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Student centric Integrated Teaching- An Innovative approach in Medical education

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Abstract
Background: Today's medical education system aims at imbibing new teaching learning methods so as to keep up with the requirements of and to match the international standards. Integration simply means bridging connections between academic knowledge and practical. Apart from having the benefits, there are some limitations, mainly it is teacher-oriented method of teaching than student oriented. In the current study, we have made to introduce a student centric approach for integrated teaching method. **Aim:** To analyse students' and faculty feedback regarding the innovative student centric approach of integrated teaching (SCIT) and the effective ness of the SCIT to the traditional integrated teaching (IT). **Methods:** Mixed method approach. Need analysis (qualitative approach)by freelisting and pile sorting. Free listing was to identify the perceptions of the students about the existing flaws/ lacunae and the suggestions that has to be incorporated to overcome the existing flaws/lacunae in existing integrated teaching method. Whole 100 students were divided in to 10 groups, each having 10 students. The objectives of the session were divided among the 10 groups one weeks prior to the SCIT session. From each department (Anatomy, Biochemistry and Physiology) two faculty were assigned to guide the students.SCIT (student centric integrated teaching method)was conducted in two sessions. All the students & the faculty were subjected to a previously validated feedback questionnaire to assess the perceptions regarding the newer teaching –learning method (Student centric integrated teaching method -SCIT) A post test was conducted to all the students and their scores were analysed. These scores were compared with the scores of their senior batch students who were exposed to current Integrated teaching method. **Results:** The cognitive map (figure 1) revealed the distribution of the lacunae in the existing integrated teaching method (Session planning related and Student's interaction related). The cognitive map (figure 2) depicted the solutions to fulfil the lacunae / expectations from the teaching learning methods (Division of session time, Assessment at end of session and Interactive sessions). post test scores between the two groups SCIT and IT Mean $\pm$SD 11.03 ± 2.5 & 8.51 ± 2.14 respectively. **Conclusion:** A modified methods SCIT has been developed which is students centric and this method has addressed majority of the issues of the students towards integrated teaching. Post test scores revealed that students exposed to SCIT had better performance than those who were exposed to regular integrated teaching session. Students and faculty were satisfied with the new method SCIT.
Keywords: integrated ,teaching

Introduction
The Medical education system has witnessed phenomenal changes in last two decades. Teaching-learning methods are the most important component in the successful implementation of any curriculum. There are many innovations and trends in medical education that have been undertaken globally which include self-directed learning, problem-based learning, integrated teaching (IT) and community orientation[1]. Integration of teaching is defined as the organization of teaching matter to interrelate or unify the subjects which are frequently taught in separate academic courses or departments[2]. It simply means bridging connections between academic knowledge and practical[3]. Subject specific learning with appropriate alignment increases the competency of a medical graduate. Here comes the importance of integration[4]. Integration is defined as organization of teaching matter to interrelate or unify subjects frequently taught in separate academic courses or departments[5]. There is a need to teach the students by correlating the various subjects to create interest and promote active learning[6]. Integration can be done in the following ways: horizontal integration means that departments in the same phase integrate and in vertical integration departments in different phases integrate[5].

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There are many advantages of integrated teaching which includes logical order of presentation of important health problems, avoids repetition and better utilization of teachers. However, there are some limitations, mainly it is teacher-oriented method of teaching than student oriented. In the current study, we have made to introduce a student centric approach for integrated teaching method in which instead of listening to the teacher exclusively, students and teachers interact equally & openly, more group work and discussion is encouraged, which makes students learn to collaborate and communicate in better way.
The objectives of the study is to analyse students' and faculty feedback regarding the innovative student centric approach of integrated teaching (SCIT) and to analyse the effective ness of the SCIT to the traditional integrated teaching (IT).

