bloom's Taxonomy include *synthesize*, *develop*, *make*, and *produce*, which offer greater opportunity for an instructor to instill critical thinking skills in graduate students. Especially in the age of artificial intelligence, proficiency in higher order reasoning skills is paramount, and it would behoove professors to creatively explore alternative pedagogical methods which challenge students to think holistically. Healthcare practitioners specifically must be able to think creatively to synthesize information and "tell a story." Human physiology is complex and movement disorders often present with nuance in unique ways. Assessing rote information and using the lower levels of Bloom's Taxonomy is inadequate for a healthcare practitioner tasked with practicing *individualized* care.

In athletic training, pathomechanics is considered foundational knowledge associated with observing a movement pattern and subsequently inferring its underlying causes (Commission on Accreditation of Athletic Training Education, 2020 Professional Standards). For instance, observing a limp in a walking gait and correctly determining the underlying musculoskeletal shortcoming could be an appropriate educational goal in a

Cite this article: Hogg, J. et al. 2025. "Using Learner-Generated Videos to Foster Multimedia Communication Skills in Graduate Health Profession Education", *Electronic Journal of e-Learning*, 23(4), pp 30-36, https://doi.org/10.34190/ejel.23.4.4279

pathomechanics course for future ATs. Inherent in high-quality pathomechanical evaluation is the ability to observe; inspecting another's movement patterns is a visual task at its core. Thus, creating visual content as a means to synthesize and communicate pathomechanical concepts is a fitting innovative pedagogical strategy. In a fast-paced clinical education program in which students are enrolled in multiple overlapping courses with related content (e.g., anatomy and physiology, orthopedic evaluation, biomechanics / pathomechanics), creating visual content is an innovative way to encourage students to synthesize information from across courses.

The reported advantages of learner-generated videos are vast, to include greater motivation, multimodal literacy, ability to problem-solve, and content mastery (Morgan, 2013). Compared with standard classroom learning materials (e.g., assigned readings, slide deck review), the creation of an original video increased student understanding in a repeated-measures design (Cohen's d = .45, p = .02) (Marley, 2014), indicating that students learn more when they are required to teach the content to others rather than in a passive learning paradigm. Others have corroborated these findings, demonstrating that active learning via learner-generated videos increased perceived acquisition of competencies and academic performance across various disciplines (Orús et al., 2016, Ariza, 2023, Pereira et al., 2014, Thomas and Marks, 2014). Development of technical skills and multimedia literacy supports post-graduation employment potential and communication competence, readying students for 21st century industry (Thomas and Marks, 2014, Sullivan, 2001, Genereux and Mangione, 2009). Further increasing the impact of learner-generated visual content, some have reported improvements in metacognition upon generation of visual video content (Schuck and Kearney, 2006). Creating videos as short as 1 minute has been shown to increase STEM students' perceptions of self-efficacy and engagement (Campbell, Heller, and Pulse, 2020), in addition to general improvements in content retention (Khalid, 2014) and critical thinking (Baclay, 2020).

Despite these purported advantages, descriptions of this pedagogical technique among medicine and health disciplines are lacking (BalikÇI and KarataŞ, 2024). A scoping review (Snelson, 2018) investigated the prevalence of student-generated videos in a content-area course. Healthy science courses accounted for ~20% of the total included studies, but none in sports medicine or athletic training. Therefore, the purpose of this experiential report is to present implementation of learner-generated videos as a means for assessing pathomechanical knowledge and application in a Graduate Athletic Training curriculum. Presenting this technique will allow graduate faculty to further their instruction of multimedia communication skills for 21st century healthcare professionals. Moreover, shedding light on the potential for collaboration between healthcare instructors and multimedia librarians will encourage future empirical data and analyses of the effectiveness of multimedia instructional modalities on student learning.

