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Original Research Article

Perceptions and behaviors of learner engagement with virtual educational platforms

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A B S T R A C T

Background: The COVID-19 pandemic has increased utilization of educational technology for surgical education. Our aim was to determine attitudes and behaviors of surgical education champions towards virtual educational platforms and learner engagement.

Methods: An electronic survey was distributed to all Association of Surgical Education members addressing i) methods of engagement in virtual learning ii) ways to improve engagement and iii) what influences engagement. Stratified analysis was used to evaluate differences in responses by age, gender, level of training and specialty.

Results: 154 ASE members completed the survey (13% response rate). 88% respondents accessed virtual learning events at home. Most (87%) had joined a virtual learning event and then participated in another activity. 1 in 5 who did this did so “always” or “often”. Female respondents were more likely than males to join audio and then participate in another activity (62.3% v 37.7%, $p = 0.04$).

Conclusions: Virtual platforms do not automatically translate into increased learner engagement. Careful design of educational strategies is essential to increase and maintain learner engagement when utilizing virtual surgical education.

1. Introduction

The COVID-19 pandemic has led to swift and often uncharted transitions to provision of virtual surgical education.^{1–3} A rapid adaption by learners and educators alike has been required in order to ensure that this pedagogical shift is associated with effective learning. There are many obvious benefits to utilization of virtual educational platforms during this time, including adherence to social distancing requirements, educating learners in quarantine and isolation and ensuring that educational opportunities available to a greater number of learners.⁴ An excellent example is the American College of Surgeons Clinical Congress meeting in 2020. This meeting logged a record 30,000 registrants from more than 150 countries.⁵

Whilst the increased accessibility and, by virtue, increased attendance of virtual learning events is attractive, what is unclear is if this

translates to either increased learner engagement or learning. Efforts have been made to study learner engagement during in-person learning events, but this has not been performed for the virtual platform.^{6,7} An additional challenge in the virtual platform is assessing the issue of “fake” engagement, and learner multi-tasking. The effects of multi-tasking may be especially pertinent for women, given the increased gender disparity observed during the COVID-19 pandemic with regard to increased childcare responsibilities and reduced proportional scholarly activity reported for women.^{8–10} Conducting medical education research in this area is important in order to avoid the tempting but unfounded assumption that increased number of learners leads to increased engagement or increased learning.

Attitudes and beliefs are important and powerful predictors of behavior.¹¹ Studying these can help us determine barriers to engagement with virtual learning events, challenges in their delivery and

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construct and deliver strategies to mitigate these. The aim of this work was to determine the attitudes, beliefs and behaviors of surgical education champions with regard to virtual surgical education and learner engagement.

2. Methods

An electronic survey was distributed to all members of the Association of Surgical Education. These individuals were selected for the survey as they can be defined as surgical education champions and arguably best placed to offer insight into the subject matter. The survey questions were generated and revised during meetings of an ASE Educational Technology Committee workgroup and focused on the respondent perceptions and behaviors as learners in surgical educational events. Pilot testing of the survey was performed to optimize usability and response rates. Questions were further revised based on the results of pilot testing.

The questions pertained to respondent demographics, their engagement behaviors as learners during virtual surgical educational events, their preferences for engagement with virtual learning events and their perceptions of factors affecting virtual learning engagement. In addition, data were collected regarding the pattern of surgical event translation to the virtual platform at the respondent's institution. ASE members of all grades/professions were asked to complete the surveys for virtual educational events in which they were present in a learner role.

The distribution of the survey responses was reported as frequency and proportion. Stratified analysis was used to evaluate the difference in frequencies and proportions of the responses of questions 12, 13, 14 and 15 by strata of age, gender, level of training and specialty. The differences in the response proportions were determined by the Chi-square or Fisher's exact test as appropriate. All the analyses were performed on Stata version 17.0 (StataCorp LLC, College Station, TX, USA)

3. Results

The survey was sent to all physician (674), non-physician (183) and trainee members (346) of the ASE. A total of 154 (13%) ASE members completed the survey, of whom 46% were female, 62% were white and the majority (49%) were surgery attendings. Demographic details are shown in Table 1. Most of the respondents (88%) accessed virtual learning events at home. Zoom was the most commonly used platform (92%) followed by Microsoft Teams (44%). A diverse range of learning and patient care events were translated into a virtual platform at respondent's institutions. Table 2.

Half of respondents preferred to engage using computer video as necessary (such as when talking). Table 3. The format of the session (58%) and how much the participant planned to talk (51%) were the most common influences on modality of engagement (video versus audio). When respondents participated via audio only on their computer or cellphone, 63% felt less engaged with the session.

More than half (60%) of respondents chose video engagement in order to form a connection with other participants Table 4. If audio was preferred, 63% selected this as they had other activities to perform during the teaching time. The majority (87%) had previously joined a virtual learning event and then participated in another activity. One in 5 who did this did so "always" or "often" (Fig. 1). Female respondents were more likely than males to join audio and then participate in another activity (62.3% v 37.7%, $p = 0.04$).