Methods
The study was conducted in the department of Biochemistry, after taking the institutional ethical approval (SVSMC/IEC Approval No.04/2020) and the consent from the first-year medical undergraduates. The duration of the study was 3 month (January to March 2020). Mixed method study design was adopted where both qualitative and quantitative data was collected by different methods. ADDIE model (Analyse, Design, Development, Implementation and Evaluation) was followed to create effective learning experience. This has been illustrated in figure 1.
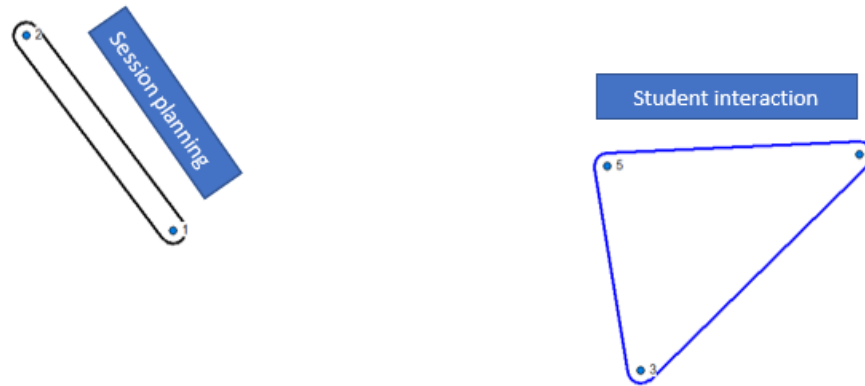
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Padugupati S *et al*   International Journal of Health and Clinical Research, 2021; 4(20):275-280
www.ijhcr.com
275

Fig 1:Lacunae in IT

Need analysis was done by using freelisting and pile sorting, a qualitative approach. We collected student's perceptions (5 Seniors who passed first year recently) on current integrated teaching practices and their expectations for adoption of innovative methods. Free listing was to identify the perceptions of the students about the existing flaws/ lacunae and the suggestions that has to be incorporated to overcome the existing flaws/lacunae in integrated teaching method. At the start of the interaction, a brief instruction was given to the participants about what is expected of them. The research questions were read to the participant one after the other, and it was ensured that they understand the question. Participants were given the option to record their responses on their own in writing. The responses obtained from the participants were analysed using the Visual Anthropac software to identify those items which are prominent and representative of the cognitive domain (table 1 &2)

Table 1: Free listing: Selected 11 lacunae faced by the students in the regular integrated teaching session(IT)

S.No	ITEM	SALIENCE
1.	Lengthy sessions	0.200
2.	Lack of assessment	0.400
3.	Repitition of subtopics by faculty	0.300
4.	Non interactive sessions	0.100
5.	No time for doubt clarification	0.133
6.	Very long sessions	0.067
7.	Difficult to concentrate for a long time	0.200
8.	No active discussion	0.100
9.	Exhausting	0.133
10.	Monotonous	0.067
11.	Boring	0.200

Table 2: Free listing: Selected 13 probable solutions for the lacunae faced by the students during regular integrated teaching sessions (IT)

S.No	ITEM	SALIENCE
.	Encouraging student's participation	0.387
.	Allotting enough time for the sessions	0.160
.	Time for doubts clarification	0.400
.	Assessment at the end of the session	0.080
.	Microplanning can be done	0.240
.	Providing break after 45 mins session	0.050
.	Subtopics can be finalised prior	0.200
.	Long sessions can be conducted for 2 days	0.200
.	Allotting enough time for discussion	0.200
0.	Prior setting of the guidelines	0.150
1.	Student's involvement in the session	0.067
2.	Faculty coordination needed	0.133
3.	Prior selection of topics for first year	0.133

