YouTube Videos as a Tool for Faculty Development in Medical Education: A Learning Analytic Overview

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**Categories:** Teachers/Trainers, Technology

Received: 23/02/2018
Published: 11/04/2018

**Abstract**

Faculty development (FD), or staff development, as it is often called, has become an increasingly important component of medical education. Staff development activities have been designed to improve teacher effectiveness at all levels of the educational continuum. The use of online tools offers many advantages for FD, and online learning can help overcome the numerous obstacles that challenge classic educational activities.

Video-based lectures (VBLs) are one of the tools of online learning. This particular instruction format has gained popularity in recent years as a component of the "flipped classroom" (FC) and the much more emergent "massive open online course" (MOOC) styles of health profession education at both under- and post-graduate levels.

The aim of this study was to describe the author’s experience in developing VBLs to be used as a tool for faculty development in the field of medical education by using Learning Analytics (LA), which is the metadata provided by YouTube, the sharing platform used for the author's videos.

A total of 19 VBLs relevant to the education of healthcare professionals was produced by the author with the software program ScreenFlow for Mac to capture and edit video. ScreenFlow also offers the option to combine screen video capture with speaker video recording for simultaneous viewing in the same video. The collected and analyzed data consisted of viewership data, including total number of views, numbers of countries viewing, gender distribution of viewers, and number of YouTube channel subscribers. Descriptive data were also collected: length of each video, watch time in minutes and number of views. Data related to viewers’ engagement included number of videos’ likes, dislikes, shares, and comments. For the purpose of evaluating audience retention and measuring how well videos maintained viewer attention, the following information was included in the audience retention report: average view duration for all videos on the channel, the average percentage viewed of each video, and the final audience retention.
In conclusion, VBLs can be considered a valuable tool for faculty development in medical education that effectively overcomes many of the common challenges related to this important training process. A variety of software programs and applications are available that facilitate the process of VBL production, particularly the accessibility of many video-sharing platforms, such as YouTube. Moreover, LA is an emerging and effective method for quantitatively evaluating VBLs.

LA includes analyzing metadata, which are downloaded from video-sharing platforms and facilitates the evaluation of the acceptability, accessibility, and audience retention of VBLs. That is, the number of views reflects the acceptability of VBLs, and the number of likes/dislikes and shares reflects audience engagement. Likewise, average view duration, average percentage viewed, and final audience retention are indicators of audience retention (AR). Finally, it appears that the length of VBLs has a profound effect on AR, as shorter VBLs are associated with greater AR, and vice versa. The synchronous interaction with speaker should be considered in VBLs to enhance their effectiveness and improve the AR.

**Keywords:** Video Based Lectures, VBL, YouTube, Faculty Development, Medical Education

**Introduction**

Faculty development, or staff development, as it is often called, has become an increasingly important component of medical education. Staff development activities have been designed to improve teacher effectiveness at all levels of the educational continuum (e.g. undergraduate, postgraduate, and continuing medical education), and diverse programs have been offered to healthcare professionals in many settings. Faculty development (FD) refers to "that broad range of activities institutions use to renew or assist faculty in their many roles." (Ullian & Stritter, 1997) That is, faculty development is a planned program to prepare institutions and faculty members for their academic roles and to improve an individual's knowledge and skills in the areas of teaching, research, and administration. The goal of faculty development is to teach faculty members the skills relevant to their institutional setting and faculty position and to sustain both their current and future vitality.(Whitcomb, 2003)

Faculty development efforts can adopt several formats: formal, structural styles, which classically involve seminars, face-to-face workshops, short courses, fellowships, and advanced training courses in health profession education (Steinert et al., 2016; Steinert et al., 2006). Despite their variety, these strategies can be restricted by logistical challenges (e.g., geographic location and scheduling), and the workload of a very busy academic or clinical practice (Steinert et al., 2009). Innovative approaches designed to deal with these kinds of concerns and develop efficient faculty "communities of practice" can significantly enhance future faculty development efforts (Steinert et al., 2010). Online learning, with all of its modalities, represents one of these innovations (Gresh, Mena-Carrasco, Rauh, & Pfaff, 2017; Swift, 2014).

