Micro Text Messaging as a Flipped Learning Approach within a Hybrid Learning Atmosphere

Nauman Ahmad

Department of Mathematics and IT, Centre for Preparatory Studies, Sultan Qaboos University, Sultanate of Oman

nauman@squ.edu.om

Abstract

Nelson Mandela had said that the success of a country is based on the quality of its education. Today, information and communication technologies are essential parts of educational progressions. Mobile's SMS (short message service) is a short text messaging tool that is used to send and receive the text as digital information for communications. Micro learning is a practice to divide study material in small parts that is used in small steps for learning. This research had divided the material of a course unit in small pieces of information, based on less than 280 characters and used as micro text messaging through SMS to send the messages on mobile devices of students, using the flipped learning approach. Total number of subjects was 48, divided in two groups of 24 subjects for experimental group 'A', and control group 'B'. Group 'A' had received course material through micro text messages, and class meetings were used with this group for discussions depending on the topics received by the participants through micro text messages; in addition, this group had filled a survey for 'Before' and 'After' the use of micro text messages. However, group 'B' went under a formal way of face-to-face instruction. Review of literature had revealed that integration of text messaging with micro learning technique through flipped learning approach in this study is a novel method of hybrid learning that has never been used before. Results of this study have produced constructive impacts on learning outcomes those are financially economical, easily applicable, and contribute towards the addition of new knowledge in the field of hybrid learning through the enhancement of educational quality. The outcomes are exceptionally encouraging for educational authorities, instructors, schools, colleges and universities at global levels.

Key Words: Digital information, Flipped learning, Hybrid Learning, Micro Learning, Micro Text Messaging, SMS, Students' Attitudes.

1. Introduction

Education is a powerful tool and knowledge is power. Education reveals hidden facts, provides rational evidence and offers logical opportunities; those are significant to live a prosperous life. Nelson Mandela had said that no ammunition is required to ruin a nation because it can be done by decreasing the standard of their education [1]. Information and communication technologies (ICT) use digital information for the purpose of communication and are one of the integral parts of pedagogical processes, today [2].

As cited by [3], [4], [5] traditional method of teaching is grounded on face-to-face education, where a teacher teaches a group of students for the duration of one or two hours or more, and gets involved in the pedagogical process with different groups during the whole day that could be of 7 to 8 hours. Likewise, each group of students could have 7 to 8 hours of study, every day. Consequently, this lengthy process of teaching and learning gets challenging in terms of in-depth creation of ideas towards the educational content that results in compromised learning outcomes and lowers the quality of education.

It is commonly known that educational institutions are mixing ICT with formal face-to-face instruction as a hybrid mode of learning, to achieve elevated learning outcomes and to improve the quality of education. A book is one of the significant sources of learning that is distributed in chapters, to unify and gather the associated information under linked ideas, contained by a chapter. A chapter in a book is additionally segmented into subtopics, in the shape of subsections to associate related concepts in micro portions; all this division and subdivision of a book in micro parts is a struggle to convey all the contents of knowledge in a clear and logical way that could be comprehensible and generates in-depth understanding through small partitions.

Hybrid learning is a well-known practice in the field of teaching and learning. However, combining information and communication technology with instructional content is a difficult exercise because

it requires the installation of a learning management system or application of related technology. In addition, training of concerned personnel, dedicated team of professionals to handle the technology, a lot of time and huge amount of budget is also required; therefore, keeping in view these challenges, field of teaching and learning is in a dire need of novel practices that could significantly enriches the learning outcomes with minimum financial impacts and trainings on all the mentioned areas [6].

Lecture handouts and books are the key resources of a pedagogical process, used for traditional face-to-face instruction, and ICT based pedagogical instruction is a new style, where the learning information of printed text is mixed with a technology and used in a hybrid learning atmosphere [4]. Dividing the topics of a subject into small portions through the method of micro learning is an effective technique that helps the students to gain detailed ideas, and improved understanding and learning [7], [2]. Integration of traditional face-to-face instruction with electronic based methods through micro learning technique produces positive and productive outcomes [7], [3], [25]. When electronic communication tools are integrated as a mode of hybrid learning, the results are constructive [2]. A combination of an additional method with the traditional process of learning could help the students to achieve better learning outcomes [8]. Hybrid learning is a technique that enhances the students' skills and positively helps the pedagogical outcomes [9]. Pedagogical experts are repetitively supplementing different methods with traditional face-to-face instruction, grounded on digital information and electronic communications those are elevating the instructional process, evidently [10]. Digitally, successful online assessment could be done through remote online proctoring [30].

Key areas to evaluate the efficacy of any electronic communication tool towards learning, centered on participants' opinions are as following [2], [5], [7], [11], [12], [13]:

The electronic tool is:
- "Friendly" during its usage.
- "Comfortable" during its usage.

- Counted as an "Essential" part of the pedagogical process.
- Helpful in "Understanding" the pedagogical material.
- Helpful in "Learning" the pedagogical material.
- Helpful in "Preparation of Exams".
- Recognized as a "Favorite approach of learning".

