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Abstract

Introduction: Innovative medical education strategy is arguably one of the most important innovations in medical education in the last century. The evident benefits of this strategy and the changing face of medicine and medical education have led many institutions including those in resource poor settings to consider the adoption of the strategy. However, experts are uncertain about how successful it will be in such settings, as literature on the implementation of the strategy in resource-poor settings appears to be inadequate. This study sought to find out if there are enough resources to successfully implement innovative medical education strategy at Moi University College of Health Sciences.

Methods: Participants were drawn from students, lecturers and administrators; all being users of innovative medical education strategy used to teach and learn in the College of Health Sciences 274 students, 65 lecturers and 9 administrators were recruited into the study. Self-administered questionnaires were used in data collection. This questionnaire utilized a five point forced Likert scale (1-Totally disagree, 2-Disagree, 3-Not Sure 4-Agree and 5-Totally Agree). The questionnaire also consisted of an open-ended section to comment on the strategy process and contents. Cronbach's alpha, median and inter-quartile range (IQR) was calculated in SPSS 22.

P-value less than or equal to 0.05 was taken as statistically significant. Ethical approval was obtained from the Institutional Review and Ethics Committee (IREC) of Moi University and Moi Teaching and Referral Hospital.

Results: The response rate among students was 250 (91%) out of 274, Lecturers' response was 90% of which 65 of them returned the questionnaires out of the total sample of 72. For the administrators they all returned their questionnaires being 100% response of the sample of 9 participants. Seventy eight percent of the administrators said that the resources were partially enough with 1 (11.1 %) saying that they were enough, All the lecturers were in agreement that the resources were partially enough.

Conclusions: Both lecturers and administrators agreed that the College had resources which were partially enough. This inadequacy of teaching materials has affected SPICES model, which it is now moving towards mixed method. The resources which were categorized as being partially enough were lecture halls, LCD projectors, computers, internet, technicians and vehicles for COBES centers and field trips. This is short of WFME Standards of requiring courses to be funded; supply of more teaching materials should be availed.

Key Words

Medical School; Perception; Problem Based Learning; Students

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Introduction

We can define innovative teaching and learning method as a program or series of events which the teacher implements to assist the student to remain focused on what that individual is doing. It stimulates the students' ability to engage in problem-solving activities that make a student an expert in his/her area of concentration. This process makes a

student an active learner and the teacher a facilitator as opined (Zhu, Wang, Cai, & Engels, 2013).

Innovative approach to learning was facilitated by the growth of technology in 19th century (Hmelo-Silver & Barrows, 2006) argues that the introduction of instructional media in teaching

facilitated various innovative opportunities. To meet the needs of innovative teaching and learning method, majority of the institutions who adopted it opted for problem-based teaching and learning method. Filho argues that problem-based teaching and learning method became increasingly popular in educational institutions because of actively being able to engage students in constructing knowledge (Rezende-Filho, da Fonseca, Nunes-Souza, da Silva Guedes, & Rabelo, 2014). Personally in a classroom, but only via internet as opined by (Deniz, Kesan, & İzgiol, 2013) Innovative method of teaching and learning adopted by medical colleges then is the problem-based learning. Koh *et al* opines that problem-based learning have been introduced to improve the quality of graduating health professionals. They argue that graduates taught using problem-based learning method are more competent and systematic compared to the ones trained using traditional lecture method (Koh, Khoo, Wong, & Koh, 2008).

This arose from the need to train doctors who can serve in the 21st Century; doctors who are equipped with skills that enable them respond to medical problems they face, able to adapt to the unknown future problems they will encounter. Doctors who can form teamwork with other health professionals to solve community's health challenges. This was to be achieved through training medical students in research methods to enable them research for solutions to community's health challenges with other health professionals. They were taught how to do self-directed learning of which they would use as a means of getting solutions to community's health problems after graduation (Levenson, Atkinson, & Shepherd, 2010).

Methods

This research is a descriptive cross-sectional study design; which utilizes both qualitative and quantitative method of data collection. Participants were drawn from students, lecturers and administrators; all being users of innovative medical

education strategy used to teach and learn in the College of Health Sciences 274 students, 65 lecturers and 9 administrators were recruited into the study. Self-administered questionnaires were used in data collection. This questionnaire utilized a five point forced Likert scale (1-Totally disagree, 2-Disagree, 3-Not Sure 4-Agree and 5-Totally Agree). The questionnaire also consisted of an open-ended section to comment on the PBL process and contents. Data entry was done in SPSS version 22. Cronbach's alpha, median and inter-quartile range (IQR) was calculated in SPSS 22 for Windows. P-value less than or equal to 0.05 was taken as statistically significant. Ethical approval was obtained from the Institutional Review and Ethics Committee (IREC) of Moi University and Moi Teaching and Referral Hospital.

