DEVELOPING 21st CENTURY SKILLS THROUGH FLIPPED CLASSROOM AT POSTGRADUATE LEVEL

By

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NATIONAL UNIVERSITY OF MODERNLANGUAGES,

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THESIS/DISSERTATION AND DEFENSE APPROVAL FORM

The undersigned certify that they have read the following thesis, examined the defense, are satisfied with the overall exam performance and recommend the thesis to Faculty of Social Sciences for acceptance:

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Submitted By: Asma Akhtar **Registration #:**09-MPhil/Edu/S20

Master of Philosophy

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Education

Name of Discipline

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Prof. Dr. Khalid Sultan

Name of Dean (FSS) Signature of Dean (FSS)

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Date

CANDIDATE DECLARATION FORM

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Discipline Education

Candidate of **Master of Philosophy** at National University of Modern Languages do here by declared that the thesis **"Developing 21st Century Skills Through Flipped Classroom At Postgraduate Level"** submitted by me in partial fulfillment of M.Phil Degree, is my original work, and has not been submitted or published earlier. I also solemnly declare that it should not, in future, be submitted by me for obtaining any other degree from this or any other university or institution.

I also understand that if evidence of plagiarism is found in my thesis/ dissertation at any stage, even after the award of a degree, the work may be cancelled and the degree revoked.

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ABSTRACT

Title: Developing 21st Century Skills through Flipped Classroom at Postgraduate Level

The study was designed to measure the level of 21st century skills development; to examine the practice of Flipped classroom approach and to measure the effect of Flipped classroom in developing 21st century skills at Postgraduate level. Conceptual framework of the study was based on two models. Flipped classroom model developed by Bishop and Verleger (2013), while the 21st century skills model developed by Binkley et al., (2012). Flipped classroom involved five sub-sections named as peer-tutoring, collaborative learning, problem based learning, active learning and e- learning and 21st century skills model involved three main dimensions named as fundamental skills, Meta skills and humanistic skills and each dimension had three sub-dimensions. The research was based on quantitative research approach with Ex-Post Facto research design. The Population of the research consisted of 586 students from management sciences programs enrolled spring session(2021) of three public sectors universities of Islamabad that used flipped classroom method. Census sampling technique was used by the researcher. Data was collected with the help of adapted tool. The reliability value of flipped classroom scale was .92 and 21st century skills development scale was .96. As 100% of the population was selected as sample size, however 40 respondents contributed in pilot testing and rest 546 students were selected for final data collection. The questionnaires were distributed by the researcher among 546 students by which 520 questionnaires were returned. Therefore, the rate of returned was 95%. Data was analyzed by utilizing Cronbach's Alpha reliability, item-total correlation, inter-section correlation, individual score, mean and linear regression. Findings revealed that (94%) students were at above average level of 21st century skills development. It revealed that students agreed with the status 4 for practicing flipped classroom method. It shows that flipped classroom had 44% positive significant contribution in developing 21st century skills and the null hypothesis was failed to accept. On the basis of findings, it is recommended Teacher may further improve students' skills by using brainstorming, think-pair-share and self-directed learning activities in teaching and learning process. Teacher may continue group work, video tutorial and lab experiments to check learning practices of students. Teacher may encourage the students to share their understanding by using discussion, debate and peer-instruction.

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LIST OF ABBREVIATIONS

Abbreviations	Terms
HEC	Higher Education Commission
NUST	National University of Science and Technology
NUML	National University of Modern Languages
MS	Master of science
MBA	Master of business administration
PH.D	Doctor of philosophy
N	Population
H0	Null Hypothesis
sig.	Significance
r	Correlation
R^2	R Square
β	Coefficient
SPSS	Statistical Package for Social Sciences
FC	Flipped Classroom
PT	Peer-Tutoring
CL	Collaborative Learning
PBL	Problem based learning
AL	Active Learning
EL	E-Learning
CS	Creativity and Innovation skills
PS	Problem Solving Skills
ICT	Information Communication Technology
CC	Cultural Competency
IS	Integration skills
LC	Life and Career skills
GA	Global Awareness

LIST OF APPENDICES

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Asma Akhtar

DEDICATIONS

To My Respected Parents and My Brother

Advocate Mr. Waqar Arif

For Encouraging Me to Believe That Everything Is Possible

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

As there is a quick revolution in the financial and social settings, it is essential for the teachers to overhaul their educational strategies and introduce an innovative learning environment for enhancing 21st century skills (Foundational skills, Meta skills and Humanistic skills) of the students. The three major innovative enterprises complained about the skills of the graduate students from the educational institutions that they did not prepare them for the workplace and business setup as per demand of this modern era. A few students scored good marks but for the workplace they had a lack of skills. The degree did not prove their skills. There is a need to focus on students' 21st century skills to accomplish the organizational necessities. Students' 21st century skills are the basic skills that teachers should organize and train their students to become a responsible part of society and achieve a goal in 21st century. As Kereluik et al., (2019) identified that mostly skills, specifically communication and collaborative skills, considered as equal of 21st century skills. Communication skills help to create group discussions activities that enhance the collaborative learning environment. Berry and Newton (2017) considered students' 21st century skills as an educational and social perspective. Students' 21st century skills (Foundational skills, Meta skills and Humanistic skills) empower students to memorize course content by discovering, arranging and assessing data with the help of multiple resources. For this purpose, teachers should conduct problem based activities in classroom and guide the students how to face and solve these problems in real life.

