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Integrating Standardized Videos to Supplement the Clinical Physical Examination Curriculum in the First Year of Medical School: An Assessment of Medical Student and OSCE Evaluator Perspective

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Cover Page Footnote

We would like to thank the Parry Center for Clinical Skills and Simulation for donating their facility, time, and technology for our video creation. We would specifically like to thank Brian Wallenburg, NRP for his guidance with video production and Dr. Roy Mortinsen, MD for his clinical guidance and mentorship. We would like to thank the University of South Dakota Sanford School of Medicine Scholarship Pathways Program for funding this study.

Integrating Standardized Videos to Supplement the Clinical Physical Examination Curricula in the First Year of Medical School: An Assessment of Medical Student and OSCE Evaluator Perspective

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Background

The rise of e-learning among medical students comes as no surprise to those in the field of medical education. As millennials enter the realm of medical education, so do their preferences for technology-based tools to enhance their education. Medical school educators have been advised to recognize this evolving academic landscape and integrate technology into didactic curricula with practical and creative approaches.⁷ Just as technology is integrated into medical practice to provide today's patients with more effective healthcare, technology should also be integrated into medical school curricula to provide students with more effective medical education. Specifically, physical examination instruction has been shown to benefit from the integration of e-learning modalities into the traditional curriculum. The literature surrounding medical education initiatives commonly reports that instructional videos have proven beneficial in the process of learning physical examination skills.²⁻⁴⁻⁷ Research shows that instructional videos lead to sustained improvement in technical performance and provide medical students with a "consistent, reproducible, standardized teaching experience."²⁻⁴ An analysis of 106 LCME-accredited medical schools found that 97% of programs utilize online videos or supplemental e-learning to enhance traditional, face-to-face education in their physical examination curricula. Of those medical schools that reported using such supplemental e-learning, 71% of these programs produced their multimedia internally.³

The Objective Structured Clinical Examination (OSCE) is frequently used by medical schools to assess students' physical examination proficiency. Educating students on physical examination techniques requires both demonstrations by skilled clinicians and hands-on practice for medical students. Developing good examination skills requires a student's careful observation and systematic practice of the techniques deemed as "standard" for their curriculum. This can often be difficult in the traditional lecture-based format when several clinical educators participate in demonstrations, each with their own nuanced examination techniques. Although the process of standardizing physical examination curricula requires compromises of individual clinicians' preferences, the standardization of the clinical exam instruction has been shown to benefit medical students.¹⁻²

Although the literature commonly reports that incorporating instructional videos and standardizing physical exam instruction are beneficial in the process of learning physical exam techniques, research is lacking on the actual process of integrating multimedia resources into existing curricula and how such integration impacts medical students' perspective and well-being. Aspects of medical student perspective such as self-efficacy, anxiety, and preparedness have been previously studied, but largely in the context of their effect on a student's OSCE performance.⁶⁻⁸ Medical students' perspective has the potential to streamline the adoption of such supplemental multimedia by providing feedback specific to their school's curriculum. This study aims to address the above discrepancies by demonstrating a practical approach to integrating supplemental videos into an existing curriculum and assessing first year medical student and OSCE-evaluator perspectives at strategic points throughout the process.

Defined Terms

Traditional Physical Exam curriculum (at USD).

At the University of South Dakota Sanford School of Medicine (USD SSOM), the traditional teaching of physical examination skills to first year medical students is primarily a lecture-based format reinforced with supplemental hands-on practice sessions. Students receive primary instruction from a physician in a lecture-based format in which the four major physical exams are explained, followed by small group “hands-on” demonstrations with various physicians. The major physical exams are as follows: the neurology exam, the musculoskeletal exam, the combined abdominal and thorax exam, and the head & neck exam. The OSCE occurs at the Parry Center for Clinical Skills and Simulation with standardized patients where students are required to perform demonstrations of the physical exams in their timed patient encounters. Evaluators grade students from an observation window. Prior to this study, there was no use of video demonstrations in the physical examination curriculum.

