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ORIGINAL ARTICLE

A Qualitative Exploratory Study to Elucidate The Impact of Integration on Pre-Clinical Disciplines Compared to Disciplines-Based Curriculum

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ABSTRACT

Introduction: While most of the institution in our country follow the Flexnerian model of medical education, only a handful of medical colleges have embraced the integrated medical curriculum. Literature on impact of integration on the preclinical disciplines is sparse. This study aims to elucidate the impact of integration on the preclinical disciplines, their content, teaching, learning, and assessment.

Methods: This qualitative exploratory study was conducted at the University College of Medicine and Dentistry from July to September 2020. Twenty-one semi-structured interviews were conducted with the faculty members from pre-clinical disciplines (Physiology, Anatomy, Biochemistry, Pharmacology, Pathology, Forensic Medicine & Community Medicine). The data was recorded, transcribed, coded and thematic analysis was done by using Atlas Ti version 7.

Results: The thematic analysis of the transcripts resulted in twenty subthemes, from which five themes emerged. The study revealed that the faculty of preclinical disciplines perceived that departmental identity has been compromised since the switch to integrated medical curriculum. But, the relationships, both intradepartmental and interdepartmental of preclinical disciplines have improved significantly. Moreover, the number and depth of topics has also been affected. But the students learning approach was of major concern for the respondents. The student's performance in the assessments was affected due to their learning approaches. Even though the number of assessments were deemed adequate, the depth of assessments had been negatively affected as a result of integrated assessments.

Conclusion: Integrated curriculum has profound impact on pre-clinical disciplines. Any institution that wishes to introduce a modular integrated curriculum should take into account the findings reported in this study.

Keywords: preclinical disciplines, organ system-based curriculum, impact of integration, faculty perspective, exploratory study

INTRODUCTION

Since the Flexner report was published more than a century ago, traditional system of education, which is discipline based, has dominated the undergraduate medical education.(Finnerty et al., 2010; Sethi & Khan, 2020)

In this basic sciences are separated from the clinical sciences disciplines.(Brauer & Ferguson, 2015)

The students gain the basic sciences knowledge in the first two to three years followed by the clinical training in the subsequent years. The critics of the system pointed out that most students have forgotten the fundamental basic sciences concepts by the time the students reached the clinical years and thus they faced difficulty in grasping the full understanding of the diseases and the underlying processes.(Custers, 2010; Malau-Aduli et al., 2013)

Integrated medical curriculum was first proposed by Harden et al in 1984.(Harden, Sowden, & Dunn, 1984)Medical students would be more interested in a topic of basic health sciences if they see its application in their professional life, thus leading to better retention and conceptual knowledge.(Finnerty et al., 2010; Kaufman & Mann, 2014; Wong & Nguyen, 2019)

In our country, majority of the medical colleges are following discipline based educational system,(Sethi & Khan, 2020) as many senior professors and heads of the institutions are reluctant to accept the change.(Khan, Asher, Ahmad, Iqbal, & Khan, 2016; Lane, 2007; Luqman, 2013; Steele, Steyer, & Nowalk, 2001)Departmental boundaries diminish as the level of integration progresses.(Harden, 2000) This has led to apprehension that departments may lose their autonomy, authority and identity as compared to the traditional system.(Fatima & Evans, 2015; Jafrey, 2001; Khan et al., 2016)It is generally believed that the teaching of pre-clinical disciplines is sacrificed to provide an early clinical exposure to the students and that the departmental identity is lost in the process of integration. (Steele et al., 2001)

Medical education regulatory bodies all over the world, including PM&DC have put forth recommendations for the integrated curriculum.(Boatright et al., 2018; Campbell, Rollin, & Smith, 2013; Halbach & Sullivan, 2005) Integrated curriculum has been gaining traction not only internationally but also nationally.(Brauer & Ferguson, 2015)

In Pakistan, only a handful of medical institutions have embraced the integrated medical curriculum while many are weighing their options.

What would greatly help this transition is the knowledge of what to expect from such a change and what is the actual experience of faculty that has already witnessed such a change.

As one of the biggest private institution in Pakistan, University of Lahore shifted its undergraduate medical curriculum from traditional discipline based integrated modular curriculum in 2015.A large number of faculty members who had previously taught in traditional curriculum are working here and their experience can help shed light on the impact the change had on the disciplines.