The teaching strategies used by the teachers for gaining students' skills; flipped classroom method is one of them. Flipped classroom is a reverse form of traditional classroom method. The traditional classroom is transferring information by repetition and using a teacher-centered approach. There are many advantages of flipped classroom involving face-to-face interaction, student participation, group discussion, online and self-paced learning.

Bergmann and Sams (2007) introduced the flipped classroom model and firstly recorded the class lecture that was helpful for absent students. Further, they prepared slides and shared via students' accessible websites. This method examine beneficial for not only absent students but the others also get knowledge through videos and recorded lectures. It is also useful for teachers to support the students in the learning process. The main purpose of this revolution in education is to clear students' perception and develops their understanding. Flipping the class provides anopportunity for teachers not just focusing on teaching but also identifies the students' improvement during class. Students' skills are sources that facilitate them to maintain progress, adjust with revolution by ultimate wisdom, and advance their profession and work position. Due to lack of these skills, individual cannot get suitable jobs and face difficulties in working places.

Flipped classroom is an important element of education and innovative tool have a flexible part in developing optimistic teachers' thoughts toward teaching. A new learning mode started by Khan (2011) of making an educational presentation with the background of his tone and shared with the students via YouTube, this method has changed now as academy called Khan Academy consisted on eight thousand educational lectures and up to two million followers. For flipping, a class teacher uses cognitive and moral development based activities. These activities enhance students' interaction and learning by doing.

Today, the demand of educational institutions is to concentrate on students as a centric part of teaching and learning process. At higher level of education, mostly teachers used lecture methods to deliver fundamental information; it never helps

Students to develop innovative skills like technical skills, and creativity skills and logical thinking skills. By flipping the class, teachers shared basic knowledge with students in pre-class and discuss it in the classroom. This method is useful for both students and teachers to develop and improve cognitive skills. To consider the availability of flipped classroom method, teachers should focus on three basic steps; course content, educational technology, and academic information.

As a new method within the educational and technological field, the flipped classroom method got the attention of many institutions to understand and implement. In class, it improved the face-to-face interaction between teachers and students. Teachers focused on common issues that students faced in daily life. By flipped classroom, students can learn independently. This method improves students' self- regulate learning habits. The teachers give directions and manage class activities and students follow all the instructions for planned homework and prepared for discussion in classroom with teachers and peers. The students can prepare the assignments and tests by using interactive innovation and multiple resources. Innovation is determined as the basic part of educational centers. Educational technology is the important component of the flipped classroom. To flip the classroom, teachers suggest thestudents to use e-learning resources like watching educational videos, listening recorded lectures and reading books or notes shared by the teachers. After learning the multiple resources, students discuss their knowledge in the class. In this way, students' learning become more strengthens. It is also helpful for those students who could not attend the class for some reasons. The flipped classroom improves and enhances students' 21st century skills. The 21st century skills comprised three major skills such as Foundational skills (Creativity and Innovation, Problem-Solving Skills and Collaboration skills), Meta skills (Information and ICT skill, Communication skill and Integration skills) and Humanistic skills (Life and career skills, Global awareness skills and Cultural Competency skills).

In Pakistan, we are distant behind in applying flipped classroom method practically; it is a demand of current situation and need of today that we should teach students in

According to flipped educational strategies. It would be helpful for their workforce after completing their degrees. Simply, students need more learning and developing skills than just reading the learning material. Teachers need to discover whether students learn the basic skills that are required in 21st century. It is necessary for the teacher to learn and gain information about new teaching strategies and their implementation in the classroom.

1.2 Rationale of the Study

According to Greiff and Kyllonen (2016), importance and utilization of 21st century skills do not show that these core skills raised in 21st century. A few skills like mental and problem-based skills had used for a long time in educational sectors. Innovative education turned the teacher-centered into a student-centered classroom. The basic component of the student-centered classroom is a flipped classroom method that is supportive for the students. There is a limited researches on flipped method, but researchers considered it important and famous classroom model because of its prominent aspects. Integration of educational videos during class is helpful for increasing students' understanding, making their concept, and offering equal opportunities for teaching (Fulton, 2012).

