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Survey among anaesthesiology trainees on usage and needs in comparison with YouTube analytics-based analysis of an educational anaesthesiology YouTube channel

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Abstract

Background: Research on anaesthesiology trainees' e-learning usage and needs are limited. This study explores e-learning preferences among University of Malaya anaesthesiology trainees, global engagement of an anaesthesiology YouTube channel, and comparisons between local and global trends.

Methods: A cross-sectional survey was conducted among University of Malaya anaesthesiology trainees in mid-2024 using a modified Matava questionnaire. YouTube analytics from 319 educational videos on @ForeverLearningAnaes (FLA) were analysed. Statistical analysis was performed using IBM SPSS version 29.

Results: The survey demonstrated satisfactory validity (ICC: 0.678–0.994; Cronbach's α: 0.689–0.994), with a 90.3% response rate (n = 75). Preferred e-learning formats included e-books, videos, slide-based courses, and quizzes. Trainees spent significantly more time on e-learning than traditional learning, with first-year trainees dedicating the most study hours. Smartphones, tablets, and laptops were the primary devices used. Key motivations for e-learning included

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exam preparation, case management, and acquiring new knowledge. The most valued features were flexibility in time, place, and pace of learning. NYSORA Education was the highest-rated YouTube channel. Preferred video duration was 5–15 minutes. The 3 most desired e-learning content types were procedural skills, practice exam questions and answers, and journal article summaries. FLA videos reached 97 countries, primarily lower-middle-income nations, with mobile phones as the dominant viewing device. Clinical/procedural videos had higher engagement than basic sciences videos. The average view duration per video for FLA viewers was approximately 3 minutes.

Conclusion: These findings can inform educators in developing digital learning resources to support self-paced, lifelong learning for anaesthesiology trainees globally.

Keywords: anaesthesiology, critical care, E-learning, YouTube

Introduction

E-learning is increasingly utilized in education,[1] yet research on anaesthesiology trainees' usage patterns, format preferences, and content needs remains scarce. Additionally, no published studies have analysed channel analytics from an anaesthesiology-themed educational YouTube (YT) channel, limiting insights into its impact on digital learning. Understanding these factors can help optimise e-learning content for anaesthesiology and critical care education.

This study explores the e-learning usage patterns and preferences of anaesthesiology trainees at the University of Malaya Medical Centre (UMMC) through a survey and compares the findings with analytics from the @ForeverLearningAnaes (FLA) YT channel. The survey questionnaire was adapted from Matava *et al.*'s 2013 study on Canadian anaesthesiology trainees' e-learning experiences.[2] FLA analytics were extracted to assess global engagement trends, offering a comparative perspective on local and international usage.

Our study aimed to enhance the quality of e-learning by identifying key metrics from YT channel analytics that could improve anaesthesiology education through video streaming platforms. Additionally, insights gained may contribute to the future development of artificial intelligence-driven educational tools in anaesthesiology. This study sought to answer 3 key questions:

1. What are the usage patterns, format preferences, and content needs of UMMC anaesthesiology trainees regarding e-learning?
2. What are the global reach, adoption, and engagement patterns of a YT channel dedicated to anaesthesiology education?
3. How do the YT usage patterns of UMMC trainees compare with global trends?

By addressing these questions, this study aimed to provide valuable guidance for e-learning content creators and educators.[3]

Methods

Our study design was analytical, observational, non-interventional, and cross-sectional. The study was conducted in 2024 at UMMC. Approval from the University of Malaya Medical Centre-Medical Research Ethics Committee (UMMC-MREC), Research Unit of Anesthesiology and Intensive Care Department, and Head of the UMMC Anesthesiology and Intensive Care Department was obtained. The collected data was anonymous, ensuring subject confidentiality.

The first study population comprised in-campus UMMC anesthesiology trainees older than 18 years, who consented to partake in the study (N = 83). The second study population comprised viewers of FLA YT videos.

Sampling and data collection method

Total population sampling was used for the survey on usage patterns, format preferences, and content needs of anaesthesia residents among in-campus UMMC anaesthesiology trainees.

Channel analytics from https://www.youtube.com/@ForeverLearningAnaes were collected from studio.youtube.com channel analytics reports, including data of 319 educational videos on the FLA YT channel[4] published between 9/9/2019 to 8/6/2024. These YT videos were created by the primary investigator of this study regarding core topics in anesthesiology and critical care. FLA's videos consist of narrated mind maps designed using mind mapping software, edited based on reputable texts and articles, and recorded using the screen record function of a laptop. Data from all these anesthesiology and critical care videos were collected and included in data analysis. Various outcome variables as detailed below were collected. YT uses proprietary algorithms to ensure the accuracy of channel analytic reports.

Survey questionnaire on e-learning usage and needs: development and validation procedure

The questionnaire was developed in accordance with published guidelines for the creation of surveys,[5] with reference to the questionnaire used in a published study.[2] The study by Matava[2] was distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/2.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

The questionnaire consisted of 2 parts. The first part included questions aimed at collecting information on the subjects' sociodemographic data. The second part was a 10-item questionnaire aimed at gathering information on the subjects' e-learning usage pattern and needs. The language used in the questionnaire was English, and the study population is proficient in English (https://study.um.edu.my/entry-requirements). The questionnaire's validity and reliability were assessed according to recommendations for questionnaire validation.[6] The operational definitions of variables and selected YT channel analytics metrics are found in the Appendix.