The barriers and challenges faced in implementation of the integrated curriculum were highlighted by multiple authors.(S. K. Ali & Baig, 2012; Asad & Khaliq, 2020; Kayani, Gilani, & Mahboob, 2018; Khan et al., 2016; Waqar & Khaliq, 2019; Zhao et al., 2020) The successful implementation of an integrated curriculum the faculty has to be trained,(Asad & Khaliq, 2020) and it require adequate recourses.(Kayani et al., 2018; Zhao et al., 2020). A large number of previous researches focused on the educational environment at institutions with integrated curriculum.(Gustin, Abbiati, Bonvin, Gerbase, & Baroffio, 2018; Sarfraz, Kiran, Mansoor, Yasmin, & Zulfiqar, 2019; Shehnaz, Sreedharan, & Gomathi, 2014; Vashe et al., 2019; Yasmeen & Anwar, 2013) Students perception of integrated curriculum has also been looked into by several researchers.(Gustin et al., 2018; Kolhe, Kadam, Narkhede, & Kulkarni, 2018; Moles & Coelho, 2015; Qurban, Saleem, & Muntaha, 2017; Saga, 2017; Sherer et al., 2014; Vashe et al., 2019).

Hopkins et al suggested that perspectives of basic scientists regarding the integrated curriculum and its impact, should be researched to better understand this phenomenon.(Hopkins, Pratt, Bowen, & Regehr, 2015) The purpose of this study is to explore the impact of integration on pre-clinical disciplines, with respect to its content, teaching, learning and assessment compared to disciplines-based curriculum.

MATERIALS AND METHODS

The study was conducted in University College of Medicine and Dentistry (UCMD), The University of Lahore (UOL). As the intention with this study was to explore the impact of integration that was felt by the faculty members in the pre-clinical disciplines, thus an exploratory qualitative study design was chosen. A purposive, non-probability sample of key informants was selected for this study. All study participants belonged to the professorial staff and had experience of working in both the traditional discipline based and modular integrated curriculum at UCMD. A total of 23 faculty members fulfilled the inclusion criteria and were contacted through email and were requested to participate in the study. Initially it was decided that at least three faculty members from each of the seven pre-clinical disciplines (Physiology, Anatomy, Biochemistry, Pharmacology, Pathology, Community Medicine and Forensic Medicine) of UCMD, would be included in the study as the sample would then have a sufficient information power.(Malterud, Siersma, & Guassora, 2016) The understanding of the researchers was that the data collection would be continued beyond this number till thorough saturation of properties of categories and of associations among them is attained.(Malterud et al., 2016)

The interview protocol along with the informed consent form were attached with the email and 21 out of 23 faculty members provided informed consent for participation in the research project. The remaining two faculty members excused themselves from the research, one was due to personal commitments during the period of data collection and other due to COVID-19 infection in the family.

Fifteen open ended questions were generated after literature review. The interview protocol was validated by five well known and renowned medical educationists of Pakistan.

Online semi-structured interviews were conducted by the principal investigator, through Zoom application. The interviews were recorded and saved locally on the computer hard drive under thumb print and password protected to maintain the confidentiality of the research participants. Notes were taken during the interview so that those could help during the coding and analysis of the interview transcripts. Each of the recorded interviews were transcribed verbatim and transcripts were emailed to each individual participant for verification and once verified the transcript was used for data analysis. Six-step framework delineated by Braun and Clarke was followed for data analysis.(Braun & Clarke, 2006) After achieving familiarization, open codes were made on Atlas.ti version. COREQ guidelines were followed for reporting this study.(Tong, Sainsbury, & Craig, 2007)

RESULTS

Table 1 Participants characteristics in my study

Characteristics	Frequency
Male	8
Female	13
Professors	8
Associate Professors	4
Assistant Professors	9

406 codes were generated by the end of first cycle of open coding. In the second round the redundant codes were discarded, and closely related codes were merged. A total of 44 codes were left which were attached to 578 participant quotes and mapped to the 20 subthemes. These 20 subthemes led to the 5 themes which highlight the impact of integration on the pre-clinical disciplines, its content, teaching, learning and assessment.