In terms of the influence of the "chat" function on learner engagement, 58% felt that this facilitated discussion and 38% felt it increased learner engagement. Nineteen percent of respondents felt that the chat function provided a distraction to the instructor and 16% felt it provided a distraction to the learner. Interestingly 46% respondents use the chat function to get their voice heard when there was a large number of learners in the group.

Most (86%) respondents felt that learner engagement in virtual educational sessions needs to be improved. One third felt that effective

Table 1
Responder demographics.

Demographics	Number of respondents (% of total number)
<i>Current practice</i>	
Surgery attending	75 (48.7)
Surgery fellow	4 (2.6)
Surgery resident in clinical years	10 (6.5)
Surgery resident in research	7 (4.5)
Surgical educator, non clinical	16 (10.4)
Educational administrator	6 (3.9)
Medical student	2 (1.3)
Allied healthcare professionals educator	2 (1.3)
<i>Specialty</i>	
Acute Care Surgery	28 (18.2)
Minimally Invasive Surgery	25 (16.2)
Colorectal Surgery	12 (7.8)
Cardiothoracic Surgery	3 (1.9)
Pediatric Surgery	8 (5.2)
Surgical Intensive Care	17 (11.0)
Surgical Oncology	17 (11.0)
Trauma Surgery	21 (13.6)
Endocrine Surgery	7 (4.5)
Other	51 (33.1)
<i>Gender</i>	
Female	70 (45.5)
Male	49 (31.8)
Not disclosed	35 (22.7)
<i>Race</i>	
White	95 (61.7)
Black	1 (0.6)
Asian	17 (11.0)
Other	1 (0.6)
Not disclosed	40 (26.0)
<i>Age</i>	
18–30	26 (16.9)
31–40	39 (25.3)
41–50	32 (20.8)
51–60	18 (11.7)
61–70	5 (3.2)
Not disclosed	32 (20.8)

Table 2
Translation of in-person events onto the virtual platform (respondents select all that apply).

Learning event	Number of respondents (%)
Journal Club	89 (57.8)
Morbidity and Mortality meetings	131 (85.1)
Grand rounds	116 (75.3)
Didactic sessions (e.g. resident SCORE sessions)	120 (77.9)
Regular departmental or societal meetings	128 (83.1)
Multidisciplinary team meetings	102 (66.2)
Other	12 (7.8)

Table 3
Preference for engagement by learners in virtual educational events (defined as all events in which the participant is attending with the primary goal of learning).

Preference for engagement in virtual learning events	Number of respondents (%)
Computer with video on all the time	45 (29.2)
Computer with video on as necessary (such as when you are talking)	78 (50.6)
Computer with audio on only, no video	9 (5.8)
Mobile device with video on all the time	3 (1.9)
Mobile device with video on as necessary (such as when you are talking)	4 (2.6)
Mobile device with audio on only, no video	1 (0.6)
Other	14 (9.1)

Table 4

Determinants of engagement modality for participants in virtual learning events (respondents select all that apply).

Number of respondents (%)	
Why do you select video engagement?	
The instructor is on video	48 (31.2)
The majority of the class is on video	69 (44.8)
I feel like it is expected of me	63 (40.9)
To show I am paying attention	67 (43.5)
To form a connection with the instructor	69 (44.8)
To form a connection with other participants	92 (59.7)
Other	9 (5.8)
Why do you select audio only engagement?	
I have other things to do during the session	97 (63.0)
I have children/pets/other relatives at home and cannot guarantee privacy	60 (39.0)
I am self-conscious	18 (11.7)
I am concerned about my appearance	42 (27.3)
I don't want my picture to be photographed and Tweeted	13 (8.4)
Other	28 (18.2)

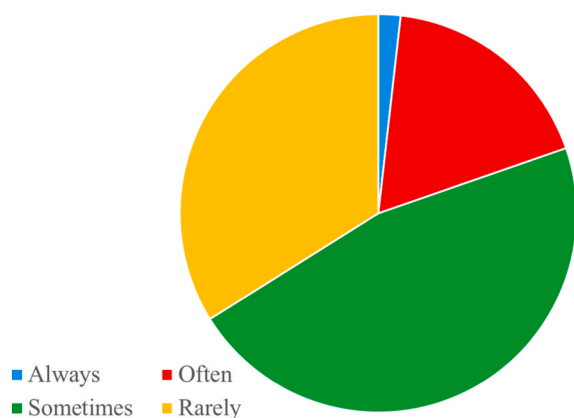


Fig. 1. The frequency that participants join virtual learning events on audio and do not pay attention (% of total).

strategies to achieve this were mandatory video use and local “engagement champions”. Less popular strategies were virtual engagement tools such as eye tracking devices (5%) and observers to monitor learner behavior and study engagement (14%).

4. Discussion

The COVID-19 pandemic has led to increased utilization of virtual surgical education, however we have demonstrated that, in the experience of surgical education champions, participation in virtual learning events does not necessarily translate to learner engagement. Importantly, there is a female preponderance for multi-tasking during these virtual events.