Data analysis

Statistical analysis was carried out with the IBM SPSS Statistical package version 29. After data checking and reduction, descriptive and associational analysis was conducted under the guidance of statisticians from Research Unit of Anesthesiology and Intensive Care Department, UM.

Results

Survey results

Our survey questionnaire demonstrated satisfactory face validity and reliability (ICC: 0.678–0.994; Cronbach's α: 0.689–0.994).[8-10] A total of 75 subjects consented to participate in the study, resulting in a response rate of 90.3%. Demographic data for the respondents (n = 75) are presented in Table 1.

Regarding preference ratings for e-learning content formats among in-campus UMMC anaesthesiology trainees, the mean ranks for e-book/articles, videos, slide-based courses, quizzes, Lecturio, podcasts and other formats were 5.19, 4.74, 4.51, 4.07, 3.65, 3.54 and 2.29, respectively ($\chi^2 = 125.30$, $p < 0.001$).

Table 1. Demographic data of in-campus UMMC anaesthesiology trainees vs @ForeverLearningAnaes YouTube (FLA YT) channel viewers

UMMC anaesthesiology trainees*	FLA YT channel viewers**
Age group (%)	
30-35 years (78.7%)	18–24 years: 28.6%
36-41 years 21.3%	25–34 years: 53.1%
	35–44 years: 16.4%
	45–54 years: 1.8%
	>55 years: 0.08%
Gender (%)	
Male: 53.3%	Male: 55.1%
Female: 46.7%	Female: 44.9%

*From survey data on May 2024, $n = 75$
**Time frame: 9/9/2019 to 8/6/2024

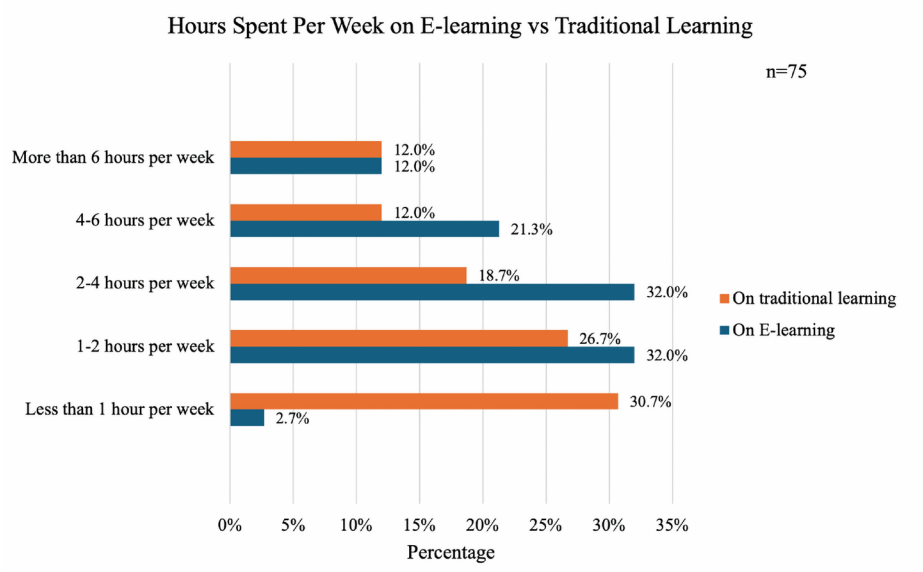

Fig. 1. Hours spent on e-learning per week vs hours spent on traditional learning per week by in-campus UMMC anaesthesiology trainees.

The number of hours spent on e-learning per week was significantly greater than that spent on traditional learning ($p = 0.001$), as shown in Figure. 1. First-year trainees spent significantly more time studying compared to trainees in more senior years ($p < 0.01$).

Table 2. Device types used for e-learning by in-campus UMMC anaesthesiology trainees vs device types used to view videos of @ForeverLearningAnaes YouTube channel from 9/9/2019 to 8/6/2024

Device type	UMMC AT (% who answered 'yes'), *n* = 75	Total views by FLA viewers (%)	Total watch time by FLA viewers (%)
Mobile phone	77.3	60.9	55.0
Computer	74.7 (laptop)	28.1	29.9
Tablet	76	8.5	10.5
TV	1.3	2.4	4.3

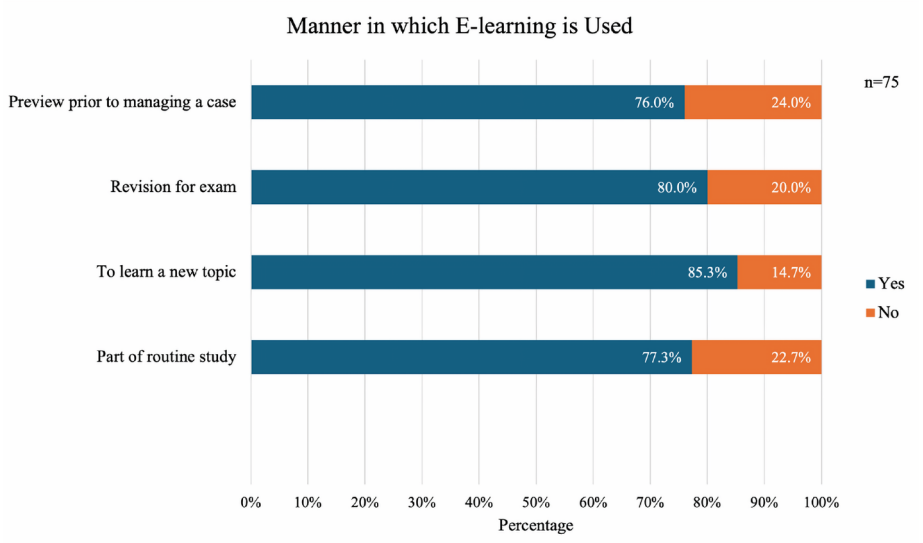

Fig. 2. Manner in which e-learning is used by in-campus UMMC anaesthesiology trainees.