The Smith's Salience Score was calculated, and depending on the cut-off observed, salient variables were selected for the next step of pile sorting.
For the first research question, the perceptions of the students about the existing flaws in integrated teaching method, a total of 20 responses were obtained from five respondents (table 1), which were then fed into the Visual Anthropac software. A Smith Salience Score of less than 0.1 was taken as the cut-off and 11 salient variables (out of the 20 listed) were selected and eventually subjected to the second stage of pile sorting. For the second research question, suggested solutions for the flaws in the existing integrated teaching method, a total of 25 responses were obtained from ten respondents (table 2), which were then fed into the Visual Anthropac software. A Smith Salience Score of less than 0.1 was taken as the cut-off and 13 salient variables out of 25 responses were selected and eventually subjected to the second stage of pile sorting.
Pile sorting was to establish a relationship between the identified key aspects. The free pile sorting method was adopted for the current study, in which the pile sorting was done on a one-to-one basis. The identified salient items were written on the cards (front side), while on the back-side numbers were mentioned to enable data entry. All the cards with the item name were placed in front of the participant and

they were asked to group them together using their own criteria. Once the groups were formed, they were asked to explain why they grouped them in that particular way and their responses were recorded in the recording format. Also, each time, the pack of cards was shuffled before giving to the next participant. The participants were allowed to rearrange the piles. The obtained results or categories were again subjected to analysis using the Visual Anthropac software, and cognitive maps were drawn to identify a meaningful relationship between the salient variables.

Overall, the items were grouped in three to three to four categories by five respondents (table 3).

Table 3: Pile sorting to assess the relationship between the identified salient lacunae

Respondent number	Pile as formed by Respondent	Reasons for the same
1	Pile 1: 1,5,6,3,7	Time management related
	Pile 2: 4,7,8,9,10,11,5	Student's interaction related
	Pile 3: 2	Assessment related
2	Pile1: 1,5,6,7	Time management related
	Pile2: 3,4,8,9,11	Interaction related
	Pile3:2	Assessment related
	Pile4: 10	Teaching learning method related
3	Pile1:4,5,7,8,9	Student's related
	Pile2:1,3,6	Faculty related
	Pile3:2,10,11	Teaching learning method related
4	Pile1:3	Faculty related
	Pile2:4,5,6,7,8,9,10,11	Student related
	Pile3:1,2	Dynamics of the session related
5	Pile1:1,2,6,9,10,11	Teaching learning method related
	Pile2: 3	Faculty related
	Pile3:4,5,7,8	Student related

These observations were subjected to pile sorting analysis through the Visual Anthropac software, and a cognitive map was drawn (figure 1). Similarly, the salient items identified during free listing 2 were used for pile sorting 2. In general, all five respondents grouped the challenges in three to four categories (table 4)

Table 4: Pile sorting to assess the relationship between the identified solutions for the lacunae perceived during regular integrated teaching session.

Respondent number	Pile as formed by Respondent	Reasons for the same
1	Pile 1: 1,11	Interactive sessions
	Pile 2: 2,3,9	Time management
	Pile 3: 4	Assessment at the end
	Pile4: 5,6,7,8,10,11,13	Medical education unit guidance
2	Pile1: 1	Students' interaction
	Pile2: 2,3,9	Time management
	Pile3:4	Assessment
	Pile4: 5,7,10,12,13	Faculty planning
	Pile5:6,8,11	Teaching learning methods
3	Pile1:1,2,3,5,7,8,9,10,12,13	Faculty planning
	Pile2:4	Assessment
	Pile3:6,11	Teaching learning methods
4	Pile1:2,3,4,9	Time management
	Pile2:1,5,6,7,8,10,11,12,13	Faculty planning
5	Pile1:1,4,9,11	Teaching learning method
	Pile2: 2,3,5,6	Time management
	Pile3:7,8,10,12,`13	Prior Planning

Once again, these observations were subjected to pile sorting through the software, and a cognitive map was drawn (figure 2).