Next sections of this paper communicate about literature review, research elements, research design, methodology, results, conclusions and future work, and references. This research assumes that the impact of micro text messaging through SMS as a tool of micro learning through flipped learning approach within a hybrid learning atmosphere will have a positive impact on the examination of course contents under instruction; moreover, students could consider this technique of flipped learning as friendly and comfortable, and an essential part of the pedagogical process. In addition, this technique might help the students in understanding and learning the course contents, help in preparation of exams, and students could count this technique as their favorite mode of learning. If the impacts of this research are verified to be creative and useful, the influence would be significant on the educational institutions at international levels, including schools, colleges and universities; educational establishments, governing bodies, field experts and professionals would utilize this micro learning technique to boost the quality of education at the next levels.

2. Literature Review

2.1. What is Micro Learning, Text Messaging (SMS), Flipped Learning, Twitter and Hybrid Learning?

Micro learning is a novel pedagogical method that splits the course material into tiny portions and consumes these portions in tiny steps [14]. When the learning material is fragmented in little portions and used in small parts is called micro learning [15], [24]. Micro learning acts as a catalyst towards the advancement of learning outcomes and is vital for polishing the expertise [14]. Micro learning is a pedagogical process where material under study gets fragmented into small pieces, those are used in small steps for the improvement of understanding

and learning the pedagogical materials [2], [5]. One of the new techniques in the pedagogical world is micro learning that produces positive outcomes in terms of understanding and learning the pedagogical materials [2], [5]. Micro learning technique is extremely effective on all kinds of learners, including visual, auditory, read-write and kinesthetic leaners [29]. Micro learning is very supportive in achieving excellent marks in the assessments [2], [7].

Text messaging is also known as SMS (short message service) is a facility which allows a sender to directly connect and converse with the receiver, and vice versa, using digital information through mobile devices; and positively affects the pedagogical outcomes [16]. Text messaging through a mobile device permits a sender to send a message to the receiver using a telephone network [17]. Digital text messaging in a pedagogical environment helps the learners in gaining better knowledge that is based on flexible locations and timings [18].

Flipped learning is a process of education outside of a classroom's boundary, where a fragment or all the teaching is done electronically through videos, podcasts or short text messages, and classroom is utilized for students' participation and communication [19]. Flipped learning is an educational method of teaching that flips conventional face-to-face method of instruction with the process of learning that happens outside of the classroom, and class activities are used to enhance the engagement and motivation of students through their communications and interactions [20]. The use of flipped learning approach has empirical evidences with significant outcomes, connected with improved performance and participation of learners during the process of teaching and learning [27].

Hybrid learning is a technique of mixing digital information with formal classroom based teaching [10]. Hybrid learning is a technique that integrates online method of instruction along with formal face-to-face pedagogy [26]. The levels of skills and expertise of learners get enriched through hybrid

learning approaches [8]. Twitter is a web based social networking provision that allows a maximum size of 280 characters for a single tweet, and works towards committed and precise use of short messages that makes Twitter a microblogging site [21], [22], [23]. A detailed integration of traditional face-to-face and electronic communication based pedagogy is required for the productive practice of instruction [28].

3. Research Elements

The purpose of this research is to use the digital text messaging (SMS) as a tool of micro learning through portable electronic gadgets (smart phones), concluded over the flipped learning approach, through the division of text (learning contents of the course unit) in small portions of less than 280 characters, keeping in view the allowed size and standard of Twitter towards micro-blogging, within a hybrid learning atmosphere. Existing literature discloses that the use of digital text messaging as a micro learning technique through flipped learning approach is a fresh and innovative method in the area of hybrid learning. There are two groups for this research, including: i). Group 'A' experimental group. ii). Group 'B' control group. Micro text messages (SMS) are planned to be shared with the learners of experimental group 'A', outside of the classroom for learning, and face-to-face meetings are planned to be used with this group for the discussions, collaborations and communications among learners, within a hybrid learning atmosphere. In addition, subjects of group 'A' are planned to be requested about their opinions through the survey questionnaire towards their attitudes and reactions in assessing this technique as friendly and comfortable while using. Moreover, the questionnaire gathers the opinions of subjects towards the level of its essentiality for the process of instruction, help in understanding and learning the pedagogical material of studied course unit, help in the preparation of examination, and subjects' preferred method of learning. However, the control group 'B' is planned under formal face-to-face instruction, only.

Therefore, this research is attempting to find the solution towards the enhancement of learning

