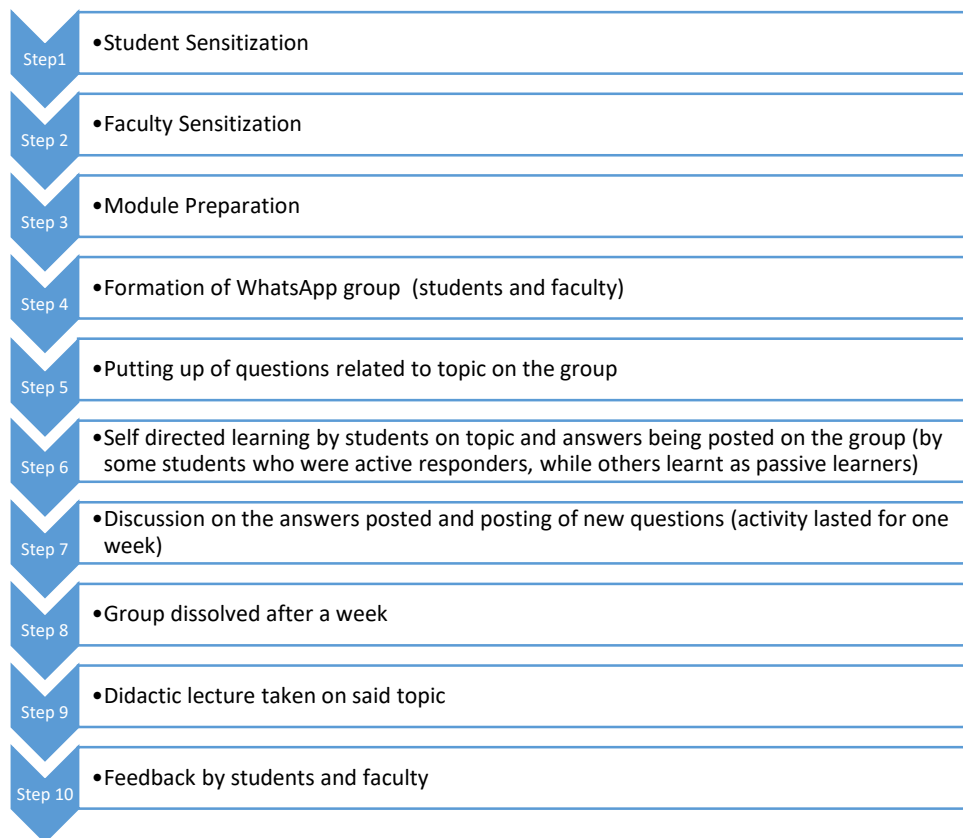






WhatsApp group excerpts from the real conversation are being given (Figure 2). In between, trigger questions or clues to answers were put up, if required, to help them come up with the answers. The whole process of

discussion and response between students themselves and with faculty was observed. After one week, the group was dissolved. After the completion of whole process, the didactic lecture on same topic was taken as per roster.



**Figure 1: Step wise depiction of methodology used**

Student feedback and faculty feedback regarding the attitude and perception towards new method used was taken via pre framed questionnaire using a five-point Likert scale. The questionnaire was duly validated by the residents and faculty peer group. Observations

towards the method used was analyzed based on the approach towards the method used, educational impact and practical utility. Qualitative data was generated via open ended descriptive questions and thematic analysis was done.

**Faculty:** Define Bacteremia and Septicemia.

**Student 1:** I think bacteremia and septicemia are quite different from each other. Bacteremia is merely presence of bacteria in the blood. Septicemia means that bacteria are using our blood as culture which is dangerous. That’s why bacteremia occurs daily but septicemia doesn’t.

**Faculty:** U are right ....., bacteremia is mere presence while in septicemia they are actively multiplying. What are types of bacteremia?

**Student 2:** Gram positive bacteremia and gram negative bacteremia, if I am not wrong

**Figure 2: Extracts from a WhatsApp discussion**

## Results

The group consisted of 94 second professional MBBS students participating with 22 faculty members. Faculty included one Professor and Head, one Professor, one Associate Professor, two Assistant Professors, five Demonstrators and twelve Junior Residents (all are involved in teaching MBBS students either in theory and /or practical classes).

The group was made for one week and a total of 178 messages were exchanged. Out of 94, 42 (44.6%) students were active responders while 52(55.4%) were passive participants. Maximum number of messages of 53 were exchanged on day 1, followed by 30 on day 2; 31 on day 3; 18 on day 4; 1 on day 5; 26 on day 6; and 19 on day 7.