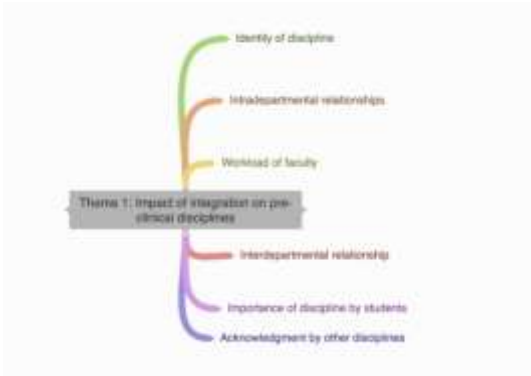

Figure 1: Generation of theme 1 from subthemes

Theme 1: Impact of integration on pre-clinical disciplines
Identity of discipline: Interviewee 2: "Which is another limitation in this, which I feel like, is another limitation on the department part that (I am) not being allowed to follow what I've been following in traditional. Because I was the boss. So, this is another limitation. Now we need to follow what we've been told that this how you need to deliver the information. So, we are bound and there are limitations on this".
Workload of faculty: Interviewee 21: "Apart from that, now it is become more erratic as well. Initially the workload was systematic. I mean the workload was evenly distributed. There was a timetable set in place, there was a set pattern and a set workload which kept going. Now, the workload has become erratic in that sense. In some module, there's a lot of workload, in another there's little workload, or there's no content at all in some. So, it's in spells now. There can be a spell of a very heavy workload, sometimes there's a spell of being free where the workload subsides to a great extent. So, it's like an erratic spread now".
Intradepartmental relationships: Interviewee 16: "Relationship within our department. And we are more interactive with each other now. All the time we are interacting…Within our department...Previously in traditional curriculum there was less interaction as everyone was pretty much doing his/her own work".
Interdepartmental relationships: Interviewee 19: "Yeah. The interaction has been increased obviously. For each class, for every module, the whole committee sits down and then obviously in this way we come to know everyone in the different departments. We interact with other departments. Our circle has increased in the integrated system. In the traditional system, we did not even know the names of some of our colleagues. That is so clear in the integrated system, that our relationships with other departments have developed".
Importance of disciplines by studentsL: Interviewee 5: "See, the importance has lessened if you look at it in the context of marks and weightage… Importance, in the aspect of content, weightage, marks, and evaluation, has lessened. That is how we feel".
Acknowledgement by other disciplines: Interviewee 19: "Yeah, yeah. Whenever the committee sits, everybody listens to each other's points that we mail before the committee begins its concerns. Everything is properly planned, there is a person of medical education as well. So, everything is well planned. Everybody listens to each other and each other's content that needs to be added".

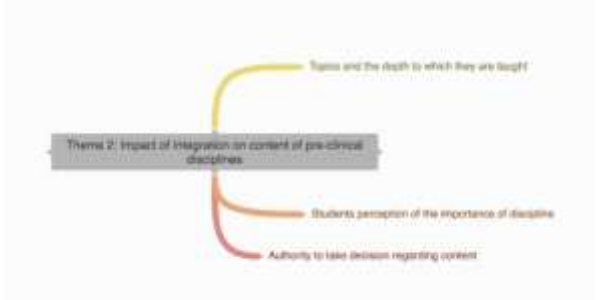

Figure 2: Generation of theme 2 from subthemes

Theme 2: Impact of integration on content of pre-clinical disciplines
Topics and the depth to which they are taught: Interviewee 2: "Yes, yes, the number of topics has changed. But I think this change is for good. Because, this is my personal opinion, we have been teaching the students almost everything, and we wanted the students to memorize the whole book, which is not humanly possible. Unfortunately, this is not the feeling of many of the teachers. So, I think, we need to teach the students what is most important".
Interviewee 2: "But definitely the depth of the knowledge is compromised in this. A little bit compromised we can say. Now, even what I have come to know and what I understood. And even the students are not able to get that knowledge in depth because of the constraint of time. Now the content is much, and the time is less. So, this is one of the issues I identified personally. Students, when I ask them why you didn't study from this book, they say that they don't have time. We have to have 8 or 10 subjects we have to cover in 4 weeks or 5 weeks' time. And so, this is not only your subject".
Students perception of the importance of the discipline: Interviewee 14: "If the content has been reduced, the mark weightage will be reduced, and naturally the students pay less attention to them. Student will pay more attention to the topics that have more weightage in the exams".
Authority to take decisions regarding content: Interviewee 1: "Now in the committee, all departments which are involved in the module committee they decide, they finalize there. What they want to keep and what they don't want to keep. By looking at the relevance of the topic,
Sequencing of the topic, importance of the topic according to the system or the module".