Roehl and Reddy (2013) defined that the teachers have to give centric position to students therefore they shift rote learning to improve their possessed information. The students' self-motivation is a vital part of the accomplishment of fundamental needs. Independent learning motivates the students for developing and improving skills. In traditional method, students just listen to the lecture and prepare notes. This way of teaching shows that this method is ineffective, insufficient and wastes the time of students (Brunsell & Horejsi, 2013). Dynamic learning style is used to represent various teaching methods in which students go from passive to active learning.

According to Abeysekera and Dawson (2015), flipped classroom method has two academic approaches; independent learning and critical thinking skills based leaning.

Success of flipped classroom method is based on students' performance. The students need to perform independently. Walsh (2013) investigated the effects of flipped classroom method on students' achievement. The study defined students' self-motivation and students' participation in a dynamic way. A study conducted by Mitsiou (2019) identified that the students' 21st century skills well thought-out as the social and specific connection and education offers an opportunity to students for developing basic skills. As a new learning mode, student-centered activities conducted in the flipped class. Flipping the class encourages in developing the 21st century skills like mental skills, creativity and problem-solving skills. Lin, Hsia and Hwang (2020) demonstrated that a versatile flipped classroom method fosters students' achievement and self-directed learning. This research considers that the flipped classroom has coordinated to extend learners' opportunities for practical classroom activities and develop abilities for solution of their own problems.

Birgili, seggie and oguz (2021) investigated a flipped strategy enhances students' performance and improves their learning capabilities. The flipped classroom method has a significant position in teaching strategies. It empowers the learners to learn 21st century skills, such as collaborative learning, group discussion and evaluation skills. The flipped classroom is a positive step toward improving students' skills like motivation, cooperation and digital skills (Park et al., 2021).

Above mentioned researches shows that flipped classroom has a good impact on students' performance, motivation and academic implementation. These studies conducted to know the students' current position in education but the basic need of today's students is to improve and develop the required skills through the flipped classroom method. It is the demand of 21st century to raise awareness among the students and develop their understanding to know how students explore knowledge and spark their skills. To fill this gap in Pakistan, the researcher selects the area of teaching strategy that was flipped classroom. This research was designed to measure the effect of flipped classroom in developing 21st century skills at postgraduate level.

1.3 Statement of the Problem

As an educational technology, a flipped classroom method offers various facilities to teachers and students. It enhances students' interest in education and transforms active participation role from teachers to students. Considering the importance of modern educational method, the current study planned, and the researcher selected the area of the flipped classroom. The flipped classroom method constructs self-motivation in students and guides them to practice problem-solving activities. The study was conducted to measure the level of 21st century skills development at the postgraduate level. This study was intended to examine the practice of the flipped classroom approach at postgraduate level. The students' 21st century skills like foundational skills, Meta skills and humanistic skills are the demand of this century.

Today, the students need to develop the basic skills as foundational skills, Meta skills and humanistic skills through teaching strategy and using instructional technology. Our education system focuses on course content that encourages rote-memorization and ignores students' skills. The students get good marks in course content, but they have a lack of core competencies. So, there was a need for the present situation to measure the effect of flipped classroom in developing 21st century skills at postgraduate level.

1.4 Research Objectives

1. To measure the level of 21st century skills development at postgraduate level.
2. To examine the practice of the Flipped classroom approach at postgraduate level.
3. To measure the effect of the flipped classroom in developing 21st century skills at postgraduate level.

3a. To measure the effect of Peer-Tutoring related to the flipped classroom indeveloping 21st century skills at postgraduate level.

3b. To measure the effect of Collaborative Learning related to the flipped classroom in developing 21st century skills at postgraduate level.

3c. To measure the effect of Problem Based Learning related to the flipped classroom in developing 21st century skills at postgraduate level.

3d. To measure the effect of Active Learning related to the flipped classroom indeveloping 21st century skills at postgraduate level.

3e. To measure the effect of e-Learning related to the flipped classroom indeveloping 21st century skills at postgraduate level.

1.5 Research Questions

1. What is the level of 21st century skills development at the postgraduate level?

2. What are the practices of the flipped classroom approach at the postgraduate level?

1.6 Null Hypotheses

H_{01}. There is no significant effect of the flipped classroom in developing 21st century skills at postgraduate level

$H_0$1a. There is no significant effect of Peer-Tutoring related to the flippedclassroom in developing 21st century skills at postgraduate level.

$H_0$1b. There is no significant effect of Collaborative Learning related to the flipped classroom in developing 21st century skills at postgraduate level.

$H_0$1c. There is no significant effect of Problem Based Learning related to flipped classroom in developing 21st century skills at postgraduate level.

$H_0$1d. There is no significant effect of Active Learning related to the flipped classroom in developing 21st century skills at postgraduate level.