The use of online tools offers many advantages for FD and online learning can help overcome the numerous obstacles that challenge classic educational activities (Cook, 2007). For example, physical distance is eliminated as an obstacle with the use of online education because FD programs have actually enrolled participants at numerous sites throughout a country (Anshu, Bansal, Mennin, Burdick, & Singh, 2008; Wearne, Greenhill, Berryman, Sweet, & Tietz, 2011) and the world (Ladhani et al., 2011; McKimm & Swanwick, 2010). In addition, several online programs allow for economies of scale, in terms of both money and time, increasing the number of participants without increasing the time needed from the trainer or funding needed from the institution. Additionally, online learning accommodates participants in terms of when they engage with the content, as highlighted in the study of utilization of online technological innovations to teach overloaded surgical academic faculty (Pernar et al., 2012).
Furthermore, trainees can use the training website as a reference after the course has officially ended. Training can be individualized as trainees manage their pace of educational activity by slowing down or accelerating as needed. Online learning also enhances trainee evaluation and allows for customized feedback. Ultimately, online solutions can be utilized to incorporate innovative training approaches, such as interactive models, games, computer animations, computer simulations, and video and audio clips. Video-based lectures (VBLs) are one of the tools of online learning. This particular instruction format has gained popularity in recent years as a component of the "flipped classroom" (FC) and the much more emergent "massive open online course" (MOOC) styles of health profession education at both graduate- and post-graduate levels (Belfi, Bartolotta, Giambrone, Davi, & Min, 2015; Della Ratta, 2015; Missildine, Fountain, Summers, & Gosselin, 2013; Robinson, 2016; Young, Bailey, Guptill, Thorp, & Thomas, 2014). Indeed, VBLs have emerged as a prominent feature of computer-based learning communities that include no face-to-face classroom interaction (Della Ratta, 2015; Mehta, Hull, Young, & Stoller, 2013).

The extensive acceptability of VBLs, as well as other individualized, asynchronous education methods, has led to a review of the guidelines and standards of medical education benchmarks. For example, the Accreditation Council for Graduate Medical Education (ACGME) permits individual active instruction to constitute up to 20% of didactic experiences in emergency medicine residency programs. The quality of VBL-based FC has generally been assessed utilizing subjective questionnaires completed by trainees. In their comments, trainees have cited greater learner satisfaction in contrast to traditional learning styles, particularly in terms of the benefits of flexibility and the ability to review previously presented material (Belfi et al., 2015; Della Ratta, 2015; Missildine et al., 2013; Robinson, 2016; Young et al., 2014). However, only a small volume of research has employed objective quantitative approaches to assess VBLs. These studies having been conducted to illustrate the achievement of satisfactory learning outcomes based on comparison of the results of pre- and post-exams (Belfi et al., 2015; Missildine et al., 2013). Other evidence of the high acceptability of VBLs includes, but is not limited to, the number of registrations and completions of courses and the level of engagement, as obtained from demographics information collected on video-sharing websites (Goldberg et al., 2015; Paton, 2014). Outside of education within the health professions, much more robust research studies illustrate the quantitative evaluation of trainees' involvement in MOOCs utilizing a method called learning analytics (LA). LA refers to the interpretation and evaluation of purposeful patterns in information obtained from trainees in an instructional context, or, in other words, the aggregate of information termed "metadata" (Cirigliano et al., 2017; Lau et al., 2017; Saqr, 2015; Saqr, Fors, & Tedre, 2017).

Based on a reading of the relevant literature, it appears that few study have described the use of VBLs as a tool for FD in medical education or the use of LA for evaluating its effectiveness. Thus, the aim of this study was to describe the authors's experience in developing VBLs to be used as a tool for FD in the field of medical education by using LA, which is the metadata provided by YouTube, the sharing platform used for the author’s videos.