outcomes and elevation of educational quality with digital technology that could be controlled by an economical way. Thus, everyone could be able to use the technology with minimum financial input and training. Hence, this research is based on the formulated hypotheses (exam results of experimental group 'A' vs control group 'B"). Moreover, students responses are planned to be taken through a survey questionnaire (from experimental group 'A') towards the use of micro text messaging (SMS) as a tool of micro learning through flipped learning approach within a hybrid learning atmosphere for two stages, 'Before' and 'After' the use of this tool regarding seven key areas, including: 'Friendly' and 'Comfortable'
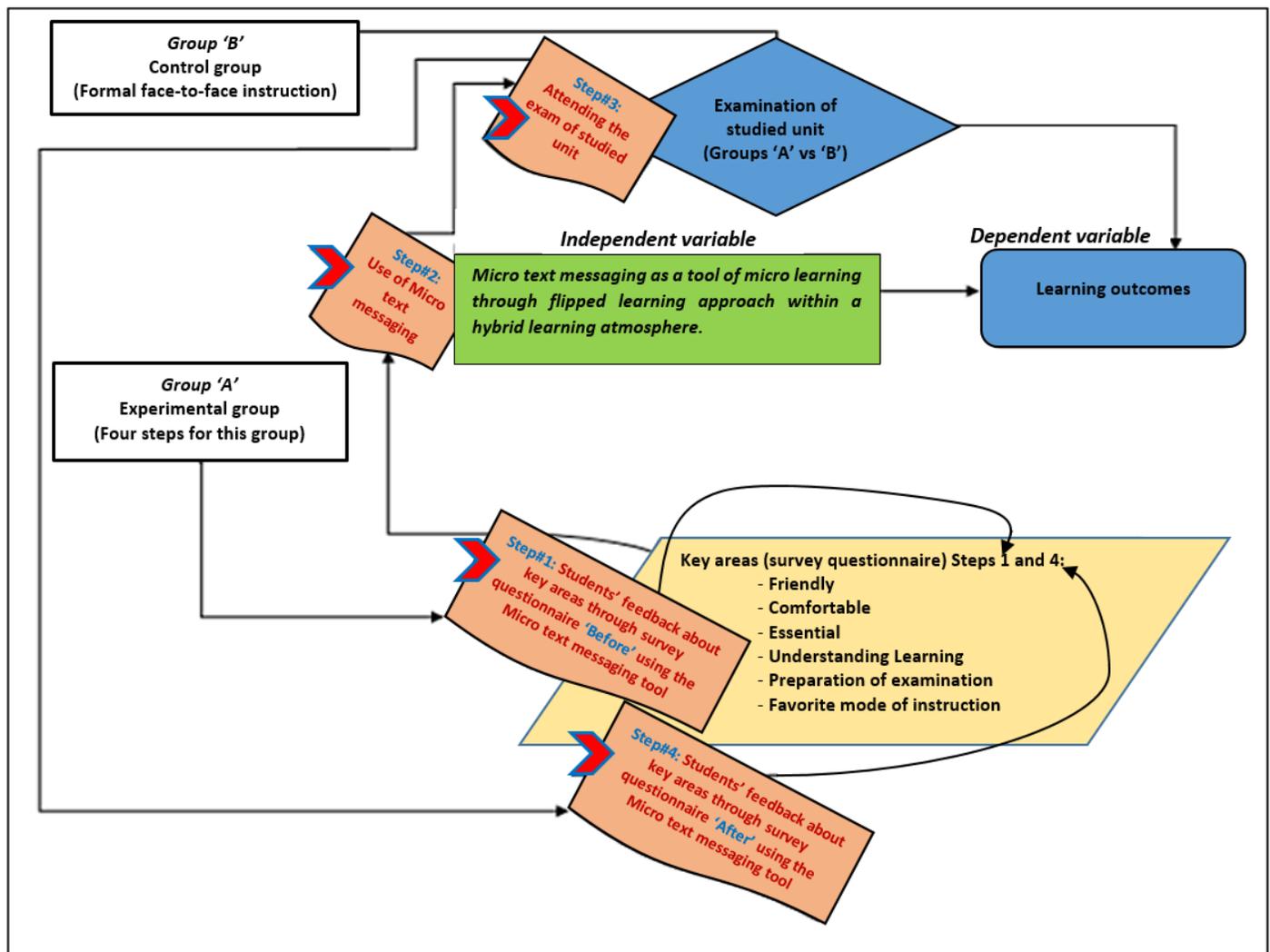
while using, 'Essential' part of instruction, helped in 'Understanding' and 'Learning' the course topics, helped in 'Preparation of exam' and 'Favorite method of learning'.

Following are null and alternative hypotheses:

H_0: Micro text messaging (SMS) as a tool of micro learning through flipped learning approach within a hybrid learning atmosphere has no impact on the examination outcomes.

H_1: Micro text messaging (SMS) as a tool of micro learning through flipped learning approach within a hybrid learning atmosphere has a positive impact on the examination outcomes.

4. Research Design

Figure 1 illustrates the research design of this study.

Figure 1. *Research design*

Figure 1. The research design shows four main steps for the experimental Group 'A', including: (1) Students feedback through the survey questionnaire towards seven key areas for 'Before' stage [before using the micro text messaging (SMS) tool]. (2) Study of course unit through the use of micro text messaging (SMS) tool by flipped learning approach within the hybrid learning atmosphere. (3) Examination of the studied unit. (4) Students feedback through the survey questionnaire towards seven key areas for 'After' stage [after using the micro text messaging (SMS) tool]. *There are two main steps for the control group 'B', including: (1) study of course unit through formal face-to-face instruction only. (2) Examination of the studied unit.*

