Epi-DyCE (Epidemiology Dynamic Concept Elucidation): A Virtual Learning Platform based Flipped-Classroom in Epidemiology Teaching

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Abstract—*This empirical paper investigates the potential role of virtual Learning Management System (LMS) based flipped(blended) classroom in introductory Epidemiology teaching. After building the initial logic authors have introduced the blended learning for Epidemiology at pilot basis and they have gathered the preliminary qualitative evidences (through free listing and content analysis). The initial evidences seem promising despite of perceiving an element of complexity by few participants.*

Keywords: *Epidemiology, Web interface, e-learning, LMS solutions*

1. INTRODUCTION

"One of the most important areas we can develop as professionals is competence in accessing and sharing knowledge." - Connie Malamed The quote mentioned above underlines the importance of knowledge dissemination for achieving the 'equity in knowledge access'. With the exponential expansion of Internet has now converted the whole world into one well-connected global village (1). Internet-based Learning Management Systems (LMS) can be understood as the web-based platform or software application for planning, administrating, assessing and organizing e-learning activities. They have revolutionized the whole learning scenario by offering a centralized structured yet avery much flexible system where learning can take place irrespective of time and space restriction (2,)(3)(4). But there are some challenges associated with an entirely online curriculum like little dialogue, passive transfer of knowledge, the requirement of self-discipline and self-direction, which may effectively reduce the efficacy of the program (5). To meet the challenges educationist started thinking in terms of the optimum combination of both online and offline methods which may compensate the disadvantages of each other simultaneously can supra-synergistically enhance the learning experiences(6).This was how blended learning started taking shape and found its place in education structure(7) Blended learning can be understood as a combination of face to face synchronous andan asynchronousweb-based learning for thebetter educational outcome (8). Flipped classroom uses blended learning where one can see an opposite approach in compared with customarycontent delivery and homework. The flipped classroom is classically quoted as one in which "events that have traditionally taken place inside the classroom now take place outside the classroom and vice versa." Information (lecture material) is "unloaded" for students to absorbexterior of class, at the cost of reserving classroom time for more rewarding activities like discussion, reflection and problem solving (9).

2. DETAILS EXPERIMENTAL

2.1. Materials and Procedures

At the first step, an enlistment of the Specific Learning Objectives (SLOs) for this program was made. Based on these SLOs an exhaustive list of expected competencies in Epidemiology was prepared. Related competencies were clubbed into border competencies. Representative content items were identified in reference to each broader competency. Several contents were attributed and converged to the archetypal topic of interest. This list of topics was shared among the subject experts to mark them the least relevant to most relevant on a scale of 1 (least relevant) to 5 (most relevant). The five topics which achieved maximum mark were chosen for inclusion.

The structure of each topic was divided into the three parts-introductory part consists of learning objectives and some basic minimal information about the issue (context) supported by the web-link of the learning resource material available in the open domain. Second part usually dealt with more theoretical elaboration (with auxiliary Power Point Presentations, notes or memos) on the topic. The third and final part covered the problem based exploratory questions related to topics. These questions were either selected from published articles or as possible as from real world problems to show relevance of the topic.

The whole topic was then transferred to an online learning management system –Eliademy (https://eliademy.com) the basic version of which is in open domain .This LMS a free online classroom that allows educators and students to create, share and manage online courses with real-time discussions and task management. Eliademy is based on Moodle (support import of course in Moodle format), Twitter Bootstrap and other open source technologies(10). Interested readers can browse the course with the link (https://eliademy.com/app/a/courses/bfc432109a)(11).

In order to get students familiar with the statistical concepts authors had created some interactive videos and uploaded them to a You Tube channel.This channel was designed to explore Medical statistics in a relevant and contextual manner with prime focus to understand the concepts of statistics rather to emphasizing on formulas and mathematical calculation (https://www.youtube.com/user/ankurjoshiudhc)(12).

A topic guide was made which consisted of basic information, expected duration to complete the topic and date assigned. Students were encouraged to take the help of the Eliademy/You Tube resources and then to discuss the topic in synchronous manner with the facilitator. They were further asked to reflect on the topic in a semi-structured manner-what happened, so what and relevance of the knowledge for me.

An unstructured anonymous feedback from the participants were taken at the end of the exercise.

3. RESULTS AND DISCUSSION

The feedback obtained from the learners was utilize to perform a qualitative analysis. At the first phase we made a free listing of the key words and frequency of endorsements by learners. This was followed by the pictorial depiction of the key-words through word-cloud(fig-1) .In a word cloud each key word takes as per its frequency count (i.e. number of endorsement by the learner).

In the next step a content –analysis of the qualitative information was done in reference with gender and year of medical schooling (novice versus mature). The result of the analysis is shown in the table-1

Attributes	Gender	Novice versus mature	Codes with frequencies
Facilitatoryrole (26)	Male(14)	Novice(8)	Unique(2) exploratory(3) self-learning (1) self-learning (2)excitatory (3)new (5) activity based(2) confident-approach(1)different (2)
		Mature(6)	Explanatory (3) Easy(2) Stress free(3)Informal (2) Easy going (1) Innovative (3)Pioneering(2) Inventive(3) New (2)Creative(1) Imaginative(2)
	Female(12)	Novice(4)	Unique(2)exploratory(3) self-learning (1)active (4)self-learning(2)
		Mature(8)	Explanatory (3)Easy(1)Stress free(2)Informal (2)Easy going(3)Innovative (2)Pioneering(1) Inventive(2) Creative(1)Imaginative(1)
Hindrance In learning (8)	Male(5)	Novice(3)	Tough (1), Hard-hitting(1), Intrigue(1)
		Mature(2)	Boredom (1), Altered –approach (1)
	Female(3)	Novice(2)	Boredom (1), difficult(2), complex (1)
		Mature(1)	Demanding (1), lengthy(1)

Epidemiology teaching is always challenging in health sciences because of a number of reasons. First, it let the students visualize health in numbers which is seemingly eccentric for a student who is habituated to perceive health in dichotomy through a patient. Second, a sound analytical quantitative mind is a pre-requirement to understand Epidemiology. Third, translation of concepts into translational practices are actually very much required for the epidemiological understanding in true sense. All these reason in unison convert the Epidemiology into a complex and delicate area when it comes to teaching. (13)

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A traditional classroom may not intervene effectively to solves these issues. However, flipped classroom which is rooted in discussion and reflection, may be a suitable answer to this predicament. (7,8) A blended learning in Epidemiology would address the conceptual understanding more effectively through the learning in collaboration. This may be equated with 'exploration based learning'. This seems to be the fundamental reason for receiving the codes like 'explanatory', 'exploratory', 'imaginative' or 'pioneering' in the study. However there also seems to be a flip –side of this flipped classroom. During the content analysis 8/34 students somehow felt discomfort with this type of teaching. They labelled it as 'complex', 'difficult', 'demanding' and somewhat 'intriguing.' The reason for this apprehension seems to be the inherent to the method of delivery of flipped classroom and different learning styles of the students. However at this juncture no conclusive statement can be made about the definite utility of blended learning for introductory Epidemiology. Although Primary results seems convincing to utilize the techniques with some customization.

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