The 3 most used devices for e-learning were smartphones (77.3%), tablet computers (76.0%), and laptops (74.7%) (Table 2). Most trainees used e-learning to revise for an exam (80.0%), manage a case (76.0%), and acquire new knowledge (85.3%) (Fig. 2). The top 3 most valued features of e-learning were the ability to review materials whenever (94.7%), wherever (88.0%), and at one's own pace (84.0%) (Fig. 3).

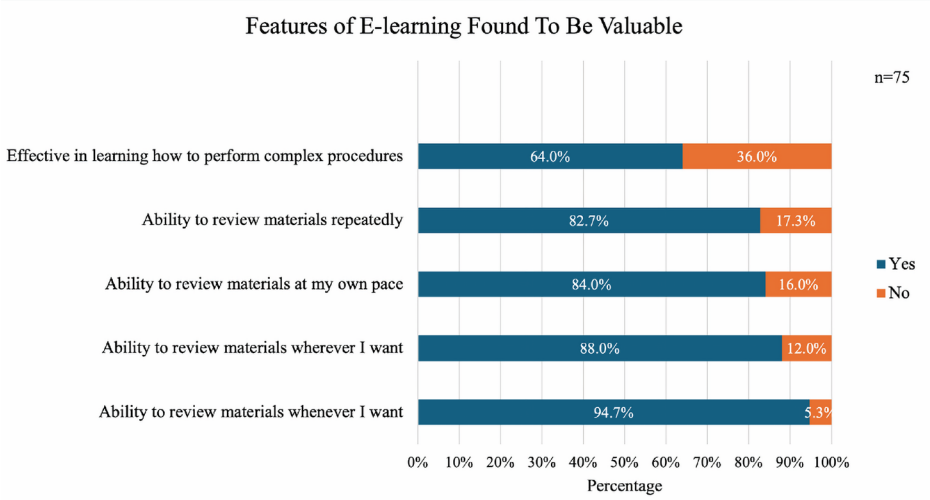

Fig. 3. Features of e-learning found to be valuable by in-campus UMMC anaesthesiology trainees.

Table 3. Preferred e-learning content topics by in-campus UMMC anaesthesiology trainees

Preferred e-learning content topics	Frequency	Percentage
Basic sciences + Procedural topics + Clinical topics	40	53.3%
Procedural topics + Clinical topics	15	20.0%
Basic sciences + Procedural topics	8	10.7%
Procedural topics only	6	8.0%
Basic sciences only	1	1.3%

The highest-rated YT channel in terms of usefulness was NYSORA Education, compared to American Society of Anesthesiologists, Royal College of Anaesthetists, ForeverLearning, Anesthesia Patient Safety Foundation, International Society for Anesthetic Pharmacology, and other YT channels, with mean ranks of 6.03, 4.31, 4.25, 3.88, 3.34, 3.23, and 2.95, respectively ($\chi^2 = 160.967$, $p < 0.001$).

Most trainees preferred 5–15-minute educational YT videos (54.7%) over other durations: < 5 minutes (4.0%), 15–30 minutes (29.3%), 30–45 minutes (6.7%), and > 45 minutes (5.3%).

The most preferred e-learning content topics among anaesthesiology trainees were basic sciences, clinical topics, and procedural topics (Table 3). The most preferred e-learning content types, in descending order, were procedural skills,

practice exam questions-and-answers, journal article summaries, case presentations, didactic lectures, and discussions or debates, with mean ranks of 4.85, 3.69, 3.63, 3.28, 3.05, and 2.51, respectively ($\chi^2 = 96.781$, $p < 0.001$).

FLA channel analytics results

Videos on FLA were viewed by audiences from 97 countries (Fig. 4), with the majority of views coming from lower-middle-income countries (Fig. 5).[11] Most FLA video viewers were between 18 and 34 years old (Table 1), with mobile phones and computers being the most commonly used devices for viewing (Table 2). The activity patterns of FLA viewers on YT are depicted in Figure 6.

The top 3 traffic sources contributing to FLA's views were YT search (56.0%), suggested videos (10.8%), and external sources (10.1%). Between September 9, 2019, and June 8, 2024, a total of 10,216 subscribers joined the FLA YT channel. Returning and new viewers contributed nearly equally to the total percentage of views (51.1% and 48.9%, respectively). The 2 most common types of comments[12] were positive (60.5%) and interrogative (33.7%).

