Perceptions of 1st year MBBS students regarding utilization of e-learning tools for collaborative learning in Anatomy.

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Abstract- E-learning in Anatomy is an improved scalability of educational development in this digital era which breaks down geographical and temporal barriers presenting opportunities for learners through availability of authentic information, subject content, skill development procedures. The present study involved a total of 195 MBBS students of 2014-2015 and 2015 -2016 batches who answered a close and open questionnaire comprising of 12 questions related to utilization of e-learning tools while learning Anatomy in a collaborative manner. Results revealed that 100% 1st year MBBS students were aware of the availability of e-learning Anatomy tools. 89.8% of 2014-2015 and 92.8% students of 2015-2016 batches utilized these learning tools in addition to traditional class room teaching in Anatomy thus adopting a blended approach for effective learning of Anatomy. 75.5% and 70.1% students of the '14-'15 and '15-'16 batches respectively applied group learning strategies and 73.6% and 70.1% students could utilize e-learning of Anatomy in a collaborative manner. E-learning engines utilized by these students were identified and archived establishing Anatomy department's e-learning bank. Thus it has been observed in this study that e-learning in Anatomy allows blended collaborative discovery learning for better alignment of the subject through use of technology, information, communication and networking.

Index Terms- e-learning, Online learning, Internet learning, Digital learning, Collaborative learning.

I. INTRODUCTION

There have been innovations in utilization of learning tools in Anatomy in MBBS program revolutionised in the 21st century in accordance with adult learning principles.[1,13] Part of this Anatomy training revolution has been driven by the effective use of digital technology to deliver, manage, learn instructional topics and perform accordingly.[8,26] Thus e-learning as educational model, has been considered as blended integration of traditional and internet based educational technology to achieve best outcome in student learning process through improved access to training, skill development and attitude building, communication and interaction facilitating adoption of new ways of understanding and comprehension.[5]

The 1st year MBBS students, as consumers, explore newer media and methodology for learning Anatomy. Traditional learning involves activities in classroom environment while on the internet, e-learning tools have been emerging as a worldwide platform designed for learning Anatomy to support individual learning or group collaborative learning thereby meeting the performance goals.[24] With the turn of the century, books have been complemented by the availability of high quality, easy to retrieve online resources referred to as e-learning resources which can be used collaboratively by the students for learning Anatomy and developing learners' related skills in diverse environments under technological, cultural and pragmatic constraints. In this study, it was also observed that besides classroom learning, e-learning technologies and techniques were also adopted by the 1st year MBBS students for learning the subject in a collaborative manner which has been captured as perceptions in the questionnaire of this study.[34,35] Results of this study reveals that digital revolution in information and knowledge age can greatly influence learning of Anatomy thus strengthening traditional class room learning.[32,33]

II. RESEARCH ELABORATIONS

Operational Definition: Since early 2000s, e-learning in education have been widely adopted through web technology as implemented in Anatomy learning.[30]

Aim and Objectives :
1. To evaluate perceptions of 1st year MBBS students towards utilization of e-learning tools in Anatomy.
2. To identify e-learning tools presently available for learning Anatomy for establishing e-learning tool bank/archive in Anatomy.
3. To analyse the utilization of these e- learning tools in providing collaborative Anatomy learning assistance to 1st year MBBS students for better understanding of Anatomy.

Materials and Methods:
This is an Observational Quasi Experimental Educational Research involving convenience sampling which included 195 MBBS students of 1st year in this Institution belonging to 2014-2015 and 2015-2016.

After Institutional Ethics Committee clearance and collection of signatures of participating 1st MBBS students in informed consent forms, the present study was implemented during Anatomy self-study slot so that the study process did not affect students' classes or examination schedule.

Close and Open ended questionnaire comprising of 12 questions assessing the utilization of e-learning tools for collaborative learning in Anatomy was finalized following a pilot study conducted on 25 MBBS students of 1st year studying Anatomy. All participants, encouraged to participate, were instructed to respond to the questionnaire independently without discussing among themselves. A total of 98 students of 2014-2015 and 97 students of 2015-2016 batches participated in the study while 5 students were drop-outs. Applying Grounded Theory and Triangulation Method, narratives for Open ended Questions were categorized and coded in Table 5 as record of e-learning strategies/ tools/ resources and sites as mentioned by the participating students in the questionnaire which helped in establishing the e-learning archive/repository in Anatomy. Graphical representation of result matrices of Quantitative analysis for Close ended Questions depicted in Tables1-4 contribute in evaluating perceptions of 1st year MBBS students towards utilization of Anatomy e-learning tools in a collaborative manner.