Results

The response rate among students was 250 (91%) out of 274, Lecturers' response was 90% of which 65 of them returned the questionnaires out of the total sample of 72. For the administrators they all returned their questionnaires being 100% response of the sample of 9 participants. Seventy eight percent of the administrators said that the resources were partially enough with 1 (11.1 %) saying that they were enough, All the lecturers were in agreement that the resources were partially enough.

Availability of Resources for Implemented innovative Medical Education Strategy

The objective of this study was to identify resources available for implementing innovative Medical Education Strategy in the College of Health Sciences. The success of any implemented program highly depends on the availability of resources to be used in running the program. Among the resources needed are buildings for classrooms and office accommodation, instructional media such as laptops, computers, chairs and books. There is need to have vehicles to transport students during field trips and COBES projects.

LCD Projectors	Total	Functional	Non-functional
SOM	27	20	7
SPH	7	6	1
SON	6	6	-
SOD	5	2	3
Total	45	34	11
Computers			
SOM Computer Lab	20	-	20
Library Computer Lab	20	20	-
Total	40	20	20
Vehicles			
Bus, mini-buses & others	22	7	15

Table 1: Checklist for Teaching Materials and Space

1. LCD Projectors, Computers and Vehicles
2. Laboratory re-agents (chemicals) stocking is always below 30%.
3. Internet connectivity is available only, but not always.
4. For a vehicle to be functional, it must be in good mechanical condition with all stickers required by Kenya government for vehicles carrying passengers.
5. Space:
 - Old Library has an area of 821 square meters.
 - Skills Laboratory has an area of 153 square meters.

To ascertain the number of LCD projectors and computers, the researchers visited the custodians and counted them physically. For the re-agents laboratory technicians from the four schools totaled stock card entries for 6 months and averaged them. This was done in the presence of the researcher, as opined by (Laitenberger, El Emam, & Harbich, 2001) that checklists can be used to compare the actual and that confirm the reality on the ground. To ascertain space, the researcher measured the two rooms and calculated the area in square meters.

Both Old Library and Skills Laboratory were chosen because they are used to teach combined groups of the four schools.

Majority of students agreed that lecture halls, technicians, chairs and books were moderately enough. But LCD projectors, computers and vehicles for COBES were seen to be lacking where students scored 50, 42 and 79 respectively by stating that they totally disagree with the availability of these teaching materials, as per *Table 2*.

	TD	D	NS	A	TA
Do you have enough lecture halls	40	58	39	78	35
Do you have enough LCD Projectors	50	80	47	45	28
Do you have enough Chair and Books	42	53	41	78	36
Do you have enough Technicians	23	49	59	85	34
Do you have enough Vehicles for COBES	79	58	58	42	13

1. TD = Totally Disagree 2. Disagree 3. NS = Not sure 4. Agree 5. TA = Totally Agree

Table 2: Students' View on Availability of Resources for Implementing Innovative Medical Education Strategy

A test of reliability was conducted on the scales used in the questionnaire. The result of the coefficient alphas indicated satisfactory reliability. According to DeVellis Reliability Guidelines (1991:15), a Cronbach alpha coefficient over 0.7 implies respectable reliability. In this study, Cronbach alpha coefficients of lecture halls, chairs and books, technicians, LCD projectors and COBES vehicles was 0.77. A value over 0.7 is seen as an acceptable value for Cronbach's alpha; a value substantially lower indicates an unreliable scale. In this study, the Cronbach alpha coefficient of the 5 scales was over 0.7 that was seen as a good

indicator of their reliability and high acceptability.

By use of calculated mode, students ranked the need of vehicles for COBES and field trips being the most wanting. The next needy area was the instructional media such as LCD projectors, computers and internet, as per Table 3.

By use of a calculated mode; all the lecturers were in agreement that the lecture halls, LCD, whiteboards, laptops and teaching rooms were inadequate at the College of Health Sciences as per Table 4.