Methods

Video Development

The video series mimicked realistic OSCE I clinical encounters with the use of standardized patients in the same testing facility used for the OSCE. Second-year medical students developed and created the video series using Bates’ Guide to Physical Examination and USD SSOM Clinical Foundations faculty as references. The peer-to-peer style of teaching utilized in these videos emphasized the perspective of a first-time learner, focusing on common pitfalls and tips for efficiency. The student educators utilized Filmora for video editing. USD SSOM Clinical Foundations faculty approved the final versions for implementation into the official physical examination curriculum. The videos were published via B-line, a protected online platform accessed through the USD SSOM Parry Center for Clinical Skills and Simulation.

Study Design & Ethical Considerations

A mixed methods study was designed to assess the integration of standardized videos into existing physical examination curricula and gather data on student and evaluator perspective. All students were given access to the videos, and students self-selected into video-user and non-video-user groups based on personal preference. This project was deemed non-human subject research by the University of South Dakota institutional review board.

Data collection and analysis

70 USD SSOM first-year medical students were provided a five-question pre-video integration and a fifteen-question post-video integration Likert scale survey. Responses to the pre-video integration survey were collected upon completion of the traditional USD SSOM physical examination curriculum, prior to video release. Responses to the post-video integration survey were collected upon completion of OSCE I Examination. 16 USD SSOM OSCE I evaluators were provided a four-question post-video integration Likert scale survey. Evaluators were asked to watch the video corresponding to the examination they were grading. This collection occurred prior to any evaluation of students.

The video series was not available for the class of 2022. As such, OSCE I performance scores were compared between the class of 2023 and class of 2022. An independent t-test was conducted to

compare average scores for each physical examination between the class of 2022 and class of 2023. A confidence interval range of 95% was utilized in all analyses.

Results

Sample Demographics and Video Series Utilization

63 of 70 USD SSOM students returned the pre-video integration questionnaire. 46.0% of respondents identify as female and 54.0% identify as male, which is similar to the overall class demographic. Respondent ages range from 21 – 42 years (med = 23, SD = 4. 08)

52 of 70 USD SSOM students returned the post-video integration questionnaire with exclusion of one response. 48.1% of respondents identify as female and 51.9% identify as male, similar to the overall class demographic. Respondent ages range from 21 – 42 years (med = 22, SD = 3.65). 13 of the 52 respondents (25%) indicated they did not utilize the video series. Table 1 depicts the rate of video utilization among USD SSOM students by examination.

11 of 16 USD SSOM OSCE I evaluators returned the evaluator questionnaire, indicating use of the video series.

Neurological Exam	33/52 = 63.5%
Musculoskeletal Exam	37/52 = 71.2%
Abdomen and Thorax Exam	33/52 = 63.5%
Head and Neck Exam	33/52 = 63.5%

Student-self efficacy

Figure 1 shows student response to the statement, “I am confident in my ability to demonstrate the skills needed to complete the following exam” prior to integration of the video series in Likert-scaled format. Significant variance exists between the videos.