2. Description of Educational Technique

The specific learning outcomes in the syllabus addressed by this assignment are: 1) Communicate using basic biomechanical terminology, 2) Describe how anatomy and anatomical variations inform biomechanics, 3) Describe pathomechanics associated with musculoskeletal injuries frequently encountered during athletic activity, and 4) Evaluate an individual's gait pattern and identify problematic movement strategies. The programmatic curriculum is such that pathomechanics is taught concurrent with gross anatomy and orthopedic evaluation courses; therefore, the student learning objectives leverage this overlap to create reinforcement between courses. The pathomechanics course serves as a 'bridge' between anatomy and orthopedic evaluation. The present assignment is administered at the end of the term in lieu of a final exam.

Approximately a month prior to the end of the term, the instructor provides students with the instructions for the assignment (**Table 1**) as well as each student's individual prompt (**Table 2**). The rubric is also provided for student guidance (**Table 3**). Each student is required to record a short (~30 seconds) video of someone walking on a treadmill and displaying the respective gait pattern. The deliverable product is a video ~1 minute in length complete with annotations and voice-over explanations of how the studied gait anomaly may influence kinematics and kinetics throughout the body (still photo example in **Figure 1**). Because each student has a unique prompt, students are encouraged to discuss their assignments with each other and with the professor.

Figure 1: Example of student-submitted work with gait and annotations depicting the given prompt of "genu varum"

Since its inception, this assignment has been collaborative with the University Library's Studio, a multimedia lab that provides access to equipment, software, and expertise. In the weeks leading up to the assignment, classroom time is allocated to go over capturing the video on the students' phones, editing, adding a voice-over, and submitting the final project. For editing, the librarian teaches TechSmith Camtasia, a video editor used primarily for educational videos and screencasts. At this institution, it is available to students in the Studio Lab. The software is simple enough for students to gain competence in an hour, and comes with "Annotations," including text, arrows, and animated circles that help students bring attention to specific aspects of their video. The librarian also shows them how to export their video to the .mp4 format, which is compatible with most Learning Management Systems.

If the assignment occurs in a strictly online modality in which students may not have access to a University Library, lower-end technological solutions may be needed. Most smartphones have excellent cameras, although students may need guidance in recording in the proper format. For instance, iPhones default to a "high-efficiency" format that will need to be converted using a website like freefileconvert.com. As for software, iMovie comes free with Mac computers. Recently, there has been a boom in free or "freemium" software that makes video assignments more accessible to students using Windows. These include Shotcut and CapCut. However, instructors should familiarize themselves with free online softwares prior to mandating its use in an assignment. When working in an online-only modality, the University Library Studio adds help pages within the course's site in the Learning Management System, in the form of videos, screenshots, or repeating .gif images that walk the students through the process.

Modifications. This assignment lends itself to collaboration and peer review. For the student, completing the assignment is a visual task, and for the instructor, grading is also a visual task. Moving the assignment earlier in the semester would allow for structured peer review, in which classmates review and provide feedback on one

another's projects. The current audience for the videos is internal to the class. If the instructor wanted to encourage more professional videos, they could be posted to YouTube or other social media forum.

Table 1: Instructions to the student for completion of the video assignment

For this final assignment, each of you will receive a unique pathomechanical movement pattern. Your assigned pattern will be delivered via the learning management system by the date specified in the syllabus. If you do not see or cannot find your prompt after that date, email me immediately. Your prompt will be randomly assigned to you. The deliverable will be an annotated and voiced-over video recording, approximately 1 minute in length. You will upload the video to a cloud service and submit the video link on our learning management system to fulfill the assignment.

Nuts & bolts of assignment:

1) Demonstrate the movement during a walking gait. Ideally you would be the person demonstrating. Also demonstrate what would be considered WNL/"normal" for your particular deviation. Be sure to capture the movement from the best plane and video angle. Your voiceover should provide explanation throughout.

2) State in which of the three cardinal planes this movement deviation lies.

3) Explain how this movement deviation will affect kinematics.

a. Briefly explain how it will affect joint-specific kinematics.

b. Explain how it will affect kinematics either up the chain or down the chain.