**Methods**

A total of 19 VBLs relevant to the education of healthcare professionals was produced by the article's author with the software program ScreenFlow for Mac to capture and edit video. ScreenFlow also offers the option to combine screen video capture with speaker video recording for simultaneous viewing in the same video. All of the videos were uploaded to the author's YouTube channel at [https://www.youtube.com/user/mhassanien2](https://www.youtube.com/user/mhassanien2).
The intended audience comprised academic staff members in all health profession colleges in middle east, especially in Saudi Arabia and Egypt, incorporating medicine, dentistry, pharmacy, nursing, and allied health sciences. VBL duration varied from nine to twenty-seven minutes. All VBL topics were related to medical education, including assessment, scientific research, leading change, and communication skills. The author uploaded the first video in May 2017. Eighteen additional videos were uploaded over the following six months, the last video was uploaded in January 2018. The metadata for all of the videos, which included audience retention (AR) reports, were downloaded from YouTube by the author in February 2018.

The collected data consisted of viewership data such as: total number of viewers, numbers of countries viewing, gender distribution of viewers, and number of YouTube channel subscribers. Other descriptive data were also collected, such as: length of each video, watch time in minutes, and data related to viewers’ engagement included number of videos’ likes, videos’ dislikes, videos’ shares, and videos’ comments. For the purpose of evaluating audience retention and measuring how well videos maintained viewer attention, the following information was included in the audience retention report: average view duration for each individual video on the channel; the average percentage viewed of each video; and the final audience retention, which is the percentage of viewers who completed the video in its entirety compared to the initial total watching at 30 seconds.
Results

Table 1 illustrates the collected viewership data, including total number of views, total number of countries viewing, male/female ratio of viewers, and number of YouTube channel subscribers. All of these data reflect the easy accessibility of VBLs from different parts of the world, as videos’ views came from 89 countries.

| Total number of views | 6429 |
|-----------------------|------|
| Total number of viewing countries | 89 |
| Male/female ratio of viewers | 56/44 |
| Total number of YouTube channel subscribers | 204 |

Table 1. Viewership data for all VBLs.

Figure 2: Screen capture from YouTube learning analytics for viewership data

The descriptive data for each video are illustrated in Table 2 and include video length, total watch time and number of views per video. The average video length was 18.4 minutes, with the shortest video (“Designing Test Blueprint for Effective Assessment”) being 10.83 minutes and the longest (“Saudi Digital Library Dr Mohammed Hassanien”) being 27.07 minutes long. The total watch time was 17,032 minutes, with an average of 896.4 minutes, and the average number of views of each video is 338 views.

Table 2. Overview of descriptive data of VBLs.

| Video title                                  | Video length (minutes) | Watch time (minutes)* | Views |
|----------------------------------------------|------------------------|-----------------------|-------|
| 1. Item Analysis Made easy                   | 25.68                  | 3011                  | 1252  |
| 2. Basic Competencies of Medical Teacher     | 15.8                   | 1496                  | 496   |
| 3. Electronic Reference Management using Mendeley | 25.7                   | 1418                  | 516   |
4. Citation and References in Minutes | 14.25 | 1396 | 593
5. Using Excel for Developing Test Blueprint | 15.75 | 1302 | 354
6. Saudi Digital Library Dr Mohammed Hassanien | 27.07 | 994 | 391
7. What is Plagiarism? | 17.15 | 919 | 276
8. Communication Skills Lecture 1 Introduction | 24.83 | 906 | 397
9. Effective Student Assessment | 16.03 | 848 | 351
10. Tips for Search in Database Dr Mohammed Hassanien | 12.47 | 768 | 377
11. Detecting and Avoiding Plagiarism Part II | 23.12 | 686 | 159
12. Master Web EndNote in Minutes Dr. Mohammed Hassanien | 16.5 | 545 | 206
13. Tips for Questionnaire design - Part I | 18.77 | 528 | 183
14. Six Step For Effective Student Assessment | 19.58 | 526 | 202
15. Designing test Blueprint for effective Assessment | 10.83 | 406 | 145
16. Easy Cite While You Write Dr.Mohammed Hassanien | 13.48 | 376 | 168
17. Exam WorkSheet for Effective Assessment | 14.22 | 361 | 156
18. Design Share and Analyze Questionnaire using Google Form | 22.88 | 345 | 120
19. Leading Change in Medical education Part I | 16.28 | 201 | 87

| Total | 350.4 | 17032 | 6429 |
| Average | 18.4 | 896.4 | 338 |

*Watch time:* Estimated total minutes of audience viewing time of the content.
Figure 3: Screen capture from YouTube learning analytics for Watch time and Viewers

Regarding data related to viewers’ engagement in Table 3, the total number of videos’ likes was 203 and dislikes equaled 3, with 215 shares and only 21 comments.