Fig 2:Solutions to overcome the lacunae related to IT Sessions

Topic selection (jaundice) for SCIT was done by discussing with the H.O.Ds & co faculty of all three departments (Anatomy, Physiology and Biochemistry) in one small group discussion session. Preparing the specific learning objectives (SLOs) for two Horizontal Integrated teaching session was done by two small group discussion sessions for half an hour each session. Suggestions from co faculty were incorporated. Whole 100 students were divided in to 10 groups, each having 10 students. The objectives of the session were divided among the 10 groups one weeks prior to the SCIT session. From each department (Anatomy, Biochemistry and Physiology) two faculty

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were assigned to guide the students. Each group had a leader (person who volunteered), who was instructed to see that the discussion goes smoothly among the team members. Each team had a recorder (student who volunteered), who compiled all the views of the team members. The students of each group with the guidance of the faculty were asked to discuss together (between 4pm – 5 pm daily for a week in the library and the librarian was asked to monitor to avoid any

disturbance to other students in the library) and the content for the presentation was prepared in the form of power points. The content prepared by the students was reviewed by the faculty. The suggestions were incorporated by the students and the respective department HOD's finalized the content. The SCIT session (table 5) was conducted for two days between 2pm -5 pm on Friday and Saturday.

Table 5: Timetable of Student centric integrated teaching on Jaundice (SCIT)

SI.No	Topic	Time	Presenter
1st day (2-4 pm)			
1.	Introduction to importance of integration	10 min	MEU Co Ordinator
2.	Embryology of liver	15 mins	(Group 1 leader)
3.	Anatomy of liver	20 mins	(group 2and group 3 leader).
Break (Tea was served) 15 mins			
4.	Clinical significance	20 mins	(Group 4 Leader)
5.	Question answer session	20 mins	(By Anatomy faculty)
6.	Over view session	20 mins	(By Anatomy faculty)

SI.No	Topic	Time	Presenter
2 nd day (2-4 pm)			
1.	Functions of liver	10 mins	(Group 5 leader)
2.	Metabolism of Bilirubin	15 mins	(Group 6 and group 7 leader)
3.	Types of jaundice and aetiology	10 mins	(Group 8 leader)
4.	Various investigations for diagnosis	10 mins	(Group 9 leader)
Break – 10 mins (tea was served)			
5.	Liver function tests	20 mins	(Group 10 leader)
6.	Question answer session	10 mins	(By Physiology and Biochemistry faculty)
7.	Over view session	20 mins	(By Physiology and Biochemistry faculty)
Post-test – 15 mins			
8.	Feedback	10 mins	By students and faculty

For every 45 mins there was 15 mins break. Leaders from first five groups presented their topics on the stage. The students from the first five groups were seated in the front rows and they answered to the questions from the faculty. After the presentation from the five students, the faculty from each department gave an overview of the topics presented and covered the points that were missed during the student's presentation. The SCIT session was continued in the same way on second day and the remaining five leaders from the last five groups presented their topics and was followed by the discussion and over view of the topics by the faculty.

All the students & the faculty were subjected to a previously validated feedback questionnaire to assess the perceptions regarding the newer teaching –learning method (Student centric integrated teaching method -SCIT) A post test was conducted to all the students and their scores were analysed. These scores were compared with the scores of their senior batch students who were exposed to current Integrated teaching method (table 5).

Statistical Analysis

Mixed method approach

Need analysis was done by qualitative analysis (free listing and pile sorting). To analyse post test scores independent t-test is used for statistical analysis, and the statistical software SPSS version 23 is used for statistical data analysis, the test of significance tested at 5% level of significance. Feedback from students and faculty was analysed and expressed in percentages.

Results

The cognitive map (figure 1) revealed the distribution of the lacunae in the existing integrated teaching method (Session planning related and Student's interaction related). The cognitive map (figure 2) depicted the solutions to fulfil the lacunae / expectations from the teaching learning methods (Division of session time, Assessment at end of session and Interactive sessions).Table 6, depicted the post test scores between the two groups SCIT and IT Mean $\pm$SD 11.03 $\pm$ 2.5 & 8.51 $\pm$ 2.14 respectively.