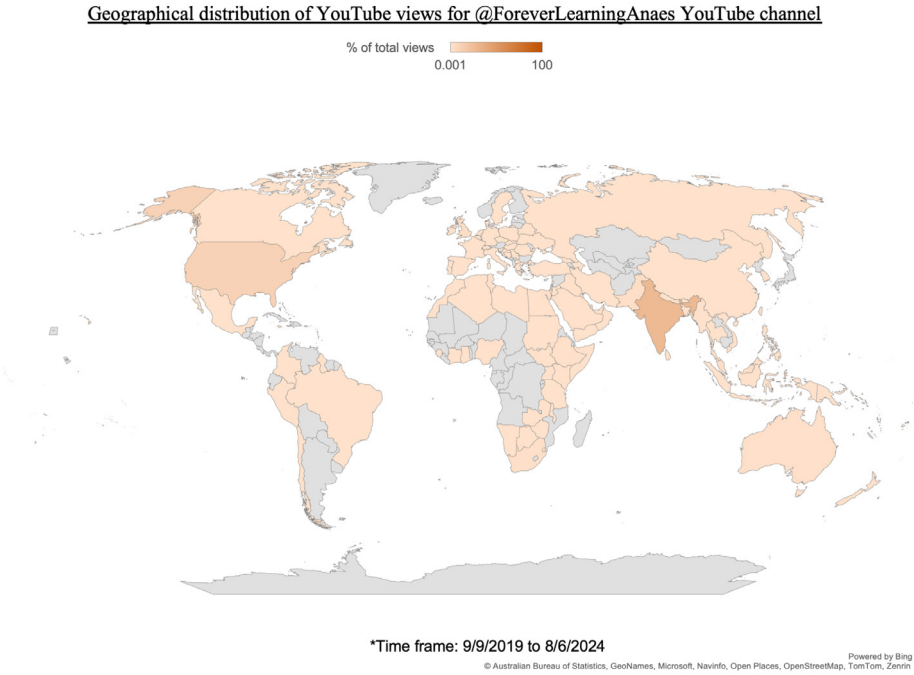

Fig. 4. Geographical distribution of YouTube views of the @ForeverLearningAnaes YouTube channel.

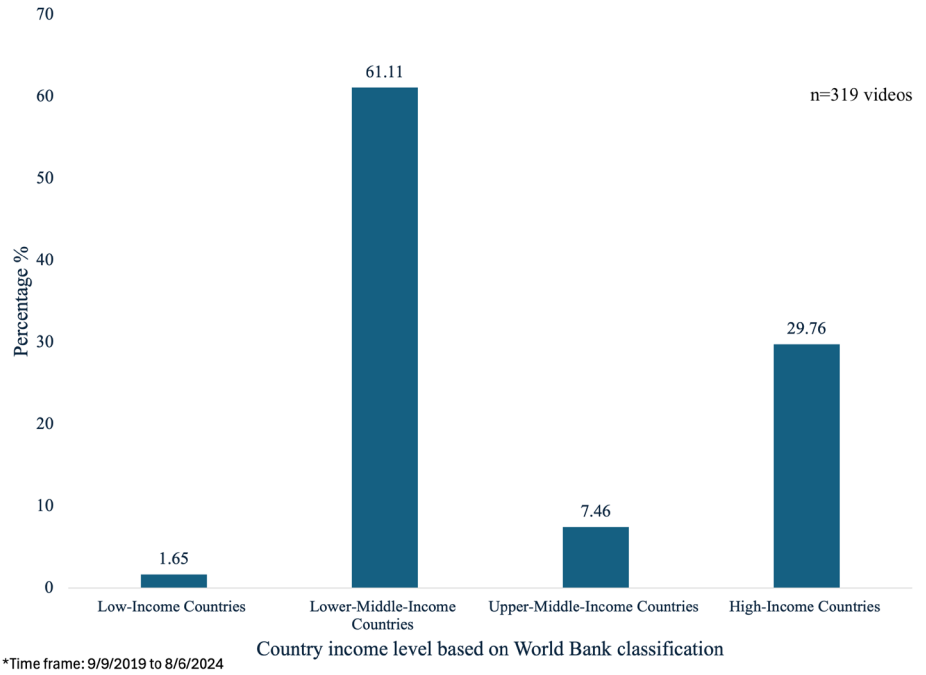

Fig. 5. Geographical distribution of YouTube views of the @ForeverLearningAnaes YouTube channel according to country income level.

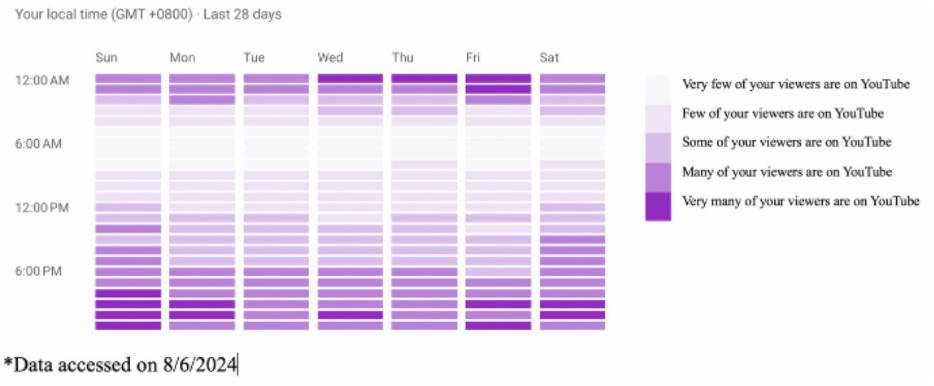

Fig. 6. The times when viewers of the @ForeverLearningAnaes YouTube channel are on YouTube.

When comparing basic sciences videos to clinical/procedural videos on FLA, clinical/procedural videos showed higher viewer engagement. This was evidenced by higher median average percentage viewed, median average view duration, and median views per playlist start, despite basic sciences videos being available on YT for a longer duration (Table 4). The average view duration per FLA video was 3 minutes and 15 seconds.