Table 3. Overview of analytic data of VBLs in relation to viewers’ engagement

| Video title                                              | Videos’ Likes | Videos’ Dislikes | Videos’ Shares | Viewers’ Comments |
|----------------------------------------------------------|---------------|------------------|----------------|-------------------|
| 1. Item Analysis Made easy                              | 16            | 0                | 29             | 2                 |
| 2. Basic Competencies of Medical Teacher                | 12            | 1                | 16             | 0                 |
| 3. Electronic Reference Management using Mendeley       | 19            | 0                | 12             | 2                 |
| 4. Citation and references in minutes                   | 18            | 1                | 10             | 0                 |
| 5. Using Excel for Developing Test Blueprint            | 11            | 0                | 18             | 2                 |
|   | Title                                                                 | Rating | Comments | Total | Completion Rate |
|---|----------------------------------------------------------------------|--------|----------|-------|-----------------|
|6  | Saudi Digital Library Dr Mohammed Hassanien                          | 15     | 0        | 13    | 1               |
|7  | What is Plagiarism?                                                 | 10     | 0        | 10    | 3               |
|8  | Communication Skills Lecture 1 Introduction                         | 21     | 0        | 11    | 4               |
|9  | Effective Student Assessment                                        | 13     | 0        | 17    | 4               |
|10 | Tips for search in data base Dr Mohammed Hassanien                  | 11     | 0        | 11    | 0               |
|11 | Detecting and Avoiding Plagiarism Part II                           | 7      | 0        | 4     | 1               |
|12 | Master Web EndNote in Minutes Dr. Mohammed Hassanien                | 6      | 0        | 13    | 0               |
|13 | Tips for Questionnaire design - Part I                              | 8      | 0        | 11    | 0               |
|14 | Six Step For Effective Student Assessment                           | 7      | 0        | 10    | 1               |
|15 | Designing test Blueprint for effective Assessment                   | 4      | 0        | 6     | 0               |
|16 | Easy Cite While You Write Dr. Mohammed Hassanien                    | 8      | 0        | 9     | 0               |
|17 | Exam WorkSheet for Effective Assessment                             | 8      | 0        | 5     | 0               |
|18 | Design Share and Analyze Questionnaire using Google Form             | 8      | 1        | 8     | 0               |
|19 | Leading Change in Medical education Part I                          | 1      | 0        | 2     | 1               |

**Total** 203 3 215 21

**Average** 10.7 0.2 11.3 1.1
Figure 4: Screen capture from YouTube Learning Analytics for viewers' engagement

Table 4 summarizes audience retention reports for all of the VBLs. The average view duration of all videos was 2.7 minutes. The average percentage viewed was 15.6%, and the average final audience retention was 6.53%. The longest video (27.07 minutes) had the lowest final audience retention (2.4%), while the shortest video (10.83 minutes) had the highest final audience retention (14%)

Table 4. Audience retention data for all VBLs.