III.   RESULTS OR FINDING

98%and 97% of 1st year MBBS students of 2014-2015 and 2015-2016 batches respectively participated voluntarily in the study following sensitizing sessions. 63.3% and 68.04% were male respondents rest being females belonging to 1st and 2nd batches respectively. Among the participants, 72.45% and 71.13% were hostelites while rest were day scholars. (Table 1-Graphs).

A total of 92.8% students have been using smart phones for networking, socializing, learning, while 86.3% students have been using Desktop /Laptop alone, 11.7% using Laptop and Ipad/Note/Tab and 2% Ipad/Note/Tab alone. 78.2% students have been using these electronic devices since 6 months-1 year while rest for >1 year. (Table 2 - Graphs)

100% respondents in both the batches participating in the study were aware of the availability of Anatomy e-learning search engines and tools while 89.8% and 92.8% students utilized and recognized that these tools and resources could provide effective assistance for learning in Anatomy. However, none felt that e-learning tools were not effective at all though only 5.1% and 3.1% students felt that e-learning tools may not be much effective in learning Anatomy. However, One Tailed Hypothesis revealed a t value as 0 with P value as 0.5 result being Not Significant $p<0.05$. While learning Anatomy, 75.5% and 70.1% students utilized e-learning tools in groups (9-15) and (2-10) respectively through face to face and/or networking while rest utilized it for self-learning purpose. However, only 59.4% and 58.6% students applied principles of Group Dynamics effectively by selecting Leader, Facilitator, Moderator, Observer and Scriber. (Table 3 and Graphs).

Students of both the batches selected e-learning tools to be most effective strategies in learning Anatomy. 60.5% students could access various sites through online search engines for learning Theoretical aspect of Anatomy while 68.7% students learnt Practical aspects of Anatomy also. These sites promoted best learning of Histology (54.4%), Neuroanatomy (52.3%), Gross Anatomy (49.2%) and Embryology (32.8%). 1st Year MBBS students could also acquire Psychomotor skills through these sites.(Table4 and Graphs).

100% students participating in the study identified their preferred Anatomy learning applications/strategies on the internet as Wikipedia (12% and 10%), You Tube Dissection Videos like Acland Dissection videos (62.7% and 67.8%), e-books (75.5% and 76.7%), e-dissection atlases (69.2% and 63.3%) , Google 3D images and Animations (92.9% and 88.7%), Online Interactive Forums (75.5% and 70.1%), Facebook (83.5% and 81.1%), What's App (82.4% and 87%), Subway Surfaces (1% each), UC Browser (3.2% and 3%) HealthKart.com (11% and 10.5%), Slideshare.com (39.1% and 42.4%), Studentconsult.com (23% and 37%) , Opera Mini (43.3% and 57.9%), e-book reviewer (1% and 4%), Medline (37% and 39%), Embase (21.7% and 29.2%) and Web of Knowledge (47.3% and 51.7%) etc. (Table5).

Students felt that Anatomy tools for e-learning contributed in basic concept building (59.8%and 60.2%), developing holistic approach to learning Anatomy (60.2%and 59.7%), deep learning (59.8 %and 60.2%), retention of knowledge (58% and 53.6%), developing dissection skills (62% and 65%) and confidence building (31.6% and 39.2%). 28.6% and 29.9% students felt motivated while utilizing e-learning tools. 20.4% and 26.8% students felt that e-learning influenced their examination performance thus enabling them to score better in Anatomy Theory and Practical. 53.1% and 45.4% students enjoyed the e-learning method in Anatomy. 37.8% and 32% participants enjoyed the discovery learning while surfing, navigating, browsing and utilizing the e-learning tools for learning and developing skills in Anatomy. In addition to traditional class room learning and e-learning, 43.9% and 47.4% students also studied in Library. Collaborative e-learning was practised by 73.6% and 70.1% students (Tables 3, 5) through e learning sites verified by faculty for content validity, reliability, easy access, credibility prior to saving as repository for establishing Anatomy e-learning bank. (Table 5). It is also planned that e-learning archive/repository set up in Anatomy shall be updated periodically for the utilization by health professional students.

Thus study results have revealed e-learning in Anatomy can be matched and blended effectively, seamlessly and harmoniously with learner-centered content in Anatomy.