Table 4. Engagement metrics of 319 educational videos on @ForeverLearningAnaes YouTube channel published between 9/9/2019 to 8/6/2024 according to video type

Metric	Video type		*P*-value	Statistic
	Basic sciences	Clinical/ Procedural		
Number of videos	178	141		
Median years since published (range)	4.0 (3.5)	1.5 (4.7)	< 0.001	U = 4790.5
Median views[a] (range)	808 (43041)	249 (18713)	< 0.001	U = 6950.0
Median watch time[a] in hours (range)	34.6 (3512.0)	16.4 (943.5)	< 0.001	U = 8191.0
Median average percentage viewed[a] (range)	20.4 (54.0)	27.2 (81.5)	< 0.001	U = 15404.0
Mean average view duration[a, b] (SD)	2.8 min (1.0 min)	3.4 min (1.3 min)	< 0.001	t = -3.889
Median views from playlist[a] (range)	119 (4206)	47 (593)	< 0.001	U = 3907.5
Median views per playlist start[a] (range)	2.5 (11.5)	2.8 (13.5)	< 0.001	U = 14598.0
Median playlist watch time in hours[a] (range)	8.7 (136.2)	3.7 (30.6)	0.009	U = 5464.0
Median likes vs dislikes %[a] (range)	100.0 (75.0)	100 (33.3)	< 0.001	U = 13314.5
Median impressions[a] (range)	19483 (476082)	8358 (228401)	0.019	U = 6373.5
Median impressions click through rate[a] (range)	2.8% (13.7%)	1.9% (7.5%)	< 0.001	U = 9024.0
Mean card clicks[a] (SD)	.01% (.07%)	.04% (.50%)	< 0.001	t = -0.962
Median subscribers[a] (range)	6 (548)	2 (377)	0.337	U = 8197.0

[a]per video
[b]Mean difference (95% CI) = -0.5 (-0.8 to -0.3)

Discussion

Our study developed and validated a concise survey questionnaire to assess anaesthesiology trainees' e-learning usage and needs, yielding a high response rate[13] of 90.3%. This tool may be useful for future research on digital learning preferences among medical trainees. The survey findings provided valuable insights into anaesthesiology trainees' e-learning habits. The most preferred formats were e-books/articles, videos, slide-based courses, and quizzes. Trainees spent significantly more time on e-learning than traditional learning, with first-year students dedicating the most hours, likely due to their intensive primary examination preparation. The most commonly used devices were smartphones, tablets, and laptops. Key motivations for e-learning included exam preparation, case management, and acquiring new knowledge. The most valued features were flexibility in access, self-paced learning, and convenience. Trainees rated NYSORA Education as the most useful YT channel and preferred video durations of 5–15 minutes. The most desired content types were procedural skills, journal article summaries, and practice exam questions-and answers.

These findings align with prior studies emphasising the importance of digital learning for self-directed, lifelong education.[14] Past research highlighted the role of social technologies in creating flexible learning environments, allowing trainees to tailor their education to individual needs.[15] The COVID-19 pandemic accelerated digital learning adoption, with 98.7% of trainees expressing interest in learning anaesthesiology and critical care via YT. YT's accessibility facilitates on-demand education,[16] particularly benefiting trainees in resource-limited settings.[17]

We examined global engagement patterns using analytics from FLA, a dedicated anaesthesiology YT channel. Videos reached audiences in 97 countries, with most views from lower-middle-income countries.[11] This suggests that YT enhances global access to medical education, contributing to professional development and knowledge dissemination.[18] Viewer demographics were consistent with our survey, with most users aged 18–34 years and accessing content via mobile phones and computers. The primary traffic sources were YT search, suggested videos, and external sources. New and returning viewers were roughly equal in their contribution to the total percentage of views on FLA, with comments largely positive or inquisitive.[12]

Comparing content types, clinical and procedural videos received higher engagement than basic sciences videos, as evidenced by longer watch times and increased interaction. This finding aligns with the results of our survey among UMMC anaesthesiology trainees regarding their preferred content topics. These findings mirror previous research demonstrating the effectiveness of video-based learning

for procedural skills training.[19] The average view duration per video was about 3 minutes, slightly lower than the 5–15 minutes preferred by trainees, indicating potential areas for engagement improvement.

Taken together, these findings highlight a clear difference between trainees' stated preferences and actual engagement patterns on the FLA channel. While trainees reported an optimal video length of 5–15 minutes, real-world analytics demonstrated an average viewing duration of only 3 minutes, suggesting that attention spans and competing demands may limit sustained engagement. This discrepancy underscores the need for educators to design content that balances pedagogical depth with brevity and accessibility. Furthermore, the higher engagement with procedural content compared to basic sciences reflects a pragmatic, exam- and practice-driven learning culture, which may risk underemphasizing foundational knowledge unless curricula deliberately integrate both. The global reach of the FLA channel, particularly in lower-middle-income countries, also raises important equity implications: YT may serve as a low-cost bridge for disseminating specialised medical education internationally, but reliance on a single platform highlights vulnerabilities in access, quality assurance, and sustainability.

Strategies to enhance viewer engagement

To optimise e-learning via YT, we propose several strategies based on previous research:[1,15,18]

1. Aligning content with core textbook topics and board exam materials.
2. Addressing gaps in local curricula.
3. Using high-quality production with subtitles, clear audio, and engaging visuals.
4. Keeping videos between 6–9 minutes to balance information density and engagement.
5. Employing an informal, tutorial-style approach with voiceover animations.
6. Organising videos into structured playlists.
7. Actively responding to viewer feedback and prompting continued engagement.

By implementing these strategies, YT-based anaesthesiology education can better cater to trainees' preferences and improve retention.