5. Methodology

This research has evaluated the impacts of digital micro text messaging (SMS) as a tool of micro learning through flipped learning approach on the exam results of a course unit of IT, titled "WWW, Network and Internet", taught at Sultan Qaboos University, Sultanate of Oman. The number of subjects for the research was 48, keeping the similar educational background, and same age group. This number of subjects in this research was significant as compared to the studies, conducted earlier for the evaluation of impacts towards electronic communication tools, concerning seven major key areas, as mentioned earlier, in this paper: 37 subjects [11]; 71 subjects [12]; 50 subjects [3]; 28 subjects [4]; 30 subjects [5]. The course material of this unit was divided into small parts. The subjects of this study were divided in two groups of 24 each; where group 'A' was the experimental, and 'B' was the control group. Group 'A' had studied this course unit within a hybrid learning atmosphere, and the students of this group had received short text messages (SMS) on their portable gadgets (smart phones) through mobile network, for a duration of two weeks before their lectures; for the purpose of understanding the topics. Keeping in view the allowed size of a tweet, the size of each micro text message was less than 280 characters that was sent to the receivers. The students were requested to read one message at a time, and to give a minimum gap of ten minutes before reading the next message. Face-to-face classroom gatherings were used for collaborations and conversations about the topics of this unit. Moreover, the students of group 'A' had provided their opinions through the survey questionnaire on two stages: 'Before' using the micro text messages (SMS) and 'After' using micro text messages (SMS), plus attending the exam. Alternatively, the control group 'B' had studied this unit through traditional, classroom based face-to-face instruction only. Finally, both the groups were examined for the studied material.

This study had measured the impacts of micro text messaging (SMS) as a tool of micro learning through flipped learning approach within a hybrid learning atmosphere, concluded over the group means of marks obtained in the examination of both the groups. Moreover, the students of experimental group 'A' were requested to furnish their opinions about the use of micro text messaging as a tool of micro learning through the survey questionnaire that was provided to each of them for two stages, 'Before' and 'After' the use of micro learning tool, to evaluate the comparisons of their opinions between 'Before' and 'After' stages; towards the size of change ('After' – 'Before').

The survey questionnaire used for the evaluation of electronic communication tool (micro text messaging) was based on key areas 'Friendly', 'Comfortable', 'Essential', '', 'Understanding', 'Learning', 'Preparation of exam', and 'Favorite method of instruction'. These key areas were used in other studies [5], [7], [11], [12] and researchers had published these outcomes in peer reviewed prestigious journals; therefore, this survey questionnaire is reliable and valid.

Each student of experimental group 'A' was provided with the questionnaire, holding 5-points Likert Scale, ranging from 1 to 5, having the following selections:

1 – Strongly disagree, 2 - Disagree, 3 – Uncertain, 4 – Agree, 5 – Strongly agree; towards following key areas:

The micro text messaging (SMS) tool through flipped learning approach within a hybrid learning atmosphere is:

- "Friendly" while using

- "Comfortable" while using.
- "Essential" part of the learning process.
- Helpful in "Understanding" the topics.
- Helpful in "Learning" the topics.
- Helpful in the "Preparation of exams".
- Students' "Favorite method of learning".

Statistical comparisons were done for this research using Microsoft Excel 2016, based on the evaluations of exam marks for studied unit by both the groups 'A' and 'B', and the outcomes of differences for 'Before' and 'After' the use of micro text messaging (SMS) as a micro learning tool towards seven key areas, received from experimental group 'A' through the survey questionnaire. These comparisons are available in the next section.

6. Results

6.1. Evaluation of Exam Marks - Groups 'A' Vs 'B'

Table 1 and Figure 2 reveal the group means (averages) of exam marks for experimental group 'A' and control group 'B'. Table 1 evidently proves that experimental group 'A' that was experimented using digital information via micro text messaging (SMS) as a tool of micro learning through flipped learning approach within a hybrid learning atmosphere has gained elevated marks, showing the group mean of 9.08 out of 12.5 marks; however, control group 'B' that was taught through formal face-to-face instruction, has taken the group mean of 8.02 out of 12.5 marks. The calculation of difference in means of groups 'A' and 'B' (=> mean of group 'A' – mean of group 'B') gives a difference of 1.06 that is corresponding to 8.48%. Therefore, on average, every single student of experimental group 'A' has an addition of 8.48 marks as compared to every student of control group 'B'. These outcomes verify that digital information used through micro text messaging (SMS) as a tool of micro learning has helped experimental group 'A' to perform better in the examination. Therefore, on the basis of empirical evidence, the outcomes of the hypotheses testing verify that the null hypothesis H_0 **is rejected**; and micro text messaging (SMS) as a tool of micro learning through flipped learning approach within a hybrid learning atmosphere has a positive impact on the examination outcomes.

Table 1. Evaluation of exam marks – Group 'A' vs Group 'B' (outcomes of hypotheses testing)

Groups	Group mean (obtained marks)	Total marks of the exam	Outcomes of exam (Group 'A' vs Group 'B')	Outcomes of hypotheses testing	Remarks
Group 'A' (*experimental group*), *supported with micro text messaging (SMS) through flipped learning approach within a hybrid learning atmosphere.*	9.08	12.50	*It is proved that:* Group mean (exam results) of group 'A' > Group mean (exam results) of group 'B'.	Reject H_0	Micro text messaging (SMS) as a tool of micro learning through flipped learning approach within a hybrid learning atmosphere has a positive impact on the examination outcomes of group 'A'; the experimental group.
Group 'B' (*control group*), *went under formal face-to-face instruction.*	8.02				