Figure 3: Generation of theme 3 from subthemes

Theme 3: Impact of integration on teaching of pre-clinical disciplines
Teaching style: Interviewee 2: "The lectures which are made in traditional teaching, I need to modify them. Because I cannot teach everything. The learning objectives are already been defined and this is good in some way. Because the students also know that this is what I have

been, or we have been expected to memorize or learn. And teacher also know that this is what I expect from my students".

New teaching strategies: Interviewee 7: "Well, we have a number of small group discussions. We have the CBLs on different topics. And then what we have started doing in Anatomy is that we have started preparing worksheets for the students where different kinds of gamifications you can say. There are crossword puzzles, there are labelling of the diagrams, there are marathons which we make the students go through. So, we use different strategies, but that is used mostly in small group discussions. We use TBLs, and MCQs, whatever we can".

Effect of courses and workshops: Interviewee 18: "We've had workshops in the university. The university has facilitated us a lot if we needed to be aware of in terms of teaching methodologies. We have workshops of every kind, such as Mentoring. So, we haven't had much difficulty with this. So, this is something we haven't had difficulty with. These FDP workshops, they're great".

Interviewee 10: "So, the thing is that, almost half of us or most of us have (been affiliated with) CHPE and MME since we have worked with that, so that has changed the way we perceive the medical education".

Students response to teaching: Interviewee 3: "Now students are more interactive and responsive. Through different strategies, student interest has increased".

Students engagement with discipline: Interviewee 16: "Student engagement is more in integrated curriculum. That's because the lecture is interactive. It's not a didactic lecture as use to happen in traditional curriculum. And the strategies also keep on changing. I make it more interesting. I forgot to mention role modelling, we are also doing that. Especially, in transport mechanisms. We make sodium potassium pump gates and all that".

Students interest in discipline: Interviewee 21: "Um, I think that the interest is developed more in this system. Because they're studying the same thing more or less from other subjects as well. So, they study the same thing over and over by different disciplines and they try to relate it. So, in this way since the same kind of knowledge is coming in from everywhere, the students relate it and develop more interest".

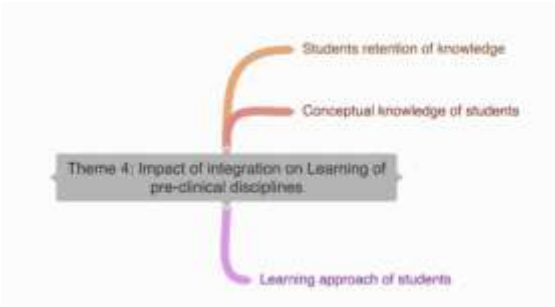

Figure 4: Generation of theme 4 from subthemes.

Theme 4: Impact of integration on learning of pre-clinical disciplines

Students retention of knowledge: Interviewee 6: "Students now retain more because of the integration process; their mind has the concept".

Conceptual knowledge of students: Interviewee 3: "The students with integrated curriculum have clearer concepts, because of PBLs, they can get a holistic view now".

Learning approach of students: Interviewee 18: "Superficial learners. The reasons are Limited LOs, limited content, less number of assessments and we don't scare students enough".

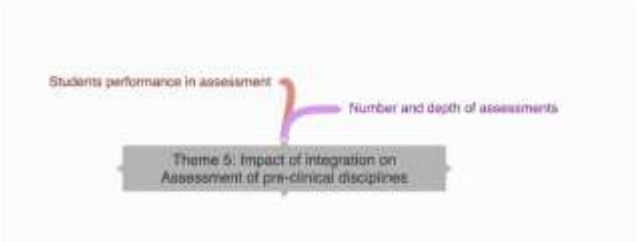

Figure 5: Generation of theme 5 from subthemes.

Theme 5: Impact of integration on assessment of pre-clinical disciplines

Students performance in assessment: Interviewee 9: "yes, yes, yes, it is quite, quite, quite, you can say, that it is decreased, the reason is same, as I have stated before, I gave you the reasons before that they have become superficial learners and the biggest thing is that in your integrated system, you cannot go outside of the LOs, you have taught the students this, that beyond the LOs there is nothing so the students don't go into the depth of any topic, yes this is a tragedy".

Number and depth of assessments: Interviewee 17: "The assessment is better in the integrated system as the assessments are planned after a small chuck of subject is covered, this reduces the load on the student. For example, in the CVS-2 module we had four SGDs and two lectures, so when we conduct the assessment at the end of the module and students only have to focus on the content taught during these sessions, then it would definitely make the load manageable. In the integrated system, since we have multiple assessments, spaced throughout the year, namely, formatives, LSA, CBA, Prof, so all the content gets assessed quite thoroughly, everything gets covered".