Table -6: Post test scores between SCIT group and IT group

Parameter (N=100)	Mean ±SD	t-test	p-value
Post test SCIT Scores	11.03 ± 2.5	7.55	*0.00001
Post test IT Scores	8.51 ± 2.14		

The p-value is < 0.00001. The result is significant at *p <0.05

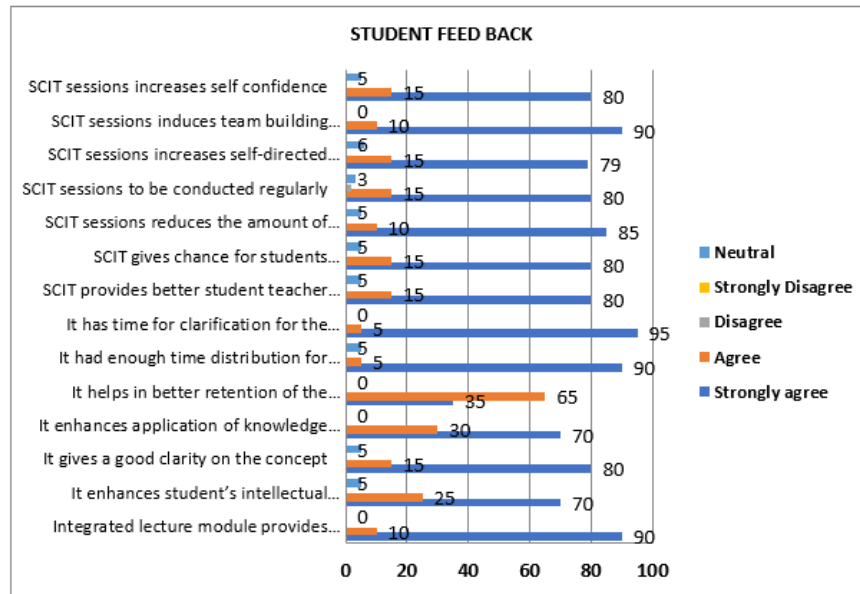Figure 3 depicts the student's perception (as percentages) in the form of bar diagram.

Fig 3:Student's perception(as percentages) in the form of bar diagram

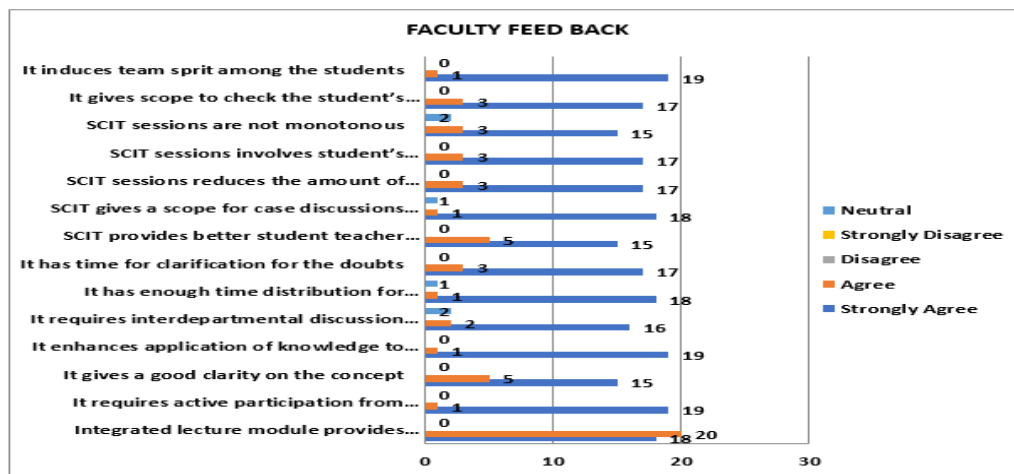Figure 4 depicts the faculty perceptions (as percentages) in the form of bar diagram.