Brief Discussion:

The study results provide insight into the perceptions of two batches of 1st year MBBS students belonging to 2014-2015 and 2015-2016 regarding utilization of e-learning tools while studying Anatomy in a collaborative manner. Blending of traditional class room teaching in Anatomy and e-learning minimize requirement of expensive human resources while promoting flexible student centered, self directed learning in a fixed time frame. Students were self motivated to practice both collaborative and discovery learning.[4,6,10,12] These e-learning tools effectively guide learners to process and assimilate new knowledge and skills in Anatomy achieving Fact, Concept, Process, Procedure and Strategic Principles of content of e-learning.[9,28] Widespread utilization of e-learning tools in Anatomy have motivated the Anatomy faculty or e-learning design team to develop upgradable Anatomy archive/repository of e-learning sites with resources to be accessed freely.[2,16] Results related to percentage of MBBS students utilizing

e-learning tools as found in this study are at par with the study by Sugrue and Rivera. [3] Media comparison studies have shown that no differences exist in learning and achievement [4,5,6,22] though some distant learning courses have been more effective than class room courses and vice versa.[7, 18,25] However, the aspects of effective learning in an online environment have given similar results as evidenced in study by Tallent-Runnels et al.[7] Losing sight of the job or media abuse are pitfalls of e-learning which could not be evidenced in the results of the present study since participants utilized e-learning tools in a specified time frame without any compulsion.[8,32,28]The three e-learning architectures e.g receptive, directive and guided discovery as expressed by Clark[9] was also evidenced in this study. The three metaphors of learning e.g response strengthening, information acquisition and knowledge construction or cognitive load or constraints in multimedia learning was expressed by the participating students as expressed by Mayer et al and Rich and Guy.[10,11,12,14,21] It has already been identified that graphics and simulations in e-learning are effective interfaces which have also been utilized by students.[15,16,29,31] Anatomy learning through Internet, though has not substituted traditional classroom teaching with text books and teacher/facilitator, however, these resources also help student access to latest developments in various fields of Anatomy, content being checked by faculty.[17, 18,19, 27] The results of the present study have been at par with those achieved in the study conducted for application of mobile learning in Anatomy where online sites have been identified which have contributed in planning this project, formulating policies for access, making an Anatomy archive/repository[19,20, 17] similar to description by Horton in 2006.[26] These online internet sites engage learners to manage cognitive load of learning Anatomy.[11,28,23,20, 18] Application of this innovative learning has also contributed in developing 21st century medical graduates being able to adapt to changing conditions from traditional class room setting to e-learning environment excelling in concept building, developing holistic approach along with critical thinking, scientific reasoning and motivation.[20,21,31,26] The students felt that they should acquire knowledge and competencies to be able to utilize learning of Anatomy in blended technology mediated education environments.[26,28,27,32,33,34,35]

IV. CONCLUSION

The results of the present study demand a further in-depth exploration of retrieval and transfer applications of e-learning content by students in formative and summative assessments and drawing a comparative analysis of e-learning tools utilized by students vs performance indicators. Facilitators in Anatomy bear responsibility to guide and encourage students to accept, understand, comprehend, implement and utilize innovative tools and resources of learning to achieve better learning influenced outcome. Various e-learning sites identified in Anatomy compiled to build an Anatomy e-learning Archive/Repository for browsing and navigation by students and faculty not only promote e-learning but also provide guidelines and tools to develop online interfaces meeting the goals in learning Anatomy. However, success in implementation of e-learning in Anatomy in a collaborative manner would depend on prudent but flexible application of e-technology based on sound and effective educational principles and designing of convenient and effective instructional strategy with inclusion of Learning Objectives. This would require planning, designing, developing, integrating, delivering and seamlessly managing learning of Anatomy in electronic media in a collaborative manner.[22,23] Thus collaborative e-learning in Anatomy marks an age of diversity and crossover of Anatomy learning integrating learning tools and topics in the dawn of a new age of network.[29] This study results thus would help in creating online environment for information exchange to knowledge construction contributing in collaborative online learning of Anatomy in addition to class room learning thus emphasizing on Utilitarian Concept of e-learning tools and resources as expressed by Schon in 1987.[31]

ANNEXURE
TABLE 1
% of responses by 1st year MBBS students, hostelites or day scholars of both batches, 2014-2015 and 2015-2016 belonging to both sexes