Study limitations

Our study had several limitations. While the survey had a high response rate (90.3%), the 9.7% who did not participate could have introduced bias. The study was conducted at a single centre, limiting generalizability. Additionally, FLA videos were produced by a single creator, affecting content diversity. YT's proprietary algorithm affects real-time data accuracy and precludes validation. Viewing a video does not necessarily indicate knowledge retention, which was beyond the study's scope.

Trainees without a subscription to YT Premium may have been distracted by advertisements, affecting engagement. The lack of a validated rating system was another limitation, as no standardised framework exists to evaluate the quality of medical education videos on YT.

True analytical comparison between the survey dataset and YT analytics could not be performed. YT analytics only provides aggregated descriptive summary data rather than subject-level information, restricting the analysis to a side-by-side descriptive comparison rather than statistical testing using software such as SPSS.

Although the FLA YouTube channel was not ranked by trainees as the most popular or useful among anaesthesiology channels, it was selected for analysis for pragmatic reasons. As the channel owner, the author of this study had unrestricted access to its analytics data, enabling detailed examination without the need for external permissions. Importantly, the channel demonstrates global reach, with viewership spanning 97 countries, supporting its relevance as a proxy for international usage patterns. Given time and resource constraints, analysis was restricted to a single channel to limit complexity. Future research could strengthen generalizability by requesting access to analytics from higherranked channels identified in the trainee survey, allowing comparison of similarities and differences in international usage patterns across various anaesthesiology and critical care channels.

Future research directions

Further studies should explore the impact of e-learning on academic performance and skill acquisition, comparative effectiveness of video-based versus traditional learning methods, and optimisation of artificial intelligence-driven learning tools for anaesthesiology education.[1]

By addressing these areas, educators can refine digital learning strategies, ensuring that e-learning platforms remain effective, engaging, and accessible for anaesthesiology trainees worldwide.

Conclusion

This study highlights the need for effective online educational content and the role of professional educators in enhancing its quality.[20] Despite challenges, multimedia learning theories[21] provide guidelines for content design. Our study findings aim to support educators in developing digital learning content that promote self-paced, on-demand, and lifelong learning.

Declarations

Ethics approval and consent to participate

The study titled 'Survey among anaesthesiologist trainees on e-learning usage and needs in comparison with big data analysis of an educational anaesthesiology YouTube channel' was performed in accordance with the Declaration of Helsinki, had informed and explicit consent from study subjects, and had approval by an appropriate ethics committee/institutional review board (Medical Research Ethics Committee, Universiti Malaya Medical Centre; MREC ID NO: 2024226-13465).

Competing interests

None to declare.

Funding

None to declare.

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References

1. Shoufan A, Mohamed F. YouTube and education: A scoping review. IEEE Access. 2022;10:125576-125599. https://doi.org/10.1109/ACCESS.2022.3225419
2. Matava CT, Rosen D, Siu E, et al. Elearning among Canadian anaesthesia residents: A survey of podcast use and content needs. BMC Med Educ. 2013;13:59. https://doi.org/10.1186/1472-6920-13-59
3. Shih YCD, Liu CC, Chang CC, et al. Effects of digital learning in anaesthesiology. Eur J Anaesthesiol. 2020;38(2):171-182. https://doi.org/10.1097/eja.0000000000001262
4. ForeverLearningAnaes [Internet]. YouTube; [cited 2025 Mar 31]. Available from: https://www.youtube.com/@ForeverLearningAnaes.
5. Fisher S. How to create an effective survey [Internet]. Qualtrics; 2023 Aug 15 [cited 2025 Mar 31]. Available from: https://www.qualtrics.com/blog/how-to-create-a-survey/.
6. Mohamad AB, Hon YK, Lee KY. A step-by-step guide to questionnaire validation research. Kuala Lumpur, Malaysia: Institute for Clinical Research, NIH MY; 2022. https://doi.org/10.5281/zenodo.6801208

7. Google. Check your YouTube analytics data - YouTube help [Internet]. Google; 2023 [cited 2025 Mar 31]. Available from: https://support.google.com/youtube/answer/6085583?hl=en&sjid=16118220471808188180-AP.
8. Desai S, Patel N. ABC of face validity for questionnaire. Int J Pharm Sci Rev Res. 2020;65(1):164-168. https://doi.org/10.21315/eimj2019.11.3.6
9. Koo TK, Li MY. A guideline of selecting and reporting intraclass correlation coefficients for reliability research. J Chiropr Med. 2016;15(2):155-163. https://doi.org/10.1016/j.jcm.2016.02.012
10. Tavakol M, Dennick R. Making sense of cronbach's alpha. Int J Med Educ. 2011;2:53-55. https://doi.org/10.5116/ijme.4dfb.8dfd
11. World Bank. World Bank Country and Lending Groups – World Bank Data Help Desk [Internet]. 2024 [cited 2025 Mar 31]. Available from: https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups.
12. Pokharel R, Bhatta D. Classifying YouTube comments based on sentiment and type of sentence [Internet]. arXiv; 2021 [cited 2025 Mar 31]. Available from: https://arxiv.org.
13. Fincham JE. Response rates and responsiveness for surveys, standards, and the Journal. Am J Pharm Educ. 2008;72(2):43. https://doi.org/10.5688/aj720243
14. Schroeder A, Minocha S, Schneider C. The strengths, weaknesses, opportunities, and threats of using social software in higher and further education teaching and learning. J Comput Assist Learn. 2010;26(3):159-174. https://doi.org/10.1111/j.1365-2729.2010.00347.x
15. Rahman NA, Ng HJ, Rajaratnam V. Big data analysis of a dedicated youtube channel as an open educational resource in hand surgery. Front Appl Math Stat. 2021;7:593205. https://doi.org/10.3389/fams.2021.593205
16. Lee CS, Osop H, Goh DHL, et al. Making sense of comments on YouTube educational videos: A self-directed learning perspective. Online Inf Rev. 2017;41(4):611-625. https://doi.org/10.1108/OIR-09-2016-0274
17. Gupta B, Singh V, Gupta N. Perception of anaesthesiology residents about the effectiveness of online learning: An exploratory observational study. Vendangam-A Multidiscip J High Educ. 2022;1(1):15-23.
18. Tackett S, Slinn K, Marshall T, et al. Medical education videos for the world: An analysis of viewing patterns for a YouTube channel. Acad Med. 2018;93(8):1150-1156. https://doi.org/10.1097/acm.0000000000002118.
19. Srinivasa K, Chen Y, Henning MA. The role of online videos in teaching procedural skills to post-graduate medical learners: A systematic narrative review. Med Teach. 2020;42(6):689-697. https://doi.org/10.1080/0142159X.2020.1733507.
20. Maynard AD. How to succeed as an academic on YouTube. Front Commun. 2021;5:130. https://doi.org/10.3389/fcomm.2020.572181.
21. Mayer RE. Incorporating motivation into multimedia learning. Learn Instr. 2014;29:171-173. https://doi.org/10.1016/j.learninstruc.2013.04.003.