4) Explain how this movement deviation will affect kinetics. Keep in mind there are several different types of kinetics. You are free to discuss GRF, joint moments, center of pressure, center of mass, or any other kinetics. If you can explain the kinetics from a multi-joint perspective or a global body perspective, that would be best. (For instance, "for this movement pattern, the GRF will pass posterior to the X joint, creating a Y joint moment here and a Z joint moment there." or, "The center of pressure will be moved laterally, which will...")

5) State 1 musculoskeletal condition that could be caused by your abnormal movement pattern. Describe in detail how this movement could result in the injury/condition you give.

Ideas for Annotating

Don't be afraid to get creative with this assignment. If you think something will help you explain your point better, then go with it. In my mind, I'm picturing paused video at key moments, with angles drawn on joints that change when the deviation becomes abnormal. Imaginary joint moments and GRFs. The ideas are endless. Make sure to get good video, at the height and angle you need, which may change when looking up and down the chain. You will probably need more than 1 view of your movement pattern. Make sure to annotate/draw where/how the musculoskeletal condition can occur.

Voice-over

I expect proper terminology. Use anatomically appropriate and biomechanically sound terminology. You need to be specific in your wording and precise. You should be able to continuously explain and elaborate for a full 60 seconds. Don't assume that the video explains everything fully--make sure to state the needed components.

References

References are not required for this assignment. However, if you are struggling to put this in perspective and don't feel that you have a grasp of the material you need, then you need to read. The textbook can be helpful, but I recommend the Library website to search for some good literature. After going through those steps and coming up empty, I can likely direct you to some good reading material.

Table 2: List of potential musculoskeletal prompts for a video-based assignment

Frog-eyed patella	Anterior pelvic tilt
Hallux valgus	Hip adduction during mid and late stance
Lordosis	Limited hip flexion
Kyphosis	Coxa vara
Quad extension lag	Wide step width
Limited dorsiflexion	Pes planus
Rounded shoulders + forward head posture	Rearfoot valgus
Limited femoral internal rotation	Tibial torsion

Table 3: Rubric provided to the students for this assignment

	Excellent	Mediocre	Poor
Video and Voiceover (20 points available)	Contains appropriate and thorough viewing angles, annotations are helpful and clear, and voiceover supplements and clarifies the video (18-20 points)	Viewing angle is not ideal or annotations are not helpful or voiceover does not clarify the video (11-17 points)	The joint(s) or interest are difficult to see or the voiceover is difficult to understand or interpret (0-10 points)
Correct demonstration of movement anomaly (10 points available)	Correctly and clearly demonstrates the movement anomaly (8-10 points)	Demonstrates the movement anomaly, but not clearly or too subtle (5-7 points)	Does not demonstrate the movement pattern correctly (0-4 points)
Correct ID of plane of movement anomaly (10 points available)	Correctly IDs the plane of movement (8-10 points)	NA	Does not correctly ID the plane of movement (0-4 points)
Description of joint-specific kinematic implications (10 points available)	Accurately IDs how movement anomaly will influence joint-specific kinematics (8-10 points)	IDs generally how joint-specific kinematics will be impacted, but minor details are wrong (5-7 points)	Unable to describe how kinematics will be influenced. (0-4 points)
Description of kinematic implications throughout the chain (10 points available)	Accurately IDs how movement anomaly will influence global kinematics, with near exhaustive discussion of salient kinetic chain segments (8-10 points)	IDs generally how kinematics will be impacted, but minor details are wrong or omitted salient kinetic chain segments (5-7 points)	Unable to describe how kinematics will be influenced. (0-4 points)
Description of kinetic implications (20 points available)	Accurately and thoroughly describes 1 kinetic variable and how it influences multiple joints (18-20 points)	Accurately describes 1 kinetic variable, but key points are missed or the description is limited to 1 joint (11-17 points)	Does not ID any kinetic implications (0-10 points)
Accurate ID and description of possible MSK condition (20 points available)	Presents common and plausible MSK injury/condition and sound supporting rationale (18-20 points)	Presents feasible MSK injury/condition, but supporting rationale is incomplete or is based on unsound biomechanical principles (11-17 points)	Presents an MSK injury/condition that does not follow from the movement pattern given (0-10 points)