Difference of means in Groups 'A' and 'B' = Mean value of Group 'A' – Mean value of Group 'B'
=> 9.08 – 8.02 = 1.06
Conversion of difference from group means to average = 1.06*100/12.5 = 8.48 %
=> Each student of experimental group 'A' has scored 8.48 extra marks as compared to each student of control group 'B'
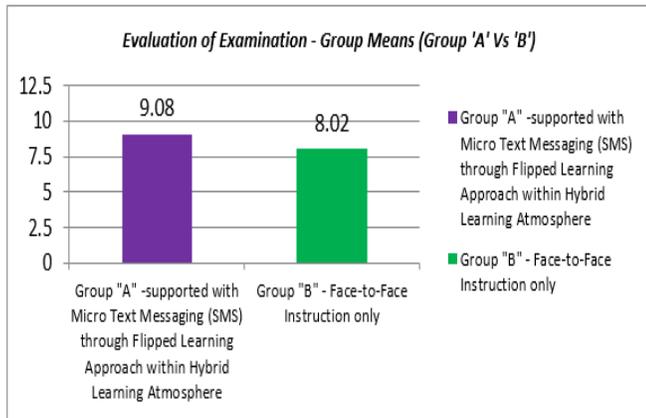
Figure 2. Evaluation of exam marks – Group 'A' vs 'B'

6.2. Students Attitudes towards Micro Text Messaging – Group 'A'

Table 2 and Figure 3 show the feedback of students' attitudes (from experimental group 'A'), received through the survey questionnaire towards the use of micro text messaging (SMS) through flipped learning approach within a hybrid learning atmosphere. The digits show opinions of the students' at 'Before' and 'After' stages with a clear difference in size of change towards major areas, including: 'Friendly' and 'Comfortable' while using the micro text messaging tool, and its counting as an 'Essential' tool for the process of learning. Earlier than the use of this electronic tool, students had furnished these key areas with the means of (2.13), (2.08) and (2.00) for 'Friendly', 'Comfortable' and 'Essential', respectively; however, these areas were furnished with high values of group means after using the micro text messaging by (4.42), (4.50), and (4.46) with a huge size of change by (2.29), (2.42) and (2.46), respectively.

Table 2. Students attitudes towards micro text messaging (SMS) – group 'A'

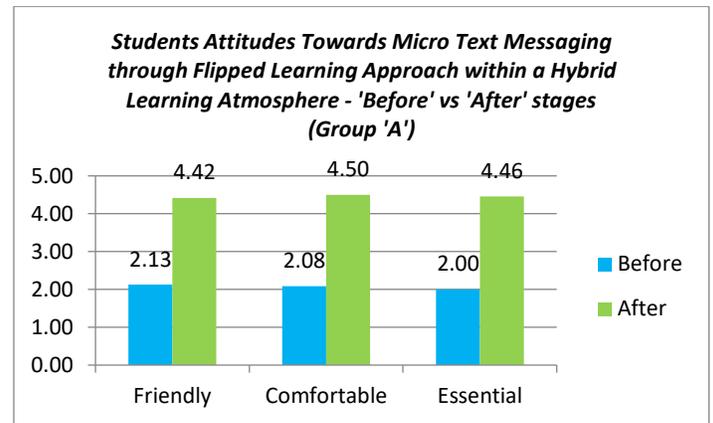| Key Areas	Group Mean		Size of change
	'Before' stage	'After' stage	'After' – 'Before'
Friendly	2.13	4.42	2.29
Comfortable	2.08	4.50	2.42
Essential	2.00	4.46	2.46

Figure 3. Students' attitudes towards 'Friendly', 'Comfortable' and 'Essential'

6.3. Students Feedback on Key Areas: Understanding, Learning and Help in Exam Preparation - Group 'A'

Table 3 and Figure 4 show the information about opinions provided by the students of experimental group 'A', regarding the help of micro text messaging (SMS) through flipped learning approach within a hybrid learning atmosphere towards:

- 'Understanding' the studied material.
- 'Learning' the studied material.
- 'Preparation of exams' for the studied material.

It is evident that the use of micro text messaging (SMS) through flipped learning approach within a hybrid learning atmosphere has formed positive impacts on the key areas, with a huge size of change with (2.29), (2.50) and (2.33) towards the help in 'Understanding' and 'Learning' the studied contents, and provided the support in 'Preparation of exam', respectively.

Table 3. Students' feedback on key areas: 'Understanding', 'Learning' and 'Preparation of exams'

Key Areas	Group Mean		Size of change
	'Before' stage	'After' stage	'After' – 'Before'
Help in 'Understanding' the studied material	2.21	4.50	2.29
Help in 'Learning' the studied material	2.04	4.54	2.50
Help in 'Preparation of exams' for the studied material	2.25	4.58	2.33
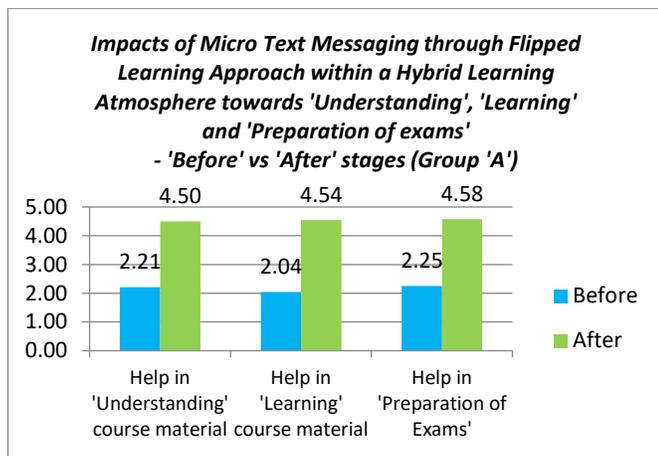
Figure 4. Feedback towards the help in 'Understanding', 'Learning' and 'Preparation of Exams'