Fig 3:Faculty perception(as percentages) in the form of bar diagram

Discussion

Present study was conducted to explore the lacunae faced by students and the strategies to overcome them, during the regular integrated teaching session using free listing and pile sorting as a tool. The free listing and pile sorting methods have been adopted in different settings in the field of medicine [7-9]. In short, these qualitative methods have been adopted to explore the cultural or the cognitive domains about any issue. In the current study, respondents gave due emphasis to the lacunae in the integrated teaching methods in the student's perspective that makes it unique. A modified methods SCIT has been developed which is students centric and this method has addressed majority of the issues of the students towards integrated teaching. Post test scores revealed that students exposed to SCIT had better performance than those who were exposed to regular integrated teaching session. Students and faculty were satisfied with the new method SCIT. This was evident from the feedback forms. On application of Kirkpatrick's Teaching effectiveness evaluation model, level 1 and level 2 were achieved.

Level 1: reaction–satisfaction and utility (responses on a 5-point Likert scale) 90% of students strongly agreed and 10% of students agreed that the understanding of the basic concepts improved after discussions; 70% students strongly agreed and 25% of students agreed that these interactive sessions evoked interest and curiosity in the topic; 78% strongly agreed and 15% agreed that they had spent more time for preparation of SDL sessions.90% strongly agreed and 10 % agreed that this SCIT session was useful to inculcate team building nature.90% of the students opined that SCIT provides better understanding of subject and learning skills.95% of the students opined that SCIT provides better student teacher interaction when compared to regular IT sessions.95% agreed that SCIT gives a chance for student's participation.

Level 2: Knowledge–improvement (Academic performance) Post test scores of the group SCIT was more than that of IT group (Mean ±SD 11.03 ± 2.5 & 8.51 ± 2.14 respectively)

Level 2: Learning skills-changes in learning strategy Self-directed learning (SDL) is an appropriate and preferred learning process to prepare students for lifelong learning in their professions and make

them stay up-to-date. To help learners persistently improve SDL skills, implementation of appropriate teaching strategies and activities has paramount importance [10]. Several studies have indicated different teaching strategies and activities that motivate students toward self-directed learning[11,12]. It was evident from feedback from students and faculty in our study that SCIT sessions increases self-directed learning.

Academic research has highlighted the role of GW in supporting the learning process since the early 20th century (Lou et al., 1996; Gillies and Boyle, 2011). It provenly has been amongst the best of active learning practices (Burke, 2011). The method holds significant benefits, both at the educational and at the future career level. As part of the education process, researchers and educators believe that group work promotes cooperation, which translates to group members sharing their knowledge, opinions, and ideas, to promote mutual learning. It fosters critical thinking skills, encourages individual accountability, and improves problem- 2 solving strategies (Daba et al., 2017). Further, it enhances debating skills, mutual understanding, and engagement (Johnson and Johnson, 1986; Gibbs, 2009; Henderson et al., 2017).

As regards students' f Academic research has highlighted the role of GW in supporting the learning process since the early 20th century (Lou et al., 1996; Gillies and Boyle, 2011). It provenly has been amongst the best of active learning practices (Burke, 2011). The method holds significant benefits, both at the educational and at the future career level. As part of the education process, researchers and educators believe that group work promotes cooperation, which translates to group members sharing their knowledge, opinions, and ideas, to promote mutual learning. It fosters critical thinking skills, encourages individual accountability, and improves problem-2 solving strategies (Daba et al., 2017). Further, it enhances debating skills, mutual understanding, and engagement (Johnson and Johnson, 1986; Gibbs, 2009; Henderson et al., 2017).

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Conclusion

This study showed that it was possible to adopt students centric integrated teaching under a conventional curriculum. Thus, we can emphasize that considering the volume load which the students are subjected to, SCIT can definitely save their time and energy, and give them better insight into the subject. Our collective experience convinced us that designing an SCIT session was well worth the considerable efforts which were involved and that it would support the integration of the content into the minds of the learners. Implementing a well student centric integrated curriculum requires strong leadership and overcoming departmental barriers. Our experiences showed that it was difficult to formulate modules for

integrated teaching and that the process required a thorough planning by faculty who were committed, who were genuinely interested in conducting these sessions. The faculty should be successful in creating sufficient interest among the students, so as to ensure maximum student participation. We suggest a further longitudinal study at a larger scale, to independently verify the actual level and behaviours of medical students

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