Interviewee 21: "Because these are combined assessments. We get a specific portion with specific amount of questions. So, whatever depth can be assessed in those questions, we try to do that. Previously, the entire exam was made on the basis of our own discipline, so it was up to us how we assessed the depth of each topic [pauses]".

DISCUSSION

Theme 1: Impact of integration on pre-clinical disciplines Identity of discipline: As pointed out by Janet Grant in the seminal book Understanding Medical Education that an integrated curriculum can make some of the pre-clinical disciplines feel that they are losing their identity.(Swanwick, 2013)Similar was the finding of this research, that many of the pre-clinical disciplines felt that their identity was being compromised. The reasons given for having these feelings were the fragmentation of the discipline, as the content was divided up into organ system-based modules and spread across the four years, in addition to this the reduction in the

content and restriction on the depth of the topic by the pre-defined learning objectives and time constraints because of multiple subjects sharing the same academic module. The feelings of loss of authority and autonomy to take decisions regarding the content of the discipline were also brought up in relation to this. Cooles et al reported loss of academic control in an integrated curriculum.(Cooles, Harrigan-Vital, & Laville, 2014)Munazza Asad also mentioned in her work that the senior faculty felt that the departmental domains were being threatened by integration, this assertion corresponds to the findings of our research.(Asad & Khaliq, 2020)

Workload of faculty: Our study participants had reported that the workload had increased massively since the introduction of integrated curriculum, related to the multiple roles that the faculty members were expected to perform, including mentoring, PBL and small group facilitation, attending module related meetings and managing the paperwork related to the modules. By far the most increase in workload had been attributed to the creation of MCQs for the multiple assessments that were spread throughout the year. These findings do correlate with the perceptions of the faculty reported by Tahira Waqar in her article where the responded said that the integrated system is difficult for the faculty as they do have to work hard and step out of their comfort zone.(Waqar & Khaliq, 2019)Shilpa Khullar in her review article also mentioned increased faculty workload as a disadvantage of the integrated curriculum. (Khullar, 2016)Cecilia Chan & Lillian Luk in their study reported that the teachers in Hong Kong felt that the new university curriculum had increased their workload, which mirrors our findings that the switch from traditional curriculum to the integrated curriculum had increased the workload of our faculty.(Chan & Luk, 2013)

Intradepartmental relationship: As reported by the study participants the intradepartmental relationships had dramatically improved due to improved interaction and coordination that are required in an integrated curriculum. Anna Jansson and Karolina Parding stated that organizational changes lead to changed, and in some ways challenged conditions for intra-professional relations, which does not agree with the findings of our research.(Jansson & Parding, 2011)

Interdepartmental relationship: Interdepartmental relationships have also been positively affected by the modular integrated system, due to frequent meetings between various departments to work on the modular curriculum, this increased interaction and collaboration has brought the departments closer and has lessened the departmental boundaries. These findings are corroborated by the article by Tahira Waqar et al. that reported that a friendly collaborative environment is necessary for the successful implantation of the integrated curriculum.(Waqar & Khaliq, 2019)Rehma Sarfraz in her study mentioned that working in an integrated curriculum provides opportunities to the faculty members to form close bonding with faculty from other departments.(Sarfraz et al., 2019)

Importance of discipline by students: As the faculty members in our research reported that the importance of the discipline in the eyes of the students, has decreased and varies from module to module depending upon the weightage of the discipline. Eugene Custers & Olle Ten Cate also reported that the students from an innovative curriculum considered basic sciences teaching to be less important for clinical practice as compared to the students from the conventional curriculum.(Custers & Cate, 2002) These findings support our findings of a reduction in the perceived importance of pre-clinical disciplines as compared to the perceived importance during the traditional discipline-based curriculum.