**Table 1: Student Approach towards WhatsApp and its Advantages as teaching-learning method (n=94)**

	Approach towards New method: number (%)				
	Strongly Disagree (1)	Disagree (2)	Nor Agree nor disagree (3)	Agree (4)	Strongly Agree (5)
Interesting	5 (5.3)	7 (7.4)	13 (13.8)	55 (58.5)	14 (14.8)
Feasible	1 (1.1)	10 (10.6)	24 (25.5)	41 (43.6)	18 (19.1)
Can be incorporated into routine teaching	9(9.57)	11 (11.7)	24 (25.5)	33 (35.1)	17 (18.1)
<b>Educational Aspects</b>					
Resources/ material given was sufficient	2 (2.1)	8(8.5)	28(29.7)	43(45.7)	13(13.8)
Doubts were cleared effectively	4 (4.2)	10(10.6)	19(20.2)	45(47.8)	16(17.0)
Discussion was more stimulating and innovative	2 (2.1)	8 (8.5)	17 (18.1)	49(52.1)	18(19.1)
Better interaction with faculty	2 (2.1)	6(6.4)	13(13.8)	46(48.9)	27(28.7)
Better interaction among peer group	4 (4.2)	14(14.8)	22(23.4)	41(43.6)	13(13.8)
Motivation for self-directed learning	3 (3.1)	9(9.6)	22(23.4)	45(47.8)	15(15.9)
<b>Practical Utility</b>					
Time consuming	7 (7.4)	41 (43.6)	21(22.3)	22(23.4)	3(3.1)
Internet issues	22 (23.4)	38 (40.4)	17(18)	13(13.8)	4(4.2)

Feedback given by students was analyzed and it was found that they had positive approach towards the method used (Table 1). About 14%-18% strongly agreed to its being interesting method of teaching which is feasible to do and can be incorporated in routine teaching. Educational impact was significant and around 40-60% agreed/strongly agreed that the discussion was stimulating and they were motivated for self-directed learning. They effectively cleared their doubts and benefitted from better student faculty interaction. Practically too, the method can be adopted well

as very few admitted to having internet issues (Table 1). Among faculty, there was strong inclination towards the method and there was little doubt regarding its educational impact. However, when compared to students, they were less sure of internet facility (59%). They were also not clear about the time related issues as most of them were of the view that it can be time consuming (Table 2).

Qualitative data was analyzed and seven main themes were identified (Table 3).

**Table 2: Faculty Approach towards WhatsApp and its Advantages as teaching-learning method (n=22)**

Approach towards New method					
	Strongly Disagree (%)	Disagree (%)	Nor Agree nor disagree (%)	Agree (%)	Strongly Agree (%)
Interesting	0	1(4.5)	1(4.5)	14(63.6)	6(27.2)
Feasible	0	2 (9.0)	4 (18.1)	11(50.0)	5(22.7)
Enthusiasm among students for the method	0	0	2(4.5)	15(68.1)	5(18.1)
<b>Educational Aspects</b>					
Resources/ material given was sufficient	0	1(4.5)	4(18.1)	17(77.2)	0
Doubts were cleared effectively	0	0	5(18.1)	13(59.0)	4(18.1)
Better interaction with faculty	0	1(4.5)	1(4.5)	13(59.0)	7(31.8)
Better interaction among peer group	0	1(4.5)	6(27.2)	11(50.0)	4(18.1)
<b>Practical Utility</b>					
Time consuming	1(4.5)	7(31.8)	7(31.8)	7(31.8)	0
Internet issues	0	5(18.1)	13(59.0)	4(18.1)	0

**Table 3: Themes identified after analyzing qualitative data generated via open ended questions**

Theme 1	Acceptance and inclination for its use
Theme 2	Platform for better interaction with faculty
Theme 3	Realization of learning process
Theme 4	Participation woes
Theme 5	Time related issues
Theme 6	Improvement strategies
Theme 7	Feeling of Bias

**Discussion**

Internet technology or online technology is changing the way of communication and sharing data. Social networks like Facebook, Twitter, Instagram etc are very popular among the younger generation. One of such application is WhatsApp which was launched by Brian Anton and Jan Koom in 2009. Its name is derived from the English phrase "What's up?" meaning "What's new?" (Gon & Rawekar, 2017). It allows exchange of

messages (both audio and written) images and videos through the internet. It is a widely used application now a days in social media. Ease of using the application, which is free, along with easy constructing and sharing the information and knowledge makes it a tool which can be used for blended teaching-learning activity between teachers and students.

In our study, maximum enthusiasm among students was seen on day 1, when maximum number of messages (53) were exchanged. On

day 4, the number decreased significantly to only 18 messages while on day 5, only a single message was shared. The reason was a unit test in Pathology and moreover, it was the weekend. Students were less interested in responding to a teaching activity over weekend and preparation for the test kept them busy. It was difficult for them to give time to other subject taught over WhatsApp.

#### *Acceptability for the method used*

Overall, faculty (90%) and students (74%) found the method used was interesting. They also agreed that the method is feasible to implement as routine which shows that students were motivated and faculty was positively oriented towards sharing knowledge online. There was acceptance and inclination to use it as referred by 'brilliant idea', 'another platform for learning' 'fun and stimulating' 'effective and good.' One student said it to be 'better than lecture, topics discussed were of clinical importance' and 'radically different.' Although they also pointed out that 'it lacks structured format and so, can't replace books.'