Figure 5. Students' feedback towards 'Favorite method of instruction'

6.4. Favorite Method of Instruction – Group 'A'

Students' were requested to furnish their feedback about the 'Instruction through instructor and supported with micro text messaging through flipped learning approach within a hybrid learning atmosphere'. Table 4 and Figure 5 show the data about students' reactions at 'Before' and 'After' stages. They have rated this key area with a low group mean by (2.17) at the 'Before' stage; however, it is rated with a high group mean of (4.63) at the 'After' stage, with a huge size of change by (2.46).

Table 4. Favorite method of instruction – group 'A'

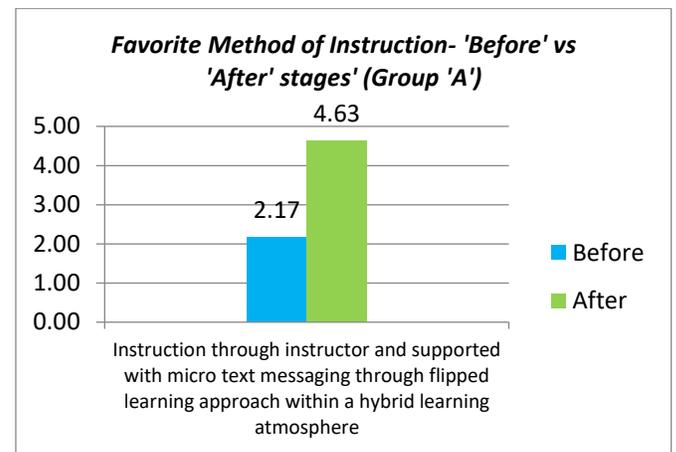| Key Areas	Group Mean		Size of change
	'Before' stage	'After' stage	'After' – 'Before'
Instruction through instructor and supported with micro text messaging through flipped learning approach within a hybrid learning atmosphere	2.17	4.63	2.46

As the null hypothesis is rejected; therefore, the outcomes of this research prove the comprehensive impacts of micro text messaging (SMS) as a tool of micro learning through flipped learning approach within a hybrid learning atmosphere towards the outcomes of examination because experimental group 'A' gained an increase of 8.48% marks for each student as compared to control group 'B'. Survey responses of experimental group 'A' show that the positive attitudes of students towards key areas 'Friendly', 'Comfortable' and 'Essential' are reacted with a huge size of change by (2.29), (2.42) and (2.46), respectively. The motivating outcomes of this research are also indicating towards key areas 'Understanding', 'Learning' and 'Preparation of exams' with a huge size of change by (2.29), (2.50) and (2.33), respectively, for 'After' minus 'Before' stages. In addition, students have honored the method of 'Instruction through instructor and supported with micro text messaging (SMS) through flipped learning approach within a hybrid learning atmosphere' with a huge size of change by (2.46).

Recently, a researcher [27] has conducted a study, based on quasi-experimental design, to examine the difference between flipped learning and traditional face-to-face learning. Experimental and control groups were used for the testing of flipped and traditional based learning on students, respectively. A questionnaire based on a five point Likert scale was used to receive the learners' feedback for before and after the tests. The outcomes have revealed that participation of students was

enhanced because of their active involvement and overall positive views about flipped learning. However, this research has not explored the impacts of flipped learning on the exam results, their attitudes and opinions towards the friendliness, comfortability and essentiality of the used flipped learning approach, its help in understanding and learning the studied material, help in preparation of exams, and students' favorite method of learning. Moreover, students have not experienced the benefits of micro learning content.

The current section of this paper has explored the impacts of text messaging (SMS) as a tool of micro learning through flipped learning approach within a hybrid learning atmosphere towards positive outcomes on the exam results, its friendliness, comfortability and essentiality. Moreover, its helpfulness in understanding and learning the course contents and usefulness in the preparation of exams. Likewise, the students' have selected this technique as a favorite method of learning.

7. Conclusions and Future Work

The outcomes of this study proclaim that the use of digital information via micro text messaging (SMS) as a tool of micro learning through flipped learning approach within a hybrid learning atmosphere certainly impacts the learning in a positive manner that supports the students to attain better marks in the examination, as equated to the traditional way of classroom based instruction. Therefore, null hypothesis is rejected; and micro text messaging (SMS) as a tool of micro learning through flipped learning approach within a hybrid learning atmosphere has a positive impact on the examination outcomes of the experimental group.

The questionnaire feedback of the experimental group clearly identifies that the use of micro text messaging (SMS) tool through flipped learning approach within a hybrid learning atmosphere is friendly and comfortable, and considered as an essential fragment of instructional practice. Moreover, it supports in understanding and learning the course topics through the creation of detailed and comprehensive concepts that helps in better preparation of the exams. Besides, this technique is

preferred by the subjects of this study as a favorite method of instruction.

