IS M-LEARNING THE IDEAL PLATFORM FOR THE MILLENNIAL GENERATION LEARNERS?

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ABSTRACT

Introduction: Mobile based learning offer a wide spectrum of learning opportunities to improve the learning of millennial generation learners. The paradigm shift of technology-supported learning helps us to provide personalized learning environment and also promote collaborative learning. The aim of this paper is to validate the effectiveness of using WhatsApp based learning and analyse the principles of learning underlying it.

Methodology: A pilot study involving 122 first year students was done to assess the effectiveness of mobile learning as curricular assistance. Their perception was then recorded and analysed statistically.

Results: 50 (41%) graded 3/5 and 26 (21.3%) students graded 4/5 when asked about the usefulness of online learning in anatomy. 95 (78%) students opted WhatsApp based m-Learning as the best method for sharing the learning resources, compared to 17 (14%) students opting for E-learning.

Conclusion: We suggest that mobile based learning if administered meticulously can aid learner engagement and promote collaborative learning. Future studies should validate its potentials and limitations.

KEY WORDS: Mobile learning, m-learning theories, teaching anatomy, blended learning.

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INTRODUCTION

Curriculum is a dynamic entity. Some important but understated reasons which calls for change in curriculum are reduction in the hours available for teaching, need to move from a teacher-centred approach to a more student-centred didactic one and the developing focus on self-directed learning [1]. A report by Cooke et al., [2] had established definite goals of medical education. The cardinal goals being standardization of learning outcomes and individualization of the learning process.

One of the goals of any education is to create an environment in which student learning can occur effectively [3]. In other words, the content should be delivered in a form which is relevant for the present day students. Many students feel that the large amount of vocabulary and facts in anatomy discipline is daunting [4]. This makes students to adapt varying "study habits". Study habits have been defined as "...study routines, including, but not restricted to, frequency of studying sessions, review of material, self-testing, rehearsal of learned material, and studying in a conducive environment" [5]. It is also said that high achieving students combined multiple study methods (e.g., quizzing, dissection, models, etc.) while under achievers

mostly engaged in only one method during laboratory sessions [6]. This calls for implementing multiple study methods within the stipulated time and also for an efficient time management.

Robinson and Hullinger [7] stated that engagement of the students can be efficiently improved by faculty members through the online learning environment, and that curriculum design should include an increased focus on student interaction with class materials. Formative assessment using well designed multiple choice questions testing critical thinking and analytical abilities of the students [8] can be delivered using online sharing platforms. In addition, interactive problem solving exercises, catching on the missed classes, self-learning modules can be effectively delivered promoting student engagement even after the class hours.

The 'Millennial generation students' of today differs a lot from the students of previous generation. The change in their traits should be taken into account during curricular revision. Millennials have greater needs to belong to social groups, stronger team instincts and tighter peer bonds, and greater needs to achieve and succeed compared with previous generation students [9]. Applying this core principle, most medical schools of today place emphasize on group activities and team based learning. As stated by Borjes NJ et al. [10], "Achievement-oriented millennial students will also expect faculty to clearly specify educational goals and desired learning outcomes in the basic science curricula, and may express a strong need for feedback to monitor their progress and accomplishment".

These students otherwise known as "digital natives" are held to be active experiential learners, proûcient in multitasking, and dependent on communications technologies for accessing information and for interacting with others [11,12]. So, it is frivolous to consider them to have the same learning styles as the previous generation. Medical education which had a singularity in its view needs to evolve into a 'personalised' curriculum which address the differential needs of students who have different learning styles.

The maturation of medical students as a learn-

ers is a crucial and dynamic process, which can't be made out on the basis of single point evaluation [13,14]. Kolb A and Kolb D [15] suggested that learners, rather than possessing a particular innate and fixed learning style, can move across a space of "possibilities". In other words, provided with challenging and multi-faceted "academic environment", a learner can gain newer learning styles. This newer "academic environment" should be different from lectures which cater a large group and time-bound, thereby curbing the interactivity between faculty and students.

Social media is a competent zone where the facilitators can promote informal learning in addition to the formal learning. According to Chen B and Bryer T [16], "Learners acquire knowledge as a function of interactions between connected partners. The interactions allow learners to raise their connections with content and peer-networks. Social connections and networks are changing the ways we think about knowledge and learning and the ways we organize work and ideas." Today's learner have a good access to smart phones with internet connection. Smart phones are considered as double edged swords. On one hand, the students can waste their time in a non-constructive way, on the other hand it can serve as an effective platform to regulate 'personalized' learning. According to Selwyn et al. [17] " the education-related activities on social media platforms include creating study groups and other interactions with classmates without the knowledge of the instructor, "post-hoc" critiquing of learning experiences and events, reading web resources with little evidence of critical inquiry or analytical awareness, and file sharing, gaming, and brief communicating".