| Video title                               | Video length (minutes) | Views | Average view duration (minutes)* | Average % viewed** | Final audience retention*** |
|-------------------------------------------|------------------------|-------|---------------------------------|---------------------|-----------------------------|
| 1. Item Analysis Made easy                | 25.68                  | 1252  | 2.4                             | 9.36                | 3.8%                        |
| 2. Basic Competencies of Medical Teacher  | 15.8                   | 496   | 3                               | 19.09               | 6.6%                        |
| 3. Electronic Reference Management using Mendeley | 25.7                   | 516   | 2.7                             | 10.69               | 3.1%                        |
|   | Title                                                                 | Average View Duration | Total Views | Added 3% | Average Percentage Viewed | Final Audience Retention |
|---|-----------------------------------------------------------------------|------------------------|-------------|---------|--------------------------|-------------------------|
| 4 | Citation and references in minutes                                   | 18.4                   | 338.4       | 2.7     | 15.6                     | 6.53%                   |
| 5 | Using Excel for Developing Test Blueprint                            | 14.25                  | 593         | 2.4     | 16.52                    | 4.9%                    |
| 6 | Saudi Digital Library Dr Mohammed Hassanien                          | 15.75                  | 354         | 3.7     | 23.36                    | 7.5%                    |
| 7 | What is Plagiarism?                                                  | 27.07                  | 391         | 2.5     | 9.39                     | 2.4%                    |
| 8 | Communication Skills Lecture 1 Introduction                          | 24.83                  | 397         | 2.3     | 9.19                     | 3.4%                    |
| 9 | Effective Student Assessment                                         | 16.03                  | 351         | 2.4     | 15.07                    | 5.6%                    |
| 10| Tips for search in data base Dr Mohammed Hassanien                   | 12.47                  | 377         | 2       | 16.34                    | 6.3%                    |
| 11| Detecting and Avoiding Plagiarism Part II                            | 23.12                  | 159         | 4.3     | 18.65                    | 5.9%                    |
| 12| Master Web EndNote in Minutes Dr. Mohammed Hassanien                 | 18.77                  | 183         | 2.9     | 15.36                    | 7.4%                    |
| 13| Tips for Questionnaire design - Part I                               | 19.58                  | 202         | 2.6     | 13.29                    | 8.5%                    |
| 14| Six Step For Effective Student Assessment                           | 10.83                  | 145         | 2.8     | 25.86                    | 14%                     |
| 15| Designing test Blueprint for effective Assessment                    | 13.48                  | 168         | 2.2     | 16.59                    | 4.4%                    |
| 16| Easy Cite While You Write Dr. Mohammed Hassanien                     | 14.22                  | 156         | 2.3     | 16.26                    | 3.9%                    |
| 17| Exam WorkSheet for Effective Assessment                             | 22.88                  | 120         | 2.9     | 12.56                    | 13%                     |
| 18| Design Share and Analyze Questionnaire using Google Form              | 16.28                  | 87          | 2.3     | 14.17                    | 9.2%                    |

*Average view duration: Estimated average minutes watched per view for the selected content, date range, region, and other filters.

**Average percentage viewed: Average percentage of the video the audience watched per view.

***Final audience retention: Percentage of viewers who completed the video in its entirety compared to the initial total watching at 30 seconds.
The aim of this study was to describe the authors’s own experience in producing VBLs for health professionals covering different topics in medical education. LA data from YouTube were used to describe the use of VBLs as a tool for faculty development in medical education. In the current study, ScreenFlow for Mac was used as a screen-casting and video editing software; both screen capturing and videorecording of the speaker were combined in all of the VBLs.

VBLs typically use images and voice to present relevant information, because image and sound are processed in separate areas of the brain (Dong & Goh, 2015). Images were presented in the form of PowerPoint slides accompanied by the speaker’s narration of relevant information. This combined approach of data presentation satisfies trainees’ preferences for auditory, verbal or visual styles of learning (Dong & Goh, 2015). PowerPoint slides are usually used during lectures to emphasize important points, and their positive effects on learning has been verified (Dong & Goh, 2015). Other screen capture software programs, such as Camtasia and Adobe Presenter, have also frequently been used to record PowerPoint video presentations and lectures.

However, there is no agreement regarding whether the instructor needs to be viewed in an educational video (Prober & Khan, 2013). The common approach includes the speaker visibly introducing the video, appearing at the end, or when emphasizing the major point of the video. It is assumed that viewing the speaker’s face assists with minimizing the gap between trainees and speaker and puts trainees in a simulated face-to-face setting, which can help prevent boredom during a lecture. On the other hand, if the speaker’s face is displayed throughout the entire VBL, this can distract trainees from concentrating on the video presentation. In addition, the speaker must strive to maintain a professional identity.