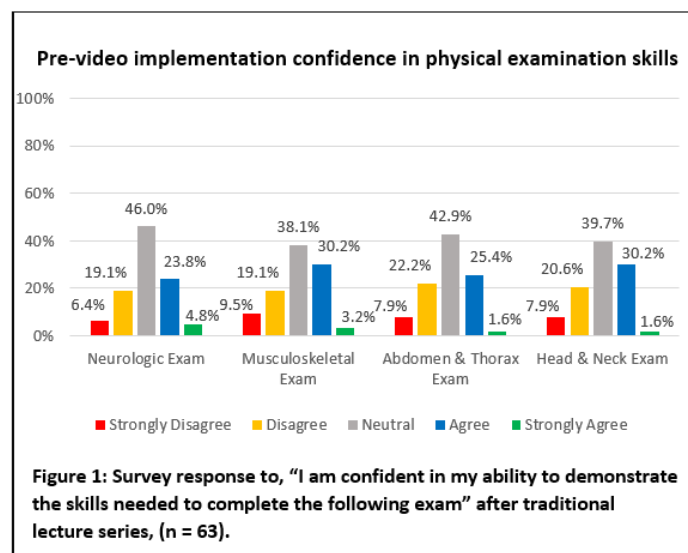


Figure 2 shows responses to the statement, "I am confident in my ability to demonstrate the skills needed to complete the following exam" among video users. 100% of students agree or strongly agree with the statement after watching the neurologic examination video or the musculoskeletal examination video. 97.0% of students agree with the statement after utilizing the abdomen and thorax examination video. 92% of students agree with the statement after utilizing the head and neck examination video.

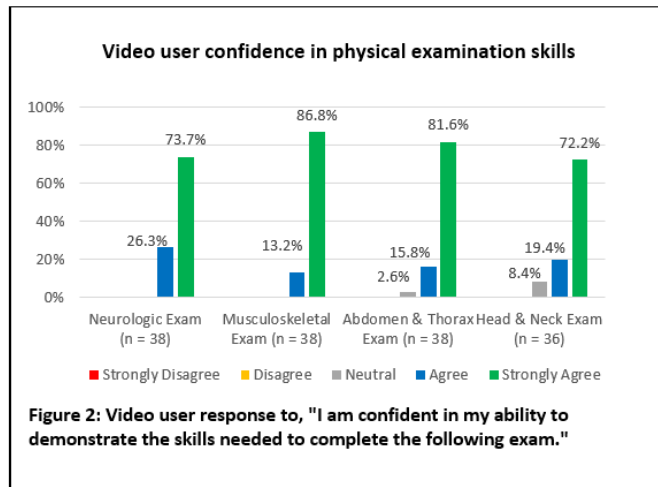
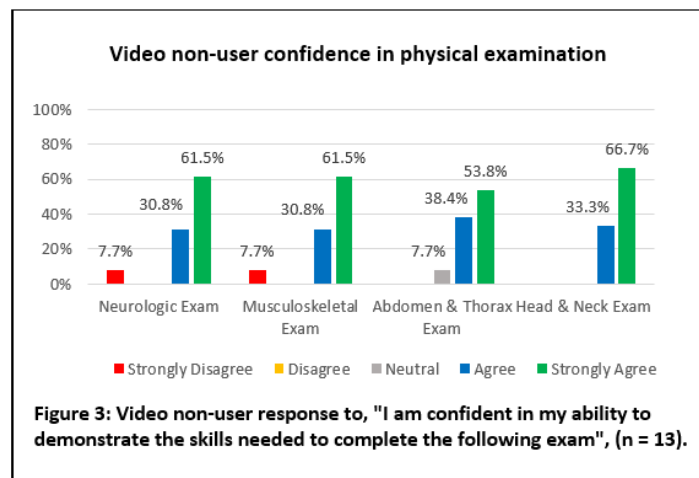


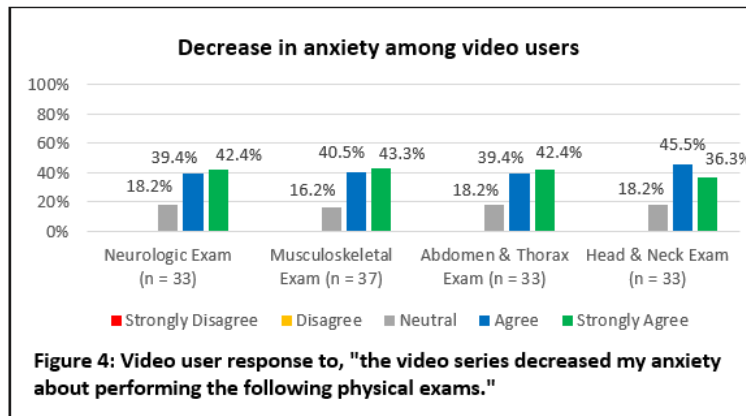
Figure 3 portrays the responses to the statement, "I am confident in my ability to demonstrate the skills needed to complete the following exam" among the thirteen video non-users. Of students who did not utilize the video series, 92.3% agree or strongly agree with the statement regarding the neurological examination, musculoskeletal examination, and abdomen and thorax examination. 100% of non-video users agree or strongly agree with the statement regarding the head and neck examination.