3. Discussion

The purpose of this paper was to present a pedagogical strategy as a method for improving not only content mastery of pathomechanical movement disorders (Greene, 2014), but also the "softer" skills associated with communication and presentation (Seiber, Schweikhart, and Bogacz, 2018). While there is evidence that student-generated videos improve myriad aspects of student engagement and learning, concrete strategies for use in professional education for healthcare providers is lacking. This brief experiential report provides considerations for further work to assess empirically the efficacy of student-created videos to improve learning outcomes in future healthcare professionals.

4. Advantages

There are several advantages to using learner-generated videos as an assessment of pathomechanical knowledge in athletic training. Namely, this technique encourages collaboration among class members. Because each student is assigned their own distinct prompt, they are free to brainstorm, communicate, and work collaboratively, helping each other through thought processes and presentation of the video content. In the same vein, academic integrity is not a concern for the instructor. The students are given their individual prompts weeks in advance and encouraged to communicate with the instructor and other classmates to work out their thinking processes, rending a truly collaborative assignment between the instructor and students (Gelman and Tosone, 2006) which can be used for face-to-face or remote learning paradigms, which has been demonstrated as an effective asynchronous tool for basic science courses (Graul et al., 2022). Additionally, the present pedagogical technique encourages students to synthesize information across a variety of related courses, which further emphasizes higher-order critical thinking. Finally, the resulting video products are a mere 1-2 minutes each. With the accompanying rubric, these are simple assignments to grade on a short timeline.

5. Disadvantages

The primary disadvantage associated with this technique is the necessity of advanced technology. As such, it is easiest to replicate in a collegiate or university setting in which myriad resources are available. However, with the advent of social media-related online editors such as CapCut or Adobe Premiere Rush, there are free and low-cost options. It is recommended to encourage students to use institutional resources as able, to render the highest-quality end-product. However, this can lead to accessibility concerns, in that access to institutional technology may be limited to library working hours. If you are not working with a library, the professor will have to invest time in learning the software in order to support the project. Additionally, the time required to compile and create videos has been reported as a barrier to students (Speed, Lucarelli, and Macaulay, 2018, Greene and Crespi, 2012). Thus, it is highly recommended to enlist a technology consultant to provide instruction and expertise for students.

Furthermore, one potential pitfall of the pedagogical strategy presented herein is related to grading of the assignment. Some report that assessment criteria often do not focus on content learned, but instead on visual quality of the end product (Schuck and Kearney, 2006). While technical quality is necessary for superior communication, learning of the content should still be retained as the primary goal. The rubric provided in the present paper appropriately reflects this concept.

6. Future Directions and Conclusion

While beyond the scope of the current paper, future work can expand empirically upon instructional benefits of collaborating with multimedia librarians and incorporation of audiovisual technology into course assignments. For instance, pre-post surveys administered to students over different iterations of a multimedia assignment could yield valuable information as instructors continually hone their craft. Additionally, it would be valuable to inspect strategies such as creating video banks for lay education, or instituting peer review of student-generated videos (Graul et al., 2022). Presented herein is an assessment technique geared to engage students in synthesizing and communicating pathomechanical concepts in an audio-visual format. Graduate AT education affords opportunity for such high-level assessments; additionally, learner-generated videos offer numerous advantages to student engagement and learning. Advantages of this strategy are greater student-student and instructor-student collaboration and brainstorming, active learning, and development of 21st century multimedia communication skills.

The authors declare that the preceding report was conducted in the absence of any commercial or financial relationship that could be construed as a conflict of interest.

Ethics Declaration: Ethics approval was not required for this study.