Acknowledgment by other disciplines: One of the findings of our study was that the disciplines are acknowledged by other disciplines in the integrated curriculum. The power to take curriculum related decisions has shifted from the head of the departments and has moved to the module team and curriculum committee. These committees have adequate representation of all disciplines involved in undergraduate medical curriculum and according to our study participants their opinions and suggestions are heard, and they receive appropriate acknowledgement by other disciplines involved in the module. Here the medical school policies mirror the guidelines set forth by Prof. Alam Sher Mailk in his article titled twelve tips for developing an integrated curriculum where the tip # 5 through tip # 9 detail the cooperation and teamwork required in developing an integrated curriculum.(Malik & Mailk, 2002)

Theme 2: Impact of integration on content of pre-clinical disciplines: Topics and depth to which they were taught

The finding from our research project was that the number of topics of the pre-clinical disciplines reduced as a result of integration were not significant, the content removed generally relates to the basic sciences practicals that had little or no clinical relevance, but what was more significant was the effect on the depth to which the topics were taught. The study found that the time constraints and the pre-defined learning objectives were felt as being responsible for this. The reduction in content of pre-clinical disciplines as a consequence integrated curriculum has been documented in a study by Xian Zhao et al. (Zhao et al., 2020)

Our findings are supported by the assertions made by researchers in another study where they stated that since the integrated curriculum focuses on the breadth of knowledge, in the process the depth of knowledge may be compromised.(Ramachandra & Muttalib, 2020) According to Edward Finnerty over the last two decades a complete elimination of the laboratory exercise in basic sciences disciplines being taught in medical colleges has taken place.(Finnerty et al., 2010)These assertions support the findings of our research.

Students perception of the importance of discipline: The study participants reported that student's perception of the importance of the discipline has been reduced and was directly related to the weightage of the discipline in the module and consequently in the assessments. Eugene Custers & Olle Ten Cate also reported that the students from an innovative curriculum considered basic sciences teaching to be less important for clinical practice as compared to the importance perceived by the students from the conventional curriculum.(Custers & Cate, 2002) Zaima Ali et al. reported that 78 % of the students, in a traditional curriculum, in their study agreed that physiology should be integrated with clinical subjects, and the

importance of the subject was more reported by the students in clinical years, where they could realize its need for building of the clinical concepts.(Z. Ali et al., 2016) These findings support our assertions that students in an integrated curriculum do realize the importance of preclinical disciplines when they are taught with clinical relevance.

Authority to take decision regarding content: As the participants of our study reported that the authority to take decisions regarding the content has shifted from the departmental heads to the modular team and curriculum committee as a result of integration. The content is decided according to the clinical relevance of the topic and its importance in the building of concepts. The old adage of teaching from cover to cover in no longer followed. This is also in line with the views expressed by the respondents in the study by Edward Finnerty, where they surmised that the decisions about the breadth, depth and detail of the content should be taken based on the requirements for the medical degree, its clinical relevance and application in the later practice and residency trainings.(Finnerty et al., 2010) Thereby shifting the focus from the discipline of knowledge to the ultimate application of that knowledge, as happens in the integrated curriculum according to the respondents of our study.

Theme 3: Impact of integration on teaching of pre-clinical disciplines Teaching style: The teaching style and the teaching of a typical topic of the discipline both had changed as a result of frequent faculty development workshops to introduce the new teaching strategies, and due to reduction and redistribution of content. A similarly positive impact of faculty development workshops to transform the teacher centered to student-centered teaching strategies and its positive impact on student learning was reported in a 2018 study conducted in a nursing school in Sierra Leone.(Noonan et al., 2018) The positive impact of faculty development workshops in changing the teaching strategies and its positive impact on teaching and learning compares with the findings of our study.

New teaching strategies: Our study participants reported that new teaching strategies were increasingly being employed ever since the introduction of the integrated curriculum, the study participants reported increased student engagement and improvement in student skills as a result of the new teaching strategies employed by the faculty members. Munazza Asad reported that the use of active learning strategies helps in the development of cognitive and non-cognitive skills in students, which corroborates the finding of this research project.(Asad & Khaliq, 2020)

Effect of courses & workshops: Our study participants felt that the training workshops and courses (certificate & masters) in medical education had facilitated the adoption of the new teaching strategies. This finding confirms the perceptions reported in a study by Ziyad Afzal Kayani et al. that trainings and workshops were essential for faculty members in an integrated medical curriculum.(Kayani et al., 2018) The positive impact of receiving trainings and attending workshops on knowledge and skills has also been reported by Justine Nasr et al.(Nasr, Falatko, & Halalau, 2018)

Student response to teaching: As reported by the participants in our study the student's response to the teaching of the discipline has improved as a consequence of integration and the newer teaching strategies which are more student centered. These findings are supported by the findings reported by Eugene Custers & Olle Ten Cate in their research where they reported that the students taught by an innovative curriculum find basic sciences teaching to be more exciting.(Custers & Cate, 2002)