Student Anxiety Reduction

Figure 4 portrays student response to the statement, "the video series decreased my anxiety about performing the following physical exams." 81.8% of students who utilized the video series agree or strongly agree the neurologic exam video decreased anxiety associated with the exam. 83.8% of students who utilized the video series agree or strongly agree musculoskeletal exam video decreased anxiety associated with the exam. 81.8% of students who utilized the video series agree or strongly agree the

abdomen and thorax exam video decreased anxiety associated with the exam. 81.8% of students who utilized the video series agree or strongly agree the head and neck videos decreased anxiety associated with the exam. No significant variability exists between videos.



Video Quality

84.2% of students who utilized the video series agree or strongly agree the video quality was adequate to facilitate use and learning. 92.1% of students report adequate audio quality. 92.1% of students agree or strongly agree the video demonstrations contain an effective amount of detail.

Education Standardization and Supplementation

84.2% of video users agree or strongly agree the video resource instructed the students in a similar manner to their peers. 94.7% of respondents who utilized the videos agree or strongly agree the videos supplemented the lecture series and small group teachings included in the traditional curriculum. 97.4% of respondents who utilized the videos agree or strongly agree the visual demonstrations were of benefit and 97.3% of respondents would recommend this resource to future USD SSOM students as shown in Figure 5.

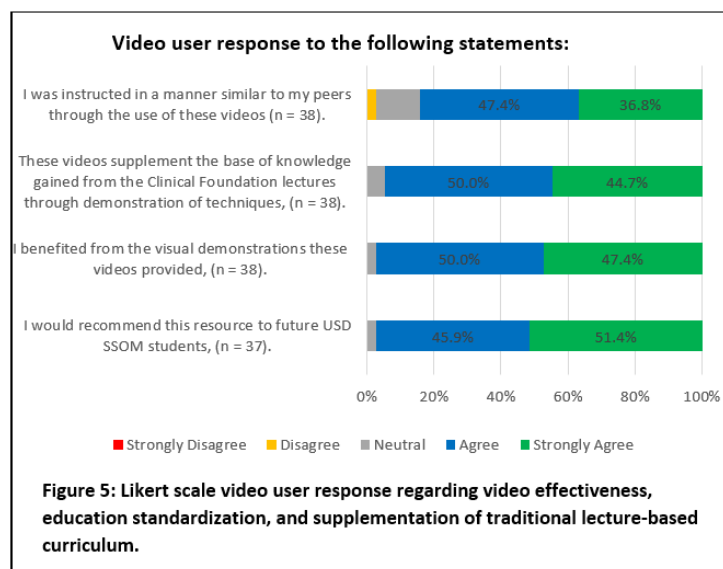
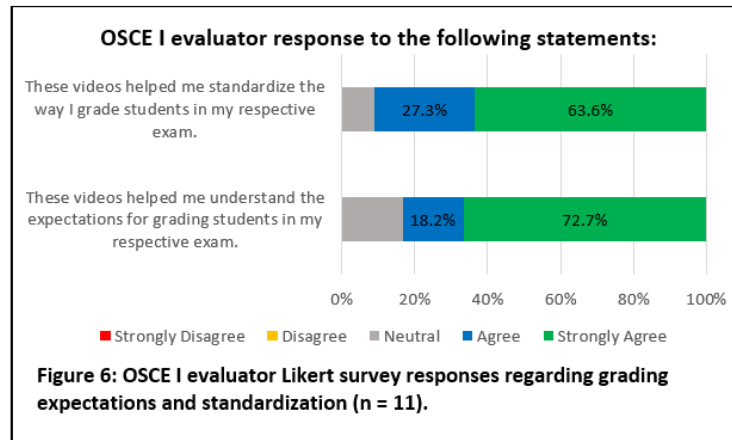


Figure 6 depicts the OSCE evaluator survey responses investigating the comprehension of grading expectations and grading standardization. 90.9% of OSCE evaluators agree or strongly agree the videos enhanced their understanding of grading expectations. 90.9% of OSCE evaluators agree or strongly agree the video series aided in standardization of the grading process.