Students Statistics					
	Do you have enough Lecture Halls	Do you have enough LCD Projectors	Do you have enough Chairs and Books	Do you have enough Technicians	Do you have enough Vehicles for COBES
N	250	250	250	250	250
Mode	4	2	4	4	1

Table 3: Students' Response about the Availability Teaching Materials

Lecturers				
		Enough	Partially	Few
Are there enough lecture halls		5	54	6
Are there enough, LCD, Whiteboards & Laptops		7	41	17
Is there enough room for teaching in the hospital		3	34	38
Lecturers Statistics				
		Are there enough Lecture halls	Are there enough LCD Whiteboards Laptops	Is there enough room for learning in the hospital
N	Valid	65	65	65
Mode		2	2	2

Table 4: Lecturers' View on Availability of Resources for Implementing Innovative Medical Education Strategy

Administrators

Administrators 7 (78%) said that the lecture halls and laboratories were partially enough with 1 (11%) saying that they were enough, they were in

agreement that the LCD whiteboards chairs and Laptops were partially available at 5 (56%) and 1 (11%) saying they were enough; as per Table 5.

Lecture halls and laboratories			
	Frequency	Percent	%
Enough	1		11
Partially	7		78
Very Few	1		11
Total	9		100
LCD whiteboards chairs and Laptops			
	Frequency	Percent	%
Enough	1		11
Partially	5		56
Very Few	3		33
Total	9		100

Table 5: Administrators' View on Availability of Resources for Implementing Innovative Medical Education Strategy

Discussion

The objective of this study sought to identify resources available for implemented innovative Medical Education Strategy in the College of Health Sciences. The success of any program depends on the availability of resources. Among the resources needed included classrooms, office accommodation and instructional media such as laptops, projectors, computers and books, as well as vehicles to transport students during field trips and COBES.WFME Standards indicates that "...allocate resources necessary for the implemented curriculum". So for the implemented SPICES model

of teaching and learning, resources have to be availed (Karle, 2006).

Student's perception on availability of resources

Among the students, majority agreed that College of Health Sciences had moderately enough lecture halls, technicians, chairs and books. This had been made possible by Medical Education Centre and Conference (MECC) and the new building for Public Health, Dentistry and Nursing, commonly referred to as PDN building (College of Health Sciences, 2016).

Students also identified COBES and field trips as the most ineffective programs due to lack of sufficient vehicles. This particular problem has also been registered in reports by (Chang *et al.*, 2011; Jinadu, Ojofeitimi, & Oribabor, 2000) and the Federal Democratic Republic of Ethiopia (2015:2). To alleviate this problem, more vehicles need to be procured for COBES and field trips. The University administrators and lecturers must see COBES as part of the curriculum that requires full support like others courses in the curriculum. However, if programs such as COBES and field trips are seen as extra-curricular activities, procurement of the needed vehicles will not be given the priority it deserves. This view has been shared by Kang'ethe, Kiguli-Malwadde, Jinadu and the Federal Democratic Republic of Ethiopia in their publications (Jinadu *et al.*, 2000; Kang'ethe, 1998; Kiguli-Malwadde *et al.*, 2006). This is contrary to the WFME Standards which indicates that "...allocate resources necessary for the implemented curriculum". COBES has not been facilitated to the level of others courses; yet it is the course that exposes students to community's health problems (Karle, 2006).

Students unanimously agreed that the College should acquire more LCDs, projectors, computers and improve internet speed and access. The provision of instructional media should be based on the population of the students (Ericsson, 2008). Students reported that there were few instructional media materials and that some which were there, had been rendered non-functional due to wear and tear and poor maintenance. Poor electrical connectivity was another factor stated by the students. Skocherlaks has observed that most modern instructional media rely on electric power (Skochelak, Barley, & Fogarty, 2001). It is important to also consider that some of the requisite instructional media needed for medical training are expensive to procure in adequate quantities (Kei, 2011).

Some areas had internet connectivity but suffered from frequent interruptions due to either non-payments or maintenance schedules on electric lines. These findings concur with those of Skocherlaks and Hamad in their studies (Hamad, 1999; Skochelak *et al.*, 2001).

Overcrowding was caused by high student-lecturer ratio, which could not allow the College to split the classes into a manageable level of 7 to 10 students per tutorial group. This pointed to the need to recruit more lecturers, a view that has also been urged by Prince and Felder (Prince & Felder, 2006). The reviewed literature showed that overcrowding in Medical Colleges in developing countries is caused by the lack of sufficient funding to these

institutions. The rate at which high schools are churning out students ready to join Medical Colleges does not match that of government funding to expand available utilities. Governments are faced with high population growth, and little sources of generating revenue; hence the lack of funding to existing Medical Colleges; and this agrees with observations by Abraham (Abraham & Azaje, 2013).