Learner engagement in face-to-face teaching events has been studied using the STROBE tool using trained observers and an engagement rubric.^{6,7} Less is known about the efficacy of learner engagement in virtual learning events and no measure currently exists to assess this. There is a temptation from the position of surgical educators to be enthused about the increased number of learners in the session by nature of their accessibility. To date, however it is unclear whether the increased number of learners is associated with a concomitant increase in engagement. Indeed, studies have identified that in face-to-face teaching events students have reported faking this engagement for 23% of the class duration.¹²

Learner engagement is a complicated phenomenon encompassing both psychological and physical factors.¹³ Although the literature regarding learner engagement within medical education is limited,

learner engagement in online continuing medical education has been associated improved patient outcomes.¹⁴ Engaging learners and being able to measure whether virtual learners are engaged with the learning event is crucial to determine whether learning is effective. The virtual platform brings with it a new dimension to this and the faked engagement observed in the in-person environment may be easier to achieve, e. g., audio only and mute options. Multi-tasking may also be easier in the virtual environment such as having alternative reading materials open on computer whilst in the virtual learning session. It is challenging for the educator to determine whether the learners are truly engaged in this context.

The many social implications of the COVID-19 pandemic include concern for the disproportionate effect on women in terms of caregiving for children and homeschooling responsibilities, and a reported significant reduction in hours worked and consequent reduction in academic productivity.^{15,16} In addition, women in the US spend 2 h more each day cleaning, cooking, taking care of children and doing other unpaid work compared to men per the Institute for Women’s Policy Research and Oxfam report.¹⁷ This is reflected by our finding that 88% respondents attend learning events online at home and that female respondents were more likely than males to join audio and then participate in another activity (62.3% v 37.7%, $p = 0.04$). This is concerning as when multi-tasking, learners are less engaged with the primary educational focus and therefore teaching is less effective.¹⁸ It may be that female learners also multi-task more often in the in-person environment also, however the pandemic may have further widened the gap between female and male learners, already affected by childcare and homeschooling.

The issues we have identified with multitasking and perhaps “fake” engagement with virtual learning events was recognized by the majority of respondents who felt that engagement needed to be improved with virtual learning events. Respondents believed that engagement champions would be an effective potential solution. It is important to raise the awareness of issues surrounding suboptimal engagement with virtual learning but in addition, as surgical educators it is crucial to build active learning strategies into these virtual events. Common to both in-person and virtual learning events, the attention span of learners is short, around 10–15 min, and followed by frequent “lapses”¹⁹, hence active learning strategies i.e. those that are in concordance with constructivism and which are learner centered and in which the students are actively or experientially involved.²⁰ Zoom offers polling tools that can be used to increase learner engagement and using the “flipped classroom” approach may also improve learner motivation. The latter is a blended learning strategy employed to stimulate learner engagement and active learning. The learner benefits from preparing with materials they access before the educational event.²¹ As learner engagement has been strongly associated with teaching effectiveness, it is key for educators to maximize engagement with the virtual platform.²²

This work has limitations. Our response rate of 13% is lower than desirable, and increases the risk of unit non-response bias i.e. non-completion of the entire survey.²³ Through survey design and administration we minimized the effects of coverage, sampling and measurement error. Specifically, by targeting ASE members we focused on those respondents most likely to reflect upon cause and effect of behaviors relating to the virtual learning environment, and to be invested in the results of this work. Careful design of survey questions through an iterative committee-based process grounded in Dillman’s Tailored Design Method minimized measurement error.²⁴ With regard to the high non-response rate there may be many reasons for this including the effect of the pandemic on survey fatigue, hours available for participation and burnout. Further, it has been demonstrated that lesser response rates are achieved with email based versus mail based surveys and this likely reflects the email volume medical professionals are exposed to.²⁵ Arguably this has been exacerbated during the COVID-19 pandemic, and given the proliferation in survey-based work during this global crisis, it is unlikely higher response rates are currently feasible. A further

limitation is that the majority, 62% of the respondents, were white and therefore the responses may not be truly representative of the surgical education champion population as a whole. Also, all respondents are ASE members and the responses herein may not represent the views of surgeons or those interested in surgical education throughout the US. Despite this, it can be argued that ASE member surgical education champions may manifest the most engagement with surgical educational activities. It is likely then that rather than underestimating the problem, the true rates of disengagement with virtual learning events and multitasking are higher than those represented within this work. Finally, it is challenging for this work to provide a comparison of learner engagement between the virtual and in-person environment to determine whether engagement virtually is more, less or the same as with pre-pandemic educational events. Learner engagement during in-person events may be assessed with instruments such as the STROBE tool, however these are rarely utilized regularly outside of educational research work.^{26,27} Certainly, the majority of in-person surgical educational events will have no prospective assessment of learner engagement. There was no previously developed tool for the virtual environment to allow comparison until the recent publication of the VIEM (Virtual In-Class Engagement Measure). This may now allow contemporaneous comparison of engagement in virtual and in person learning events to occur.²⁸

5. Conclusion

With the rapid transition to predominantly virtual surgical education during the COVID-19 pandemic it is essential to determine the effect of this on learner engagement, by extension, and learning. We have demonstrated that virtual platforms do not automatically translate into increased learner engagement. Careful design of educational strategies is essential to increase and maintain learner engagement when utilizing virtual surgical education.

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