Appendix

SURVEY QUESTIONNAIRE: E-LEARNING USAGE AND NEEDS

Interviewee code number (for researcher's usage):
Instructions: Please tick ✓ at the appropriate box/boxes and fill up (in words) in the appropriate box, thank you.

Demographics			
1. Age (years)	_____	2. Gender	☐Male ☐Female
3. Ethnicity	☐Malay ☐Chinese ☐Indian ☐Others: _____	4. Academic year	
5. Marital status	☐Married ☐Unmarried	6. Number of children	_____
7. Usual mode of **transport** to UMMC	☐Public transport ☐Private transport: Car ☐Private transport: Motorcycle ☐Walking ☐Others: _____	8. Estimated **duration of time to travel** between UMMC and place of stay	a) During rush hour traffic: _____ (hour/min) b) During light traffic: _____ (hour/min)

E-LEARNING (LEARNING VIA ELECTRONIC MEDIA) USAGE AND NEEDS

1. Rate the **importance** of the following **E-learning content types or tools** to you in learning anaesthesiology and critical care topics:

E-books/articles: ☐unimportant ☐slightly important ☐moderately important ☐very important ☐extremely important

Podcasts: ☐unimportant ☐slightly important ☐moderately important ☐very important ☐extremely important

Videos: ☐unimportant ☐slightly important ☐moderately important ☐very important ☐extremely important

Slide-based courses (includes weekly department CMEs): ☐unimportant ☐slightly important ☐moderately important ☐very important ☐extremely important

Quizzes: ☐unimportant ☐slightly important ☐moderately important ☐very important ☐extremely important

Lecturio: ☐unimportant ☐slightly important ☐moderately important ☐very important ☐extremely important

Others: _____ ☐unimportant ☐slightly important ☐moderately important ☐very important ☐extremely important

2. How many **hours per week** do you spend on **E-learning** (including online CMEs)?	☐ None ☐ Less than 1 hour per week ☐ 1-2 hours per week	☐ 2-4 hours per week ☐ 4-6 hours per week ☐ More than 6 hours per week
3. How many **hours per week** do you spend on learning using **hardcopy** materials?	☐ None ☐ Less than 1 hour per week ☐ 1-2 hours per week	☐ 2-4 hours per week ☐ 4-6 hours per week ☐ More than 6 hours per week
4. What **type of device** do you use for E-learning? *(select all that apply)*	☐ Mobile phone ☐ Laptop computer ☐ Tablet computer	☐ Desktop computer ☐ Smart TV ☐ Others: _____
5. Which of the following describe **how you use E-learning**? *(select all that apply)*	☐ Part of routine study ☐ To learn a new topic ☐ Revision for exam	☐ Preview prior to managing a case in the operation theatre/Clinic/ICU ☐ Others: _____

E-LEARNING (LEARNING VIA ELECTRONIC MEDIA) USAGE AND NEEDS		
6. Which of the following features of E-learning do you find most **valuable**? *(select all that apply)*	☐ Ability to review materials whenever I want ☐ Ability to review materials wherever I want ☐ Effective in learning how to perform complex procedures	☐ Ability to review materials at my own pace ☐ Ability to review materials repeatedly ☐ Others: _____
7. a) Have you watched these **YouTube (YT) channels?** b) If watched, are the contents of the said YT channel **helpful** in learning anaesthesiology and critical care topics?	**1) NYSORA education** ☐Never watched ☐Unhelpful ☐Slightly helpful ☐Moderately helpful ☐Very helpful ☐Extremely helpful **2) American Society of Anesthesiologists** ☐Never watched ☐Unhelpful ☐Slightly helpful ☐Moderately helpful ☐Very helpful ☐Extremely helpful **3) Anesthesia Patient Safety Foundation** ☐Never watched ☐Unhelpful ☐Slightly helpful ☐Moderately helpful ☐Very helpful ☐Extremely helpful **4) International Society for Anesthetic Pharmacology** ☐Never watched ☐Unhelpful ☐Slightly helpful ☐Moderately helpful ☐Very helpful ☐Extremely helpful **5) Royal College of Anaesthetists** ☐Never watched ☐Unhelpful ☐Slightly helpful ☐Moderately helpful ☐Very helpful ☐Extremely helpful **6) ForeverLearning** ☐Never watched ☐Unhelpful ☐Slightly helpful ☐Moderately helpful ☐Very helpful ☐Extremely helpful **7) Others** *(please state):* ☐Never watched ☐Unhelpful ☐Slightly helpful ☐Moderately helpful ☐Very helpful ☐Extremely helpful	
8. What is your **preferred duration of a YT video** to learn anaesthesiology and critical care topics?	☐ <5min ☐ 5-15min ☐ 15-30min	☐ 30-45min ☐ >45min
9. What are your **preferred content topics** when learning anaesthesiology and critical care topics on YT? *(select all that apply)*	☐ Basic sciences ☐ Procedural topics ☐ Clinical topics	☐ Others: _____