Student engagement with discipline: Our study participants have reported that the student's engagement with the discipline has also improved as a result of integration. This study is supported by the evidence established in another study where they documented that the reformed curriculum resulted in improved student engagement.(Hopper & Brake, 2018)

Students interest in discipline: The study participants reported that students' interest in the discipline has improved as a result of integration. Khalid Javed et al. reported that most of the participants in their study who were medical students in traditional curriculum had reported no interest in basic sciences.(Javed, Anwar, & Aamir, 2016) Our findings show a positive impact of integrated curriculum on the students as their interest in the basic sciences has increased. Sana Qurban et al. reported that out of 150 students 17.9% strongly agreed and 25.8% agreed with the statement that modular integrated system increased interest in the studies. (Qurban et al., 2017) Similar assertions were made by Nazish Rafique in her article, where second year students at University of Dammam were exposed to a vertically integrated respiratory module, reported that integrated teaching increased students' interest and facilitated meaningful and deep learning of the physiological concepts.(Rafique, 2014) The findings of these two studies give credence to the statements of the faculty in our study that the students interest has increases as a result of integrated curriculum.

Theme 4: Impact of integration on learning of pre-clinical disciplines Students retention of knowledge: Our study participants reported that student's retention of knowledge has been improved as a result of integrated teaching with clinical relevance by various disciplines. The participants reported that the retention of knowledge is enhanced as the students relate their knowledge of pre-clinical disciplines with the clinical picture that they see as part of their early clinical exposure. This finding correlates with the findings reported in the study by Tahira Waqar and Tanveer Khaliq where they reported a similar perception by the faculty in an integrated curriculum.(Waqar & Khaliq, 2019) The findings of this research project are in congruence with the assertions made in another study.(Azzalis et al., 2012) A study conducted to test the retention of anatomy content taught through integrated approach also reported an improvement in retention for the content taught through the integrated curriculum.(Zhao et al., 2020) The integrated curriculum promotes a strong understanding and retention of knowledge as reported by Sarah Fraser et al. and this is in agreement with the findings of our study.(Fraser, Wright, van Donkelaar, & Smirl, 2019) The study finding also parallels the assertions made that breaking down the boundaries between basic and clinical sciences would improve retentions.(Brauer & Ferguson, 2015)

Conceptual knowledge of students: Our study found that conceptual knowledge of the students has improved since the introduction of integration. This is in contrast to the findings reported by McKeown et al. who reported that the knowledge of surface anatomy was lower in the students taught by system-based curricula as compared to the students taught by traditional curricula, the reduction in teaching time was reported as the reason for this reduction in knowledge.(Arantes, Andrade, Barbosa, & Ferreira, 2020) The findings of our study are also supported by the work of Sarah Fraser et al. who reported a strong understanding of knowledge resulting from the integrated teaching.(Fraser et al., 2019)Munazza Asad reported that multiple strategies employed in an integrated curriculum help enhance concept making in the students which supports the findings of this research.(Asad & Khaliq, 2020) As Ambreen Gul et al. reported in their article that innovative teaching strategies like CBL, are an effective means to learn and consolidate concepts for students in the pre-clinical years and these findings support the assertions made in our study.(Gul, Khan, Yasmeen, & Ahsan, 2020)

Learning approach of students: Our study participants reported that introduction of integration has made the students surface and strategic learners. The concept of deep and surface learning approach was given by Morton and Saljo(Cohen, Manion, & Morrison, 2004) and further developed by Entwistle and Ramsden. When a student, who is internally motivated to carefully and critically assess an argument and demonstrates an active interest to learn more about it, the approach is labeled as a deep learning approach.(May, Chung, Elliott, & Fisher, 2012) Strategic approach to learning is labeled where the student is driven by a desire for high achievement and emphasizes on good time management and organized study to achieve his goal.(May et al., 2012) Whereas, if a student, motivated only by fear of failure, learn something, without ever reflecting on it, i.e., memorizes without understanding, with the sole purpose of reproducing that material during an assessment, the approach is termed as a surface approach to learning .(Malik & Mailk, 2002; May et al., 2012) 2012). The study by Ziyad Afzal Kayani et al. corroborated the findings of our research, where the faculty perceived that the students understanding and approach towards the topic is very superficial.(Kayani et al., 2018)