Percentage of responses by batch 2014-15
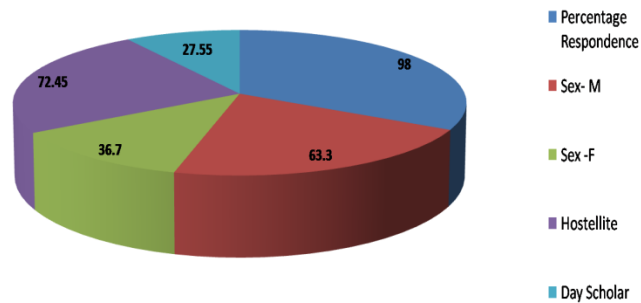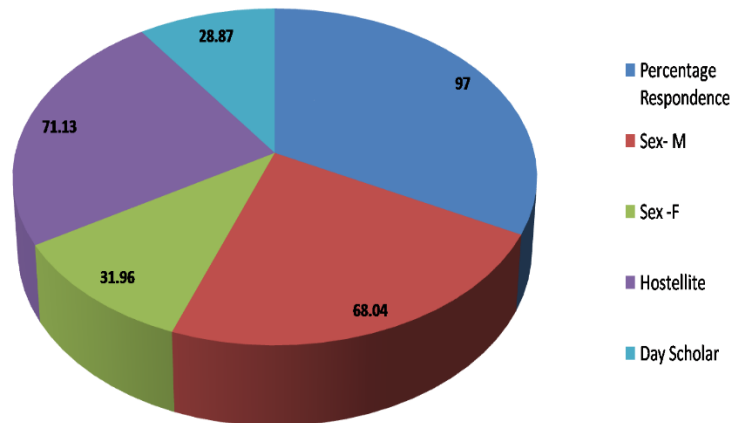

Percentage of responses by batch 2015-16

TABLE 2
% of responses by 1st year MBBS students of both batches regarding use of mobile phones and electronic devices for various purposes:
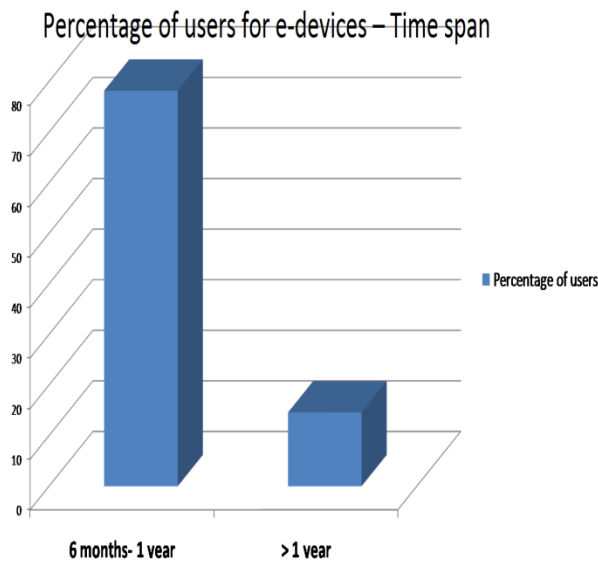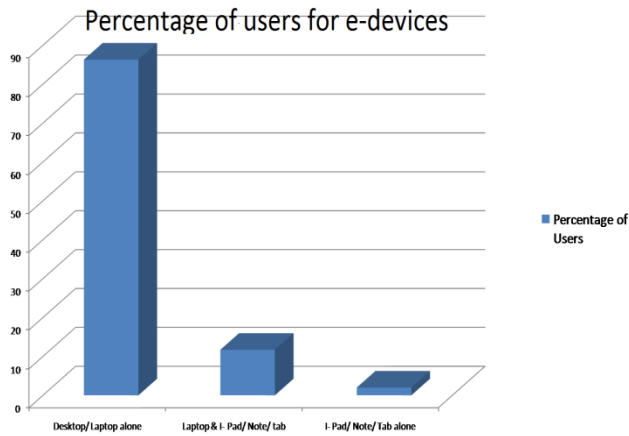
TABLE 3
Responses regarding strategies for e-learning in groups following group dynamics along with library utilization:

Batch	Strategies(Numbers)					Mean (M), Median (MED), Mode (MO)	E-learning in Groups		Group Dynamics %	Library Utilization %
	Graph for 2 batches						Graph for 2 batches			
	ME	E	U	NE	NEAA		%	No of participants in Groups		
2014-2015	18	70	4	5	0	M:19.4 MED: 5 MO:18	75.5	9-15	59.4	43.9
2015-2016	23	67	4	3	0	M:19.4 MED:4 MO:23	70.1	2-10	58.6	47.4