Use of Artificial Intelligence Statement: No artificial intelligence was used in the development of this paper.

References

Anderson, L. W. & Krathwohl, D. 2001. *A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives*, Addison Wesley Longman.

Ariza, J. Á. 2023. Bringing active learning, experimentation, and student-created videos in engineering: A study about teaching electronics and physical computing integrating online and mobile learning. *Computer Applications in Engineering Education*, 31**,** 1723-1749.

Baclay, L. J. 2020. Student-created videos as a performance task in science. *International Journal of Research Studies in Education*, 10.

Balikçi, H. C. & Karataş, S. 2024. Student-Generated Videos: A Bibliometric Analysis and Systematic Review. *Bartın Üniversitesi Eğitim Fakültesi Dergisi*, 13**,** 147-161.

Campbell, L. O., Heller, S. & Pulse, L. 2020. Student-created video: an active learning approach in online environments. *Interactive Learning Environments*, 30**,** 1145-1154.

Gelman, C. R. & Tosone, C. 2006. Making It Real: Enhancing Curriculum Delivery Through the Use of Student-Generated Training Videos. *Journal of Technology in Human Services*, 24**,** 37-52.

Genereux, B. & Mangione, E. 2009. Enhancing Student Learning with Video Projects. *2009 Annual Conference & Exposition*. Austin, Texas.

Graul, B., Rollins, M., Powers, N. & Della Corte, D. 2022. Student created video content for assessment, experiential learning, and service. *The Physics Teacher*, 60**,** 491-495.

Greene, H. 2014. Learning through student created, content videos. *International Journal of Arts & Sciences*, 7**,** 469-478.

Greene, H. & Crespi, C. 2012. The Value of Student Created Videos in the College Classroom - An Exploratory Study in Marketing and Accounting. *International Journal of Arts & Sciences*, 5**,** 273-283.

Khalid, A. 2014. Use of student-generated videos to enhance teaching quality in aerospace engineering classes. *ASEE Southeast Section Conference*. American Society for Engineering Education.

Marley, K. A. 2014. Eye on the Gemba: Using Student-Created Videos and the Revised Bloom's Taxonomy to Teach Lean Management. *Journal of Education for Business*, 89**,** 310-316.

Morgan, H. 2013. Technology in the Classroom: Creating Videos Can Lead Students to Many Academic Benefits. *Childhood Education*, 89**,** 51-53.

Orús, C., Barlés, M. J., Belanche, D., Casaló, L., Fraj, E. & Gurrea, R. 2016. The effects of learner-generated videos for YouTube on learning outcomes and satisfaction. *Computers & Education*, 95**,** 254-269.

Pereira, J., Echeazarra, L., Sanz-Santamaría, S. & Gutiérrez, J. 2014. Student-generated online videos to develop cross-curricular and curricular competencies in Nursing Studies. *Computers in Human Behavior*, 31**,** 580-590.

Schuck, S. & Kearney, M. 2006. Capturing Learning through Student-Generated Digital Video. *Australian Educational Computing*, 21**,** 15-20.

Seiber, E., Schweikhart, S. & Bogacz, A. 2018. Comparing student perceptions of two pre-class engagement methods: online quizzes & student-created videos. *The Journal of Health Administration Education***,** 107-114.

Snelson, C. 2018. Video production in content-area pedagogy: a scoping study of the research literature. *Learning, Media and Technology*, 43**,** 294-306.

Speed, C. J., Lucarelli, G. A. & Macaulay, J. O. 2018. Student Produced Videos - An Innovative and Creative Approach to Assessment. *International Journal of Higher Education*, 7.

Sullivan, B. 2001. Developing 21st Century Skills with Student-Created Videos. *Ubiquitous Learning: An International Journal*, 5**,** 49-55.

Thomas, K. A. & Marks, L. 2014. Action!: Student-Generated Videos in Social Work Education. *Journal of Technology in Human Services*, 32**,** 254-274