E-LEARNING (LEARNING VIA ELECTRONIC MEDIA) USAGE AND NEEDS	
10. Are you likely to **watch the following content types** when learning anaesthesiology and critical care topics on YT?	**1) Recorded didactic lecture** ☐Very unlikely ☐Unlikely ☐Neutral ☐Likely ☐Very likely **2) Discussions or debates** ☐Very unlikely ☐Unlikely ☐Neutral ☐Likely ☐Very likely **3) Journal article summaries** ☐Very unlikely ☐Unlikely ☐Neutral ☐Likely ☐Very likely **4) Procedural skills** ☐Very unlikely ☐Unlikely ☐Neutral ☐Likely ☐Very likely **5) Case presentations** ☐Very unlikely ☐Unlikely ☐Neutral ☐Likely ☐Very likely **6) Practice exam Q&A** ☐Very unlikely ☐Unlikely ☐Neutral ☐Likely ☐Very likely
Would you like to learn more about anaesthesia & critical care education on YT?	☐ Yes ☐ No

Operational definitions of variables and selected YT channel analytics metrics

Survey on usage patterns, format preferences and content needs of anaesthesia residents outcome variables:

1. Preferred e-learning content format: Preferred e-learning content format chosen by the respondent. Options include ‘E-books’, ’podcasts’, ’videos’, ‘slide based courses’, ‘quizzes’, ‘others’.
2. Hours spent on e-learning per week: Hours spent on e-learning per week by the respondent.
3. Hours spent on traditional learning per week: Hours spent on learning using hardcopy materials per week by the respondent.
4. Device type used for e-learning: Type of device used by the respondent for e-learning. Options include ‘mobile phone’, ‘computer’, ‘tablet’, ‘smart TV’ and ‘others’.
5. Manner in which e-learning is used: Manner in which e-learning is used in learning anesthesiology and critical care topics. Options include ‘part of routine study’, ‘to learn a new topic’, ‘revision for exam’, ‘preview prior to managing a case in the OR/Clinic/ICU’ and ‘others’.

6. Features of e-learning found to be valuable by respondents: Options include 'ability to review materials whenever I want', 'ability to review materials wherever I want', 'effective in learning how to perform complex procedures', 'ability to review materials at my own pace', 'ability to review materials repeatedly' and 'others'.
7. Usefulness of select anesthesiology YT channels: Rating (Likert scale) of the usefulness of select anesthesiology YT channels by the respondent.
8. Preferred duration of YT video: Preferred duration of YT videos by the respondent for learning anesthesiology and critical care topics.
9. Preferred content topics: Preferred content topics by the respondent for learning anesthesiology and critical care topics. Options include 'basic science topics', 'procedural topics', 'clinical topics', and 'others'.
10. Preferred content type: Preferred content type by the respondent for learning anesthesiology and critical care topics. Options include 'recorded didactic lectures', 'discussions or debates', 'journal article summaries', 'procedural skills', 'case presentations', and 'practice exam Q&As'.

Selected YT channel analytics metrics[7]
Audience metrics

1. Viewer demographics: Statistics of viewers who watched the videos of a YT channel stratified according to age, gender and geography.
2. When viewers are on YT: Frequency distribution of times viewers were on YT
3. Traffic sources: Traffic sources report shows how viewers found the content creator's videos and which sources garnered the most views and watch time.
4. Subscriber growth: The change in total subscribers which is found by subtracting subscribers lost from subscribers gained for the selected date range and region.

Engagement metrics

1. Unique viewers: Estimated number of people who watched one's contents within a selected date range.
2. Returning viewers: Viewers who have previously watched your channel and returned to watch within the selected time period.
3. Average views per viewer: The average number of times a viewer watched any video on a channel (in channel analytics) or a particular video (in video analytics).
4. Watch time: Total amount of time viewers have watched videos of a YT channel.
5. Average percentage viewed: Average percentage of a video that the audience watches per view.

6. Average view duration: Estimated average minutes watched per view for the selected video and date range.
7. Likes (vs dislikes): The percentage of likes a video received (out of the total number of likes and dislikes).
8. Comments: Comments from viewers on a YT video.
9. Impressions click through rate: Views per impressions shown, whereby impressions are the number of times video thumbnails were shown to viewers on YT.
10. Card clicks: Number of times a card has been clicked.
11. Top videos: Most-watched videos in a specified time period.
12. Views from playlist: Number of views a video receives when watched as part of a playlist.
13. Playlist watch time: Duration of time people watch a video when watched as part of a playlist.
14. Views per playlist start: Average number of video views after a playlist is initiated.