Index: ME: Most Effective, E: Effective, U: Undecided, NE: Not Effective, NEAA: Not Effective At All   Note: In the text, Most Effective and Effective have been clubbed for % analysis. Analysis for Strategies: Significance level: 0.05   One Tailed Hypothesis: t value : 0   P value: 0.5   Result Not Significant $p<0.05$
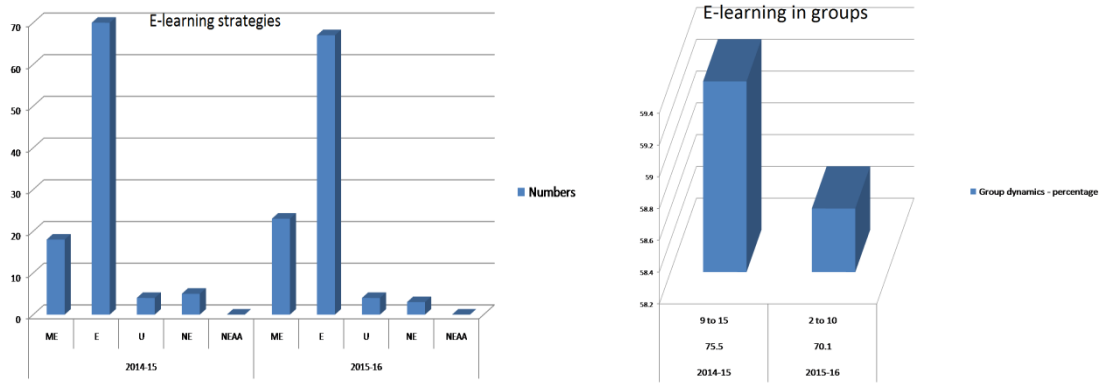
Table 4
%of responses for estimating development of Cognitive and Psychomotor skills during e-learning of various sections of Anatomy:

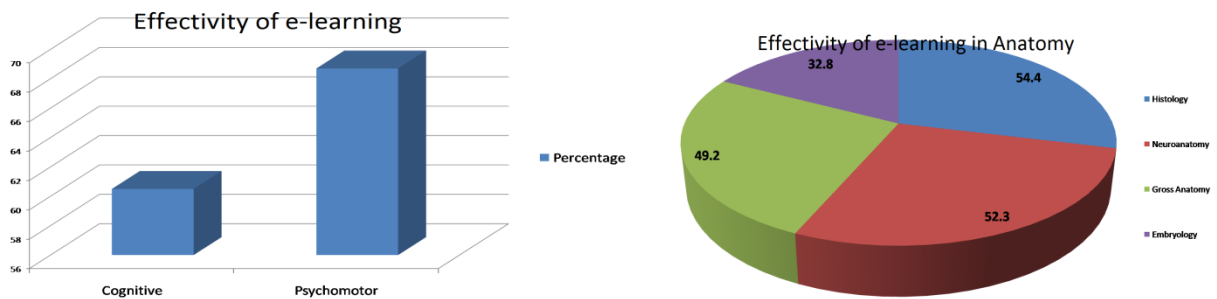| Effectivity(%)			
Cognitive	Psychomotor	Parts of Anatomy	%
60.5	68.7	Histology	54.4
		Neuroanatomy	52.3
		Gross Anatomy	49.2
		Embryology	32.8

TABLE 5
Coding and Categorization of themes for e-learning search engines and contributions

Sl.No	Categories/Codings/Themes	%Responses Batch 2014-2015	%Responses Batch 2015-2016
1	**e-Learning Applications /Search Engines utilized**	100	100
	Wikipedia	12	10
	You Tube Dissection Videos like Acland Dissection Videos	62.7	67.8
	e-books	75.5	76.7
	e-dissection atlases	69.2	63.3
	Google 3D Images and Animations	92.9	88.7
	Online Interactive Forums	75.5	70.1
	Facebook	83.5	81.1
	What's App	82.4	87
	Subway Surfers	1	1
	UC Browser	3.2	3
	HealthKart.com	11	10.5

	Slideshare.com	39.1	42.4
	Studentconsult.com	23	37
	Opera Mini	43.3	57.9
	e-book reviewer	1	4
	Medline	37	39
	Embase	21.7	29.2
	Web of Knowledge	47.3	51.7
2	**e-Learning contributing in learning and examination**		
	Basic concept building	59.8	60.2
	Deep learning	59.8	60.2
	Holistic approach in learning anatomy	60.2	59.7
	Retention of knowledge	58	53.6
	Developing dissection skills	62	65
	Confidence building	31.6	39.2
	Motivation	28.6	29.9
	Better performance in examinations	20.4	26.8
	Discovery learning	37.8	32
	Collaborative learning	73.6	70.1
	Enjoyment in learning	53.1	45.4

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