#### *Educational impact*

About 65% of students agreed that the resource material shared was sufficient and their doubts were cleared effectively. Around 77% of faculty was of the same view (Tables 1 & 2). Previously too, Preston *et al.*, (2010) had reported that nearly 70% of students in their study stated that they learnt well in online learning communities such as WhatsApp groups, Facebook communities, Twitter chats and Google+ communities.

Thematic analysis revealed that educational impact occurred in the form of 'realization of learning process.' 'New knowledge, new topics and repository for information' or 'the topic was an important one. I even screenshot important facts.' Fifty eight (62.3%) students thought that the method prompted them for self-directed learning. One student wrote that 'it is nice way of learning as you took yourself to internet and learn more.' 'There is better retention.' Passive learning happened and it was mentioned as 'I did not do any message but, I got to know many additional points'.

The interaction among teacher and students was good. About 90% of faculty felt that interaction was better among student and faculty than routine, but about 76% of students felt so (29% strongly agreed while 47% agreed). One said 'Learning through WhatsApp

was a unique way of discussions among the teachers and the students' Previous studies support the fact that online mobile teaching promotes social interaction between facilitator and students leading to better learning and problem solving (Makoe, 2012; Ashton & Bhati, 2007). Although 54% students and 64% faculty thought that it led to better interaction in peer group, thematic analysis of qualitative data also pointed to 'participation woes.' General observation was that although students were participating, there was lack of much discussion between students, with each other. One student pointed out 'Bias' that 'students were copying things from internet.' This kind of response helps in looking into the psychology of students where they might feel cheated that somebody was quick enough to get his hand on information material available on internet and post it in group when they themselves might still be searching for it in the textbooks to answer. It was mentioned that 'less is left for other students to talk about, once a question is answered, so, you always need to be prompt and quick to answer.'

However, they did enjoy the partial anonymity. Respect and recognition or fear of failure in front of peer group often drives the student's approach to learning and educational activities. One student expressed acceptability to use of this mode of teaching as 'There is no burden of teacher asking you question in the class by your name and making you stand in front of the whole class' Similar observations have been made by Willemse (2015) that students feel less intimidated while asking questions as no one knew their identity.

Parental perception was another aspect as they felt 'Parents do not understand the concept of using mobile for studying.' One student felt no inclination to use WhatsApp in his personal time for study purposes.

#### *Practical Utility*

Since WhatsApp operates through internet, students and faculty were specifically asked about logistics, mainly availability of internet. Students were not at all bothered about internet availability, although faculty was not so sure about it. There are many wireless internet facilities available now a days. One student even mentioned availability of 'Jio'. Internet has led to emergence of online learning communities. There is easy access to multitude of information available and students freely access it.

There wasn't any consensus or majority regarding whether it is more time consuming or not. Among faculty, majority thought it to be time consuming while among students the verdict was around 50%. Different viewpoints were expressed regarding this. While some felt that 'utilized my free time effectively' others felt 'short messages should be sent as too long message become time consuming' 'sometimes difficult to read all the messages' However, it was realized that time management is must with such activity. Students may have some other assignments and they suggested that either a fixed time slot should be allotted during the day for the activity or such interaction 'should not be held during tests as we are not able to participate and learn at best.'

There were disagreements and few participants were not much inclined towards this method of teaching and expressed it clearly as 'I am not a big fan of studying on mobile phone. Looking on screen for too long is not a thing I want to achieve.' and other one saying 'some people (like myself) do not use WhatsApp on regular basis' 'don't make this routine method of teaching' One of the faculty member also was not at all in favor of it, saying 'I am not much of an advocate of teaching method on phone. I already feel with the availability of simply anything and everything on phone, people are just not ready to look up from their phones. There is no direct interaction and no real expression'.

Our study had limitations as the activity was for a short period of time. The interaction among all faculty members, residents and all students together could have been more, a fact observed by the students and they expressed their wish for more faculty involvement so that they could learn from intellect of all.

Overall, the verdict was in favor that the method is implementable and students often welcome 'something new'. This type of education activity was not used in our set up before. This study might pave a way for utilizing more asynchronous teaching-learning methods in future. However, as a student pointed out that the interest starts waning after first day, the topics/content need to be more image based or clinically oriented to keep the students engaged.

There is no doubt that the concept of use of social media site for teaching-learning process fits well with the learning theory 'Social Constructivism' (Overview of learning theories, Accessed June 9, 2020) Here, knowledge is

constructed through connectivism and sharing within social communities. The learner is not learning alone but along with its peer group and in knowledgeable community leading to better contextual understanding.

Thus, we would like to conclude that such activities can be planned with students to introduce new topics, clarify doubts, and increase faculty student interaction. Such groups can also be made interdisciplinary by including faculty from other departments. For example, along with Microbiology, if faculty from department of Pathology, Pharmacology, Community Medicine and General Medicine can also be included to promote discussions on infectious diseases clinical scenarios starting from cause of infection, pathology, their treatment and management, it will be interesting to note the improvement in learning of students via such methods as a significant adjuvant to the routine teaching.

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