Overcrowding reduces the effectiveness of for implementing innovative Medical Education Strategy because the little resources available for this program will be strained, students have to crowd around a projector of which some will not understand the ongoing teaching. This then forces the lecturer to improvise, which ends up having to teach using mixed method other than SPICES model, as observed by Wood (Wood, 2003).

Concerning the study objective; resources are available for the implemented innovative Medical Education Strategy, but they are all depleted and even the functional ones are faced by interruption of electricity and overcrowding of students.

Lecturer's perception on availability of resources

Most lecturers noted that the College had inadequate lecture halls, chairs, computers, books, LCD projectors and laptops. However, they noted that most of the available equipment was non-functional. They attributed this to the fact that some of this equipment is expensive to replace, as opined by Kei in his PhD Thesis (Kei, 2011).

Lecturers suggested that all teaching and learning facilities need improvement; that when teaching aids are not availed, teaching is compromised. They argued that the insufficiency of the equipment needed was one reason many lecturers were shifting from SPICES model teaching and learning method back to the lecture one. This is against WFME Standards that teaching and learning should be funded (Karle, 2006). When lecturers are not facilitated, then proper teaching cannot take place, this finding was in agreement with an observation made by Veitia *et al* in their study (Veitia, McCarty, Kelly, Szarek, & Harvey, 2001).

Most of the lecturers said that they needed training in SPICES model of teaching and learning. Some of them said they had been trained in their undergraduate using SPICES model. Others had had a chance to be trained in the use of SPICES model, either through workshops they had attended or by voluntarily joining first-year students during lessons on how to use SPICES model of teaching and learning during first year students' orientation. The

approach taken by lecturers in joining first-year students in order to learn SPICES model is not the best way to train new staff. This approach reduces SPICES model to lecture method; because students will participate during the course but the lecturer/administrator will observe, take notes and leave.

Lecturers pointed out that they had not been provided with teaching materials such as laptops and the internet. Even the few functional laptops could not be fully utilized because of electric power interruptions. Lecturers who are not provided with teaching materials and trained on the use of instructional media are overtaken by their students in the area of technology. Lonka suggests strongly that lecturers should always be availed with instructional media and training on how to apply them (Lonka, 2013).

Availing resources for the implemented innovative Medical Education Strategy model, lecturers have been hired, but they are not facilitated to teach. The little resources available have been overstretched by overcrowding.

Administrator's perception on availability of resources

The College administrators pointed out that lecture halls were inadequate. They also noted that laptops, projectors, computers and internet were not enough. They attributed the problem to inadequacy to funding for the College. They observed that stocking the College with teaching and learning materials was costly. It is contrary to WFME Standards that courses should be funded, and should be noted that when courses are not funded, teaching changes from SPICES model to lecture method (Karle, 2006).

The respondents emphasized the need for sufficient office spaces and teaching rooms. The College has grown from a population of 40 students to the current one of 1200 as indicated in Moi University College of Health Sciences. It has grown 30 times from its initial population, yet the teaching and office spaces have not grown to in corresponding rate. The lecturers also posited that the skills laboratory was not well equipped. The administrators attributed this to the high cost of equipping innovative Medical Education Strategy.

The College has acquired some instructional media such as laptops, projectors and the internet, but these are few, insufficient and inefficient. Coupled with the inefficiency of some equipment due to constant power interruptions it disrupts learning. According to the respondents, these power interruptions were caused by scheduled maintenance and disconnection due to non-

payment.

Students, lecturers and administrators reported that College vehicles were not enough to facilitate excursion activities. Concerning the second objective, therefore, on the state of resource availability for the implementation of innovative Medical Education Strategy, it was found out that resources were inadequate; a thing that goes contrary to WFME Standards which urges Medical Schools to avail resources for teaching all courses (Karle, 2006).

Conclusions

Both lecturers and administrators agreed that the College had resources which were partially enough. This inadequacy of teaching materials has affected implementing innovative Medical Education Strategy, which it is now moving towards mixed method. The resources which were categorized as being partially enough were lecture halls, LCD projectors, computers, internet, technicians and vehicles for COBES centers and field trips. This is short of WFME Standards of requiring courses to be funded; supply of more teaching materials should be availed.

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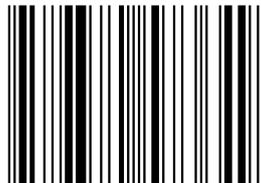


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