The contents of course material used through micro text messaging (SMS) was based on the text that was less than 280 characters for each message and consumed in small steps (reading of text content with a gap of 10 minutes) via smartphones. Formal face-to-face classroom meetings were used for the purpose of conversations and discussions for the delivered micro content. These meetings were extremely useful contrasting the traditional classroom based instruction that is centered on long meetings and conversations towards the struggle of detailed development of concepts and produces compromised outcomes. Micro text message (SMS) is easy to send that is independent of any special software or a course management system, therefore, its usage is free from any specific expertise or training for instructors or learners. Moreover, micro text messaging (SMS) is an economical and inexpensive solution. Hence, instructors have to use this electronic tool through flipped learning approach within a hybrid learning atmosphere that is identified by this research as a friendly, comfortable and essential tool, helps in understanding and learning the course material, and supports in better preparation of the examination. Overall, experimental group 'A' has scored higher marks as compared to the control group 'B', and students of group 'A' have identified this mode of instruction as their favorite practice. The outcomes of this research are in agreement with [5] that the use of electronic communications as a tool of micro learning within a hybrid learning atmosphere clearly impacts the learning outcomes towards progressive direction.

Therefore, all the initial suppositions indicated at the beginning of this paper, regarding the expected impacts of this practice through the use of micro text messaging (SMS) as a tool of micro learning through flipped learning approach within a hybrid learning atmosphere have turned to be substantial those have produced positive outcomes and have bridged the gap in existing literature. Hence, this practice has produced novel outcomes, and has created state-of-the-art results that is a marvelous addition and new knowledge in the field of digital information and hybrid learning.

Few students had faced the depletion issue of batteries; consequently, they had to recharge their smartphones to read the next micro text message, which was a trivial limitation encountered in this study. Slight digression of concentration through WhatsApp messages while reading the micro text message of course content was another limitation, faced by some students of the experimental group. Generally, there were no major limitations or concerns with this study. It is common knowledge that electronic communications through text messaging (SMS) is focused; however, communications through social media applications, like WhatsApp, Facebook are distracted because of other entertainment stuff. Therefore, this practice is a productive solution to enhance the learning outcomes.

Dear educational establishments, governing bodies, concerned ministries, academicians, field experts, researchers, pedagogical professionals, principals, schools, colleges and universities of the entire world; snap to it, and use this technique of micro text messaging (SMS) as a tool of micro learning through flipped learning approach within a hybrid learning atmosphere that is economical and produces tremendous learning outcomes towards the enhancement of better educational quality; as believed by Nelson Mandela that the success of a nation depends on the quality of provided education [1]; therefore, micro text messaging tool (SMS) through flipped learning approach within a hybrid learning atmosphere is strongly recommended for pedagogical instruction at worldwide levels for the betterment of educational quality.

Audio podcasts, video podcasts, online chat sessions and wikis can be used through the flipped learning approach as a tool of micro learning within a hybrid learning atmosphere for the future work.

8. References

1. Prakash, S. (2019). *The Fifth Apple: An Apple a Day Keeps the Doctor Away*. Trafford publishing.

2. Ahmad, N. (2020). Taking Twitter to the Classroom as a Micro Learning Tool with In a Blended Learning Environment. Proceedings of 11th International Conference on e-Learning, Belgrade Metropolitan University, Belgrade, Serbia, 24-25 September.

3. Ahmad, N. (2017). Video Podcast as A Micro-Learning Tool in a Blended Learning Environment. E-Leader International Journal, Volume 12, Number 1, http://www.g-casa.com, ISSN 1935-4819, Chinese American Scholars Association, New York, New York, USA, February, 2017.

4. Ahmad, N., (2018). Effects of Gamification as a Micro Learning Tool on Instruction. E-Leader International Journal, Volume 13, Number 1, http://www.g-casa.com, ISSN 1935-4819, Chinese American Scholars Association, New York, New York, USA, February, 2018.

5. Ahmad, N. (2019). Impact of WhatsApp as a Micro Learning tool on Instruction. E-Leader International Journal, Volume 14, Number 1, http://www.g-casa.com, ISSN 1935-4819, Chinese American Scholars Association, New York, New York, USA, 2019.

6. Mocanu, E. M., & Deaconu, A. (2017). The Use of Information and Communication Technology (ICT) as a Teaching Method in Vocational Education and Training in Tourism. *Acta Didactica Napocensia, 10(3),* 19-34. https://eric.ed.gov/?id=EJ1160585

7. Ahmad, N. & Al-Khanjari, Z. (2016). Effects of Audio Podcasts as a Micro Learning Tool on Instruction. E-Leader International Journal, Volume 11, Number 2, http://www.g-casa.com, ISSN 1935-4819, Chinese American Scholars Association, New York, USA, July 2016.