$H_0$1e. There is no significant effect of e-Learning related to the flipped classroomin developing 21st century skills at postgraduate level.

1.7 Conceptual Framework

The Conceptual Framework shows the effect of flipped classroom in developing 21st century skills. Conceptual framework consisted on two models, flipped classroom model and students' 21st century skills model. Conceptual framework of the study defined one-way relationship in which flipped classroom has effect as anindependent variable in developing 21st century skills that is used as dependentvariable. The flipped classroom model based on five dimensions name as; per- tutoring, collaborative learning, problem based learning, active learning and e- learning. All dimensions of flipped classroom model have effect in students' 21st century skills development scale. The students' 21st century skills scale based on three main section; Foundational skills (creativity and innovation skills, problem solving skills and collaboration skills), Meta skills (information and ICT skills, communication and integration skills) and Humanistic skills (life and career skills, Global awareness skills and cultural competency skills). The researcher used Flipped classroom model which was developed by Bishop and Verleger (2013) and students' 21st century skills model developed by Binkley et al. (2012).

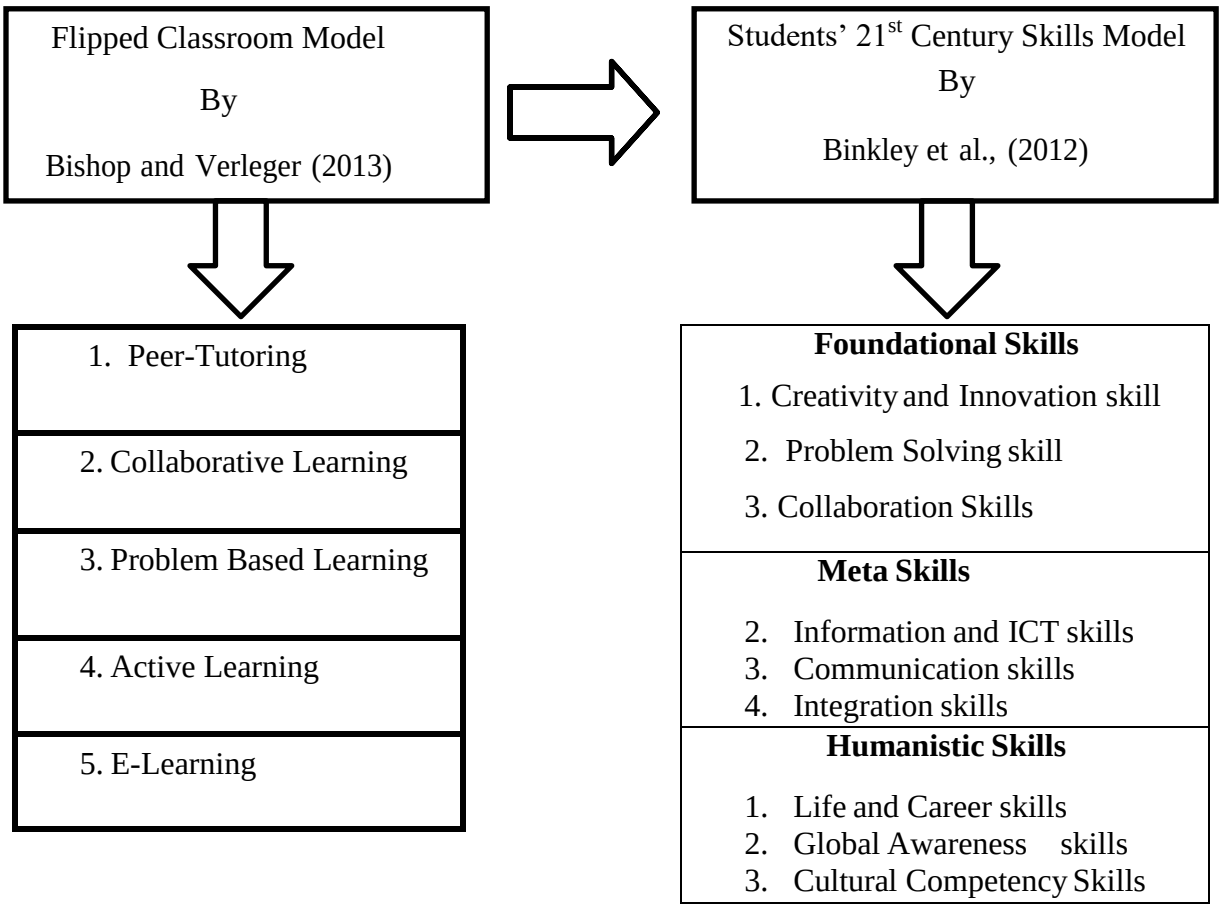

Fig. 1.1 Conceptual Framework of the study

1.7.1 Flipped Classroom Model Bishop and Verleger (