OSCE Performance

Table 2 shows the average score and standard deviation for each physical examination for the class of 2022 and class of 2023. No statistically significant difference exists between the class of 2022 and class of 2023 for the neurological examination ($t = 1.91, p = 0.06$), the musculoskeletal examination ($t = 1.08, p = 0.23$), the head and neck examination ($t = 1.84, p = 0.07$), the abdomen examination ($t = -0.50, p = 0.62$), or the thorax examination ($t = 0.65, p = 0.52$).

	Neurological Examination	Musculoskeletal Examination	Head & Neck Examination	Abdomen Examination	Thorax Examination
Class of 2022 (n = 69)	M = 19.67 SD = 0.59	M = 19.63 SD = 0.68	M = 18.74 SD = 1.39	M = 19.14 SD = 1.14	M = 19.33 SD = 1.41
Class of 2023 (n = 70)	M = 19.42 SD = 0.92	M = 19.49 SD = 0.84	M = 18.30 SD = 1.43	M = 19.24 SD = 1.20	M = 19.19 SD = 1.12

Discussion

Consistent with existing literature, this study reveals positive student perceptions of technology incorporation into physical examination education.^{2, 4-7} This study outlines the implementation process of a comprehensive video series to supplement traditional didactic curricula. Further, this study reveals incorporation of the video series aided in the standardization of physical examination education from both the student and faculty perspective. One OSCE examiner stated, “I would've loved this as a medical student, and even as a practicing doctor I appreciate the review to know that I am doing it right in my practice, and more specifically that I am teaching it correctly to medical students.”

In accordance with existing literature, most students found the incorporation of supplemental e-learning to be advantageous in terms of reducing student anxiety and contributing to increased confidence in their physical examination skills.^{6,8} Unfortunately, due to a low response rate among video non-users (n

= 13), this study was not powered to assess for significant statistical difference in self-efficacy between video users and non-video users.

Overall, the major limiting factor reported by students who did not utilize the video series was ease of access. In accordance with existing literature, the authors recommend institutions evaluate the ease of access, including mobile access, of their multimedia platforms when incorporating e-learning resources.⁵

Inconsistent with existing literature, this study revealed no statistically significant difference in OSCE performance between the individuals without access to the video series (class of 2022), and individuals with access to the video series (class of 2023). It is believed the ceiling effect contributed to these findings. The ceiling effect is a measurement limitation that occurs when the highest possible score or close to the highest possible score is reached on an examination, and there is a decreased likelihood the examination is accurately evaluating the intended outcome and variance.⁹

Limitations

A potential confounding factors present in our analysis includes the extended time period between the pre-video integration survey and post-video integration survey that allowed further time for OSCE preparation. Additionally, when comparing OSCE grades between the two classes, there is potential for introduction of confounders due to slight changes in the OSCE curriculum and evaluators. As stated previously, this study was not powered to assess the difference in self-efficacy between video users and non-video users, and the ceiling effect likely diminished the statistical significance when comparing graded OSCE performance.

Future Studies

During the COVID-19 pandemic, this video series was utilized as the sole, primary resource for physical examination education. Future studies will analyze the perspective of students and faculty on e-learning as a primary resource as well as the effect on OSCE performance.

Conclusion

Overall, this study outlines the successful augmentation of traditional didactic curricula of physical examination techniques with the implementation of a comprehensive instructional video series. Video users report decreased anxiety and increased self-efficacy after using the video series. Students and OSCE evaluators found the video series to be useful tool for both educational technique and evaluation standardization.

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