8. Nazarenko, A. L. (2015, October 27-30). *Blended Learning Vs Traditional Learning: What Works? (A Case Study Research)* [Paper presentation]. Social and Behavioral Sciences, 200(The XXVI Annual International Academic Conference, Language and Culture. https://doi.org/10.1016/j.sbspro.2015.08.018

9. Joanna P. (2013). Blended Learning: An Institutional Approach for Enhancing Students' Learning Experiences. *MERLOT Journal of Online Learning and Teaching, 9(2),* 271-289. https://jolt.merlot.org/vol9no2/poon_0613.pdf

10. Auster, C. J. (2016). Blended Learning as a Potentially Winning Combination of Face-to-Face and Online Learning: An Exploratory Study. *Teaching Sociology, 44,* 39-48. https://doi.org/10.1177/0092055X15619217

11. Naqvi, S. J., & Ajiz, M. A. (2006). Attitudes toward WebCT and Learning: An Omani Perspective. *Issues in Informing Science and Information Technology, 3,* 435-444. https://doi.org/10.28945/904

12. Naqvi, S. (2006). Impact of WebCT on Learning: Oman Experience. *International Journal of Education and Development using Information and Communication Technology (IJEDICT), 2(4),* 18-27. http://ijedict.dec.uwi.edu/viewarticle.php?id=220

13. Ahmad, N., & Al-Khanjari. Z. (2011). Effects of Moodle on Learning: An Oman Perception. International journal of Digital Information and Wireless Communications (IJDIWC), 1(4), 746-752.

14. Minimol A. J., & Habil S. O. (2012). Micro Learning as Innovative Process of Knowledge Strategy. *INTERNATIONAL JOURNAL OF SCIENTIFIC & TECHNOLOGY RESEARCH, 1(11),* 92-96, ISSN 2277-8616. https://www.aou.org.bh/research/Documents/Research/IT/Dr _Minimol/Journals/2012C.pdf

15. Hug, T. (2005, January 25-28). *Micro Learning and Narration, Exploring Possibilities of Utilization of Narrations and Storytelling for The Designing of Micro Units and Didactical Micro-Learning Arrangements* [Paper presentation]. Fourth Media in Transition conference, USA. https://www.researchgate.net/publication/237558117_Micro _Learning_and_Narration_Exploring_possibilities_of_utiliza tion_of_narrations_and_storytelling_for_the_designing_of_ micro_units_and_didactical_micro-learning_arrangements

16. Jones, G. (2009). How can mobile SMS support and enhance a first year undergraduate learning environment? *Research in learning technology, 17(3),* 201-218. https://doi.org/10.3402/rlt.v17i3.10877

17. Naughton, D. (2014). A Review of Text Messaging (SMS) as a Communication Tool for Higher Education. *International Journal of Advanced Computer Science and Applications. 5(5),* 129-131, http://doi.org/10.14569/IJACSA.2014.050519

18. Kinshunk. (2003, March 10). *Adaptive mobile learning technologies [Online].* www.kcweb.org.uk/weblibrary/M-learning.pdf

19. Aliye, K., Nadia J. C. & Charles T. J. (2018). A systematic review of research on the flipped learning method in engineering education. *British Journal of Educational Technology, 49(3),* 398–411. https://doi.org/10.1111/bjet.12548

20. Uzunboylu, H., & Karagozlu, D. (2015). Flipped classroom: A review of recent literature. *World Journal on Educational Technology, 7 (2),* 142-147. http://doi.org/10.18844/wjet.v7i2.46

21. Haewoon, K., Changhyun L., Hosung P. & Sue M. (2010, April 26-30). *What is Twitter, a Social Network or a News Media?* [Paper presentation]. International World Wide Web Conference, Raleigh, North Carolina, USA. https://images.derstandard.at/2010/05/06/2010-www-twitter.pdf

22. Gil P. (2021, August 30). *What Is Twitter & How Does It Work?* https://www.lifewire.com/what-exactly-is-twitter-2483331

23. Caroline, F. (2019, January 6). *What Is Twitter and How Does It Work?* https://blog.hubspot.com/marketing/what-is-twitter

24. Mosel, S. (2005, January 10-14). *Self Directed Learning with Personal Publishing and Microcontent, Constructivist Approach and Insights for Institutional Implementations* [Paper presentation]. The Microlearning Conference, Innsbruck, Austria.

https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.1 67.4378&rep=rep1&type=pdf

25. Ahmad, N. (2020). Aftermath of Twitter as a Tool of Learning on Coeducation. Proceedings of 11th International Conference on e-Learning, Belgrade Metropolitan University, Belgrade, Serbia, 24-25 September.

26. Al-Ataby, A. (2021). Hybrid Learning Using Canvas LMS. European Journal of Education and Pedagogy, 2(6), 27-33. https://doi.org/10.24018/ejedu.2021.2.6.180

27. Alajlan, H.A. (2022). Performance, Participation and Perception of Computer Education Students Toward Flipped Learning. Tech Know Learn. https://doi.org/10.1007/s10758-022-09590-1

[28]. Ahmad, N. (2021). Online Education During and after Covid-19 Pandemic; Challenges, Opportunities and Post-Pandemic Changes. *Proceedings of 12th International Conference on e-Learning.* Belgrade Metropolitan University, Belgrade, Serbia. 73-79.

[29]. Ahmad, N. (2021). A Conceptual Framework of Instruction after COVID-19 Pandemic - VIAUTWGA Hybrid for VARK Learners. *Proceedings of 12th International Conference on e-Learning.* Belgrade Metropolitan University, Belgrade, Serbia. 80-85.

[30]. Ahmad, N. (2021). SRTRIN - A Framework of Remote Online Invigilation. *Egyptian Computer Science Journal (ECSJ) - 45(3)*, 21-36. (ISSN-1110-2586).