This finding is in contrast to the perception of the faculty as reported by TahiraWaqar and TanveerKhaliq where the faculty from an integrated curriculum felt that integration facilitates contextual and applied learning and thus it not only enhances students' levels and depths of knowledge, but also develop learners' critical thinking abilities.(Waqar & Khaliq, 2019) The findings of our research are also contrary to the findings reported in another research which asserted that integrated teaching approach increased deep learning, enhanced SDL readiness and enabled application of the knowledge of basic science in the clinical context).(Vashe et al., 2019) Another study echoed similar sentiments.(Van der Veken, Valcke, De Maeseneer, & Derese, 2009) Ambreen Gul et al. in their article reported that innovative teaching strategies like CBL inculcate deep learning approaches in the students, this finding is not congruent with the findings of our study, but the assertion made by Ambreen Gul et al. that high workload compels students to employ surface learning approaches might explain the findings of our research.(Gul et al., 2020) Students being taught in traditional curriculum were reported to be more likely to adopt surface learning approach as compared to the students in integrated curricula.(Feeley & Biggerstaff, 2015; Ullah, Richardson, Malik, & Farooq, 2016)

Theme 5: Impact of integration on assessment of pre-clinical disciplines Students performance in assessment: Participants of our study reported that student's performance in the assessments has deteriorated and is related to the weightage of the discipline in the integrated assessment, the disciplines with less weightage would be skipped by the students. This is in contrast to the findings reported by Klement et al. who reported higher or equivalent subject examination average scores for students in an integrated curriculum.(Arantes et al., 2020)Azzalis et al. reported that the students taught by an integrated curriculum had improvement in the grades which is in contrast to the findings of this research.(Azzalis et al., 2012) Another study supported the claims made in our research that students time in an integrated curriculum is a finite resource and as multiple subjects are vying for the student's attention, integrated assessments inculcate the tendency in the students to favor some disciplines over the others and thus affecting their performance in those disciplines.(Cooles et al., 2014) Sami Hussein in his article reported that integrated curriculum does lead to a deterioration in students' performance as is reported in our research as well.(Hussein, 2017)

Number and depth of assessments: The study participants reported that the number of assessments in an integrated system are adequate, but the depth of the assessments has been compromised since the introduction of integrated exams, as the total number of MCQs in an integrated exam are divided amongst the various disciplines according to the table of specifications which reflects the number of hours taught by each subject.

Muhammad Ijaz Anwar in his research article reported that the faculty at AJK medical college did express their disapproval with the integrated assessments but the author did not elaborate on the reasons behind their feelings and probably the sentiments expressed by faculty members at AJK medical college were due to the impact on the depth of knowledge assessed that this research has uncovered.(ANWAR, KIANI, & NADEEM)

Limitations: One of the limitations of this study was that it was a single center study. Only one medical institution was included, where the switch from traditional discipline based medical curriculum to the spiral integrated modular curriculum had happened. This limits the transferability and generalizability of the findings. Future studies can include other institutions to broaden the transferability and generalizability of their findings.

Since perspectives of only faculty members were recoded. Future studies can get the perspectives from other stakeholders, e.g., administration and students.

CONCLUSION

Integrated curriculum has profound impact on pre-clinical disciplines. Any institution that wishes to introduce a

modular integrated curriculum should take into account the findings reported in this study.

Way Forward: This exploratory study did reveal the impact of integration on student's workload and attitude towards learning in an integrated curriculum, but this was based on the perceptions reported by the faculty members. The author recommends that in a future study perspective of the students should be taken to further elucidate these findings.

Another area of potential research is the change in hierarchy of power as a result of parallel pyramids of power within an institution, as are created with the involvement of faculty from the pre-clinical disciplines in projects that are run by the department of medical education or college administration where the faculty is not directly answerable to the HoD, as this affects the intradepartmental relationships and can potentially affect the daily working of the department.

As the study highlighted that the faculty perceived the students to be mostly surface learners, this finding should be investigated further with appropriate instruments to document the students learning approach.

Recommendations: Recommendation based on suggestions made by the study respondents for the institution where study was carried are given below.

The institution should revise the learning objectives as making the learning objectives broad would encourage students to go into the depth of the topic. Since students tend to skip the disciplines with less weightage in an integrated exam, instead of integrated assessments, discipline-based assessments should be instituted. Marks for viva stations should be increased as the faculty members felt that this would encourage students to prepare the topics more thoroughly.

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