The information flowing in, if regulated by an instructor, who might provide the required monitoring and acts as a gatekeeper, can be compounded into a form, which accrue the ongoing benefit to all involved in the process. This "faculty monitored peer-networking" forms the central tenet for mobile based learning (m-learning). Kirkwood and Price [18] reported that teachers' underlying conceptions of teaching and learning affect the way digital technologies are used. E learning, mostly used in the form of

online discussion portals, serves as a source for transmitting knowledge. Ellaway and Masters [19] divided the implementation and usage of digital technology in medical education based on content and process. Of these, E learning is mostly content driven, by which the students can access presentation form of lectures, live streaming, videos and some formative assessments. The process component owing to technical shortcomings and sparse internet connectivity may face troubles in the implementation phase.

The shortcomings in the implementation phase can be evaded by m-Learning, which delivers maximum accessibility and flexible functionality compared to other technologies. M- Learning provides medical students a means to self-directed learning [20], by which the content can be catered according to the perceived learning styles of students. The 2008 Mobile Learning report [21], defines it as: "any activity that allows individuals to be more productive when consuming, interacting with, or creating information mediated through a compact digital portable device that the individual carries on a regular basis, has reliable connectivity and fits in a pocket or purse". Based on this, Stanford's computer science department has shifted several courses to instruction using 10-to-15-minute video segments with embedded quizzes to engage learners and test their comprehension [22].

The aim of this communication is to describe the educational impact of WhatsApp based learner-centred module developed to supplement neuro-anatomy training for first year medical students. A meta-analysis on education technologies [23], had stated that "larger effects can be achieved if the online learning was combined with face-to face instruction". Therefore we provided this module as a supplement to the traditional pedagogical activities.

METHODOLOGY

This teaching – learning methodology was delivered in the Department of Anatomy, Pondicherry Institute of Medical Sciences, Puducherry. It included 122 (n=122) second semester MBBS students belonging to 2015-16 batch. We selected "Neuro-anatomy" as the preferred region, as the subdivision per se, requires lot of conceptual understanding and doesn't involve much of dissection. Initial trial run-throughs were made during the regional anatomy teaching of "abdomen and pelvis" and "head& neck" and the difficulties during the implementation phase were rectified during neuro-anatomy module. WhatsApp groups were made table wise by the students themselves and willing faculty members were added. Faculty members served as "nodes" to regulate the interactivity in the group. Though all the students who wish to be in the group were added, they had free will to withdraw at any time.

We used the groups as platforms to deliver:

1. Supplementary content for reading such as pdf files, jpeg images, instructional objectives for lecture classes, practical sessions and step wise approach for discussion specimens (example: medial surface of cerebral hemisphere).

2. Links of YouTube videos pertaining to the corresponding topics (example: external and internal features of medulla oblongata) were shared

3. Mini-evaluation of students using fill in the blanks, identifying a cluster of structures in unlabelled photographs, sectional anatomy and radiological images were administered. However, there were no reading checks to verify whether students had completed the readings, as the module is optional.

4. Clinical vignettes of neurological cases (example: a case of Benedikt's syndrome).

The perception of the students regarding this model of teaching and learning was evaluated with responders maintaining their anonymity. Our college has an online platform, (MOODLE) which help us to share the learning materials and formative self-assessments. We tried to find out the better sharing platform in terms of accessibility and functionality. The close ended questions have to be answered in a Likert scale of 1-5 (1- strongly disagree; 5 – strongly agree). The outcome was analysed subjectively.

OBSERVATIONS

Responses were collected from 122 students at the end of the yearly academic schedule and after the completion of the university theory examinations. When asked about the perceived

utility of the M-learning in learning anatomy, 40 (32.8%) students graded 3/5 and 37 (30.3%) students graded 2/5. Figure 1 summarises the respondents' evaluation for the question.

The next question was regarding the usefulness of online learning in anatomy for which 50 (41%) graded 3/5 and 26 (21.3%) students graded 4/5. Figure 2 summarises the participants' percipience for this question.

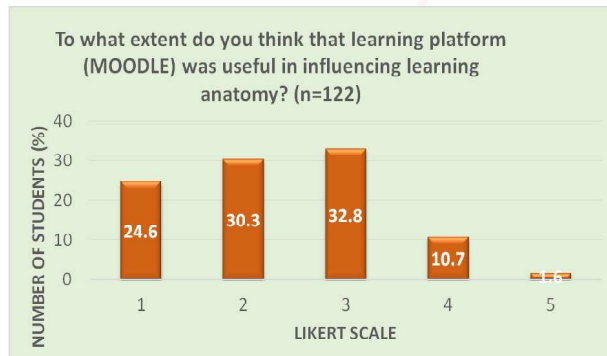**Fig. 1:** Perceived utility of online learning platform (MOODLE) in learning anatomy (n=122).

To what extent do you think that learning platform (MOODLE) was useful in influencing learning anatomy? (n=122)

Fig. 2: Respondent's opinion about the extent online learning being beneficial for them in learning anatomy (n=122).

How far online learning is beneficial for you in learning anatomy?
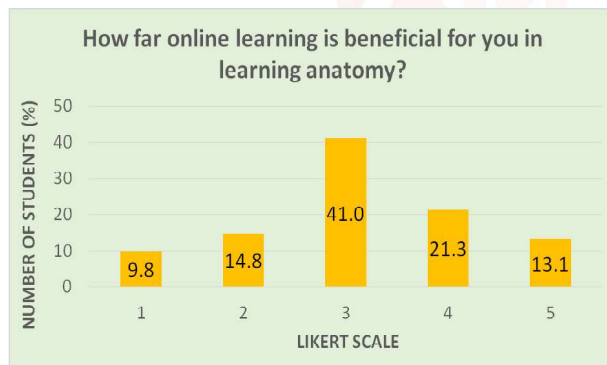
Regarding the best method for sharing the learning resources, 95 (78%) students opted WhatsApp based m-Learning compared to 17 (14%) students opting for E-learning.

Fig. 3: Pie chart showing the students' preferred method for sharing learning sources (n=122).

Best method for sharing learning resources

- E learning platforms like MOODLE
- WhatsApp
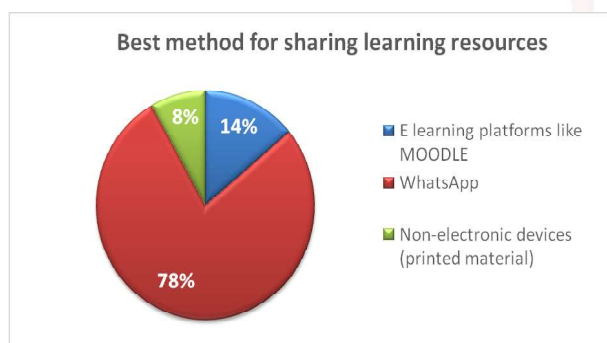- Non-electronic devices (printed material)

Fig. 4: Sample screen capture of the formative assessment showing the structures related to the third ventricle. Students were asked to label the marked structures and post back. The answer key was displayed subsequently.
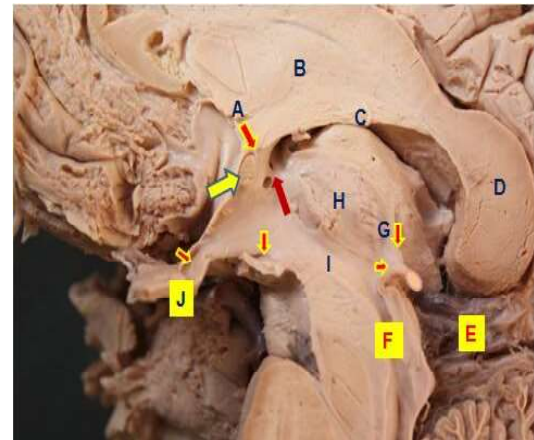

Fig. 5: Sample screen capture of the labelled photograph showing structures in the floor of the fourth ventricle shared via WhatsApp groups.
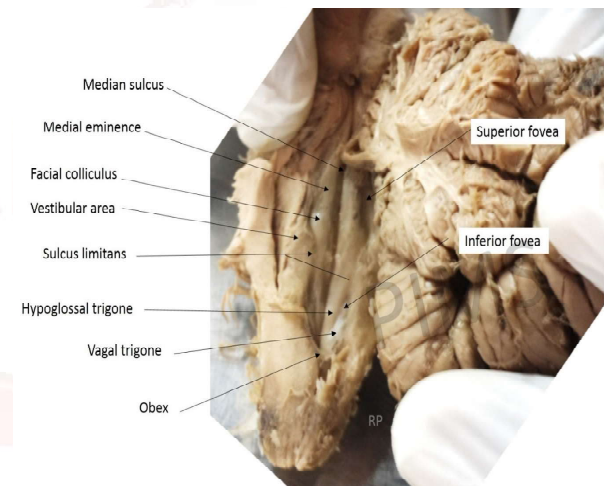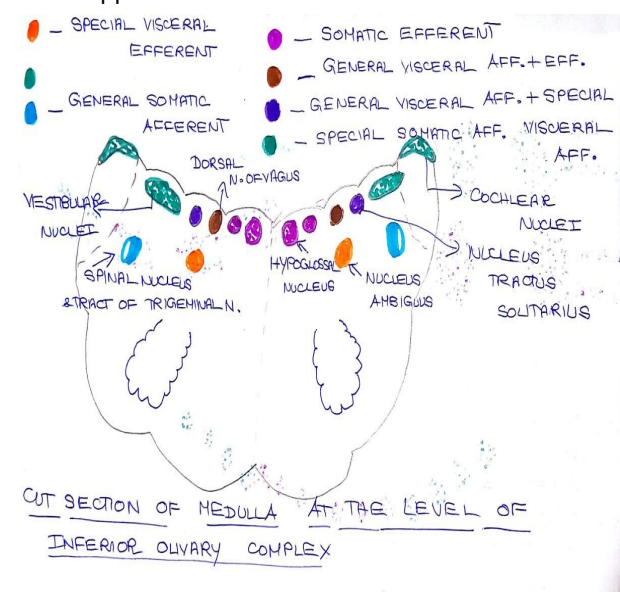

Fig. 6: Schematic representation of the transverse section of medulla at the level of inferior olivary complex showing various cranial nerve nuclei shared via WhatsApp.

DISCUSSION

Prober & Heath [22] stated that, "medical education can be improved without increasing the time, if we make lessons "stickier" (more comprehensible and memorable) and embrace a learning strategy that is self-paced and mastery-based and boosts engagement". Flipping of the traditional classroom, though advocated as a revolutionary approach in medical education, has its own risk of being caught in pedagogical dichotomies as using it as the sole mode of learning has some disadvantages. First, it poses a tremendous instructional challenge for the concerned teachers to create a concise and lucid digital presentation. Second, the digital presentation has to be delivered in a platform in such a way, it should be accessible to all students. These, in addition with the need for a rigid technical infrastructure, makes the "traditionalists" to dislike the innovative shift.

Bergman and Sams [24], the pioneers of "flipping", found that students wanted teachers to answer questions and help them when they didn't understand course concepts. Students did not require the same level of support when the teacher was lecturing or reviewing content. This made them to propose a model which can promote deeper understanding, making the process of learning more individualized and self-directed, as the student should bear the brunt of discharging the learning activities outside the class.

In the first year of medical education, on entering into a new learning environment, students have an unquenchable thirst to learn and do new things. This thirst won't last long considering the adaptation of the student to the new learning environment and the cognitive load imposed by the voluminous subjects. The ideal trigger to get the students out of this plateau phase is by creating an active personalized learning environment, incorporating blended learning and making the student responsible for his / her own learning.

Blended learning in anatomy materializes a more self-directed, student-centred approach and is supported by the current technological framework of society [25,26]. The blended learning module should be based on the constructivist learning principles which demands 1) new learning being shaped by prior knowledge 2) Intelligent thought involving metacognition and context based learning which promotes deeper understanding [27]. The fact that the recipients of innovative T-L methodologies in anatomy are teenagers should also be kept in mind. It is hard to expect an impressionable teenage learner, who have not yet learned the skills of adult learning [28] and being exposed only to traditional didactic lectures till now to exhibit the zenith of active learning. This is one of the reason why "flipping" classes turn ineffective in certain institutions despite of rigorous implementation. In our study, we used M-learning as an adjunct to conventional classes.

The advantages of M-learning are it promotes ubiquitous learning and enables two way communication. In the present study, 78% of the students felt M-learning using WhatsApp as a better medium over E-learning platforms. Our findings are in concordance with another study which aimed at evaluating WhatsApp M-learning [29], 73% of the student found it convenient, 82% of the participants agreed that it promotes collaborative learning and 81% of the participants agreed it has increased social interactivity in the group. Overall, 76% of the participants had favourable attitude towards WhatsApp m learning and found it as a personalized instruction medium [29]. In another study [30], 75% of the first year medical students gave positive review for M-learning and 54% stated that lectures if succeeded by relevant clinical questions or images over WhatsApp group steer analytical thinking. Also, 79% of the students felt that M- Learning helped with better and quicker knowledge sharing as well as group-discussion to come to a conclusion for better understanding [30].

Table 1: Pre-requisites for an effective m-learning environment.

1.	Making students aware of the principles of self-directed learning; to reduce aimless and redundant interactivity in the group.
2.	Providing clear learning objectives, designing a lesson plan by faculty on daily basis.
3.	Arousing interest in the topics by posting case scenarios and clinical vignettes
4.	Faculties should focus on learning more and accommodate varied learning style based inputs (visual, auditory and reading) which invokes critical thinking.
5.	Encouraging collaborative learning
6.	Periodic formative self-assessment designed to promote deep learning
7.	Effective, supportive supervision and mentoring by faculty. At the same time the discussions should be "student-led" and not being dominated by enthusiastic teachers.
8.	Frequent error detection of the module itself and maintaining the 'fluidity' during the implementation through effective feedback mechanism.
9.	Archiving of the contents delivered for review or remediation.
10.	Concerned faculty should promulgate efficient and balanced group dynamics by motivating the "curious learner" at the same time keeping a track on escapists.

Table 2: Advantages and Disadvantages of M-learning (inputs from [31]).

ADVANTAGES	DISADVANTAGES
a. Ubiquitous learning	Social isolation which can potentially can hamper communication skills
b. Individualised learning	In absence of effective instructor, or poor designing of program de-individualized instruction results
c. Easily updated perpetual resource	Some students might experience increased cognitive load which can impede learning
d. Flexible scheduling with asynchronous discussion	Requires committed faculty to monitor the instructional activities.
e. Accommodates novel instructional methods	May lead to "drop out" of dissatisfied learners if the forum is dominated by curious learners.
f. Allows documentation of learning tasks and feedback	Chances for students becoming inattentive in formal classes / lectures
g. Cost effective compared to e-learning	

Promoting efficient students' conversation in WhatsApp group is another dimension which has to be taken care of. Stanfield [32], presents a relatively simple four-stage process for focusing critical reflection that begins with objective-level questions based on facts to reflective level, interpretive level (drawing implications) and ends up with decision level (invoking critical thinking). If the facilitators who design the instructional unit frame the educational objectives according to this four-stage process, effective 'active learning' can be achieved.

Fig. 7: The unique features of M-learning pedagogy.
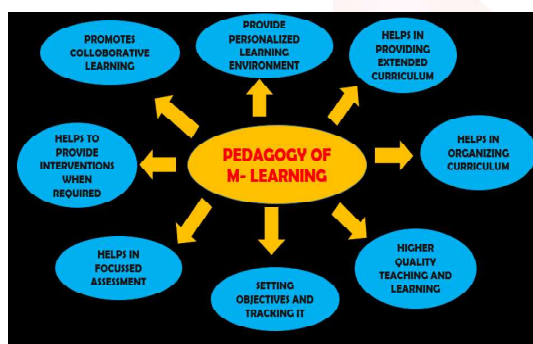
Limitations: This study is just a pilot project to validate the implementation of M-learning via WhatsApp. We used it as a supplementary methodology to the existing traditional curriculum and its benefit has to be validated separately using better study designs and hypotheses. The study is subjected to variations as the effectiveness depends on 1) capability and commitment of the instructor to facilitate group dynamics 2) well designed study materials and 3) level of motivation and curiosity possessed by the students. It relies on "active processing principle" by Mayer RE [33], which states that "meaningful learning occurs when learners engage in appropriate cognitive processing during learning, including attending to relevant material, mentally organising it into a coherent cognitive representation, and integrating it with prior knowledge activated from long-term memory". [34]. Despite of the fact that, we were unable to measure the significant effectiveness of M-learning as a stand-alone pedagogy, we can infer from the principle stated above that, engagement of the students with learning aids based on specific learning objectives and endorsing active faculty-student interaction had benefits.

"Drop out" of the students during the study period or refraining from active discussion is another dimension which should be taken as attrition. Formative assessments were not endorsed by all students as participation is not made compulsory. The results thus may vary according to institutional culture. It is also necessary on the part of faculties to regulate the discussion as the group has all chances in itself to become a "chat-room".

CONCLUSION

We suggest that educational programs should consider the use of mobile based learning. Especially for millennial generation learners, mobile learning has its own advantages over e-learning, as it enhance the learner's perceptions and also keeps them engaged in academic activities. It serve as a potential platform to provide personalized learning environment by catering to students with varied learning styles. Further studies with different hypotheses would help us define its potentials, limitations and the presumed weightage for it.

Conflicts of Interests: None

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