LA was used to evaluate VBLs in this study by using the aggregate data provided by YouTube. Evaluation of these data was performed on three levels: global, series, and individual, and the evaluation covered accessibility, engagement, and audience retention effects of VBLs. While no similar study appears to exist to compare its LA with the current study, some of the LA data from this study were compared globally with the data obtained from a recent...
study conducted by Lau et al. (2017) on using LA for evaluation of the effectiveness VBL series.

At the global level, both the demographic and descriptive data revealed an acceptable level of accessibility of VBLs, as shown by the total number of views (6429) with an average of 338 views per video. In addition, the number of countries of views (89) appears to be a good indicator of videos accessibility and efficient use of keywords to attract viewers and absence of any technical obstacles. At the same time, the videos with high view counts could indicate topics of high interest and applicability to a broad range of trainees in their real-life practices, such as the video of "Item analysis made easy."

The durations of VBLs in the current study ranged from 10.83 to 27.07 minutes, with an average of 18.4 minutes. While there is no consensus about the optimal length of VBLs used as a tool for faculty development in medical education, it does stand to reason that shorter videos would be preferable to the viewer and would be associated with greater AR (Lau et al., 2017). Perhaps the most significant research study to date examining trainee involvement was based on edX, a MOOC provider that organizes university-level training courses (Guo et al., 2014). Having the aim of identifying best practices in VBL design, it analyzed almost seven million views coming from their website to identify enhanced trainee involvement along with shorter VBLs, preferred formats (e.g., drawing was preferred to PowerPoint slides), and faster pace of the trainer, among other aspects.

Regarding viewers’ engagement, as summarized in Table 3, the total number of videos’ likes, shares, and comments, which are 203, 215 and 21 respectively could be considered as an indicator of viewers’ engagement. On the other hand, the very small number of videos’ dislikes (two) may reflect great acceptability of the channel’s contents. In the current study, the apparent weak engagement may be due to the lack of interactive elements in the VBL and the absence of discussion before and after the videos. Interactive elements that could be included in VBLs include embedded questions, feedback, and quizzes (Dong & Goh, 2015). Using these interactive techniques in VBLs could help to build a dynamic online community of practice that could enhance and strengthen the connection between trainer and audience with the net result of better engagement and involvement of the audience (Swift, 2014).

In terms of the audience retention data, as summarized in Table 4, no similar study exists with which it can be compared. However, the data tell us that the longest video, "Saudi Digital Library", had the lowest final audience retention (2.4%), while the shortest video, "Designing test Blueprint for effective Assessment", had the highest final audience retention (14%). This phenomenon was also noticed in another study unrelated to medical education, which showed greater audience retention and learner involvement in shorter videos (Goldberg et al., 2015).

**Take Home Messages**

VBLs can be considered a valuable tool for faculty development in medical education that effectively overcomes many of the common challenges related to this important training process. A variety of software programs and applications are available that facilitate the process of VBL production, particularly the accessibility of many video-sharing platforms, such as YouTube. Moreover, LA is an emerging and effective method for quantitatively evaluating VBLs.

LA includes analyzing metadata, which are downloaded from video-sharing platforms and facilitates the evaluation of the acceptability, accessibility, and audience retention of VBLs; that is, the number of views reflects the acceptability of VBLs, and the number of likes/dislikes and shares reflects audience engagement. Likewise, average view duration, average percentage viewed, and final audience retention are indicators of audience retention. Finally, it appears that the length of VBLs has a profound effect on AR, as shorter VBLs are associated with greater AR, and
vice versa. The synchronous interaction with speaker should be considered in VBLs to enhance their effectiveness and improve the AR.

Notes On Contributors

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Acknowledgements

Authors would like to thank Prof. Sherif El-Saadny for his support and suggestions in preparing the Video Based Lectures (VBLs) of this study. Special thanks for "NICE" and "Egy Med Edu Forum" Whatsapp groups, both are gathering of medical education experts in Saudi Arabia and Egypt, for their support, encouraging and inspiring us to produces the VBLs in Medical Education.

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Appendices

Declaration of Interest

The author has declared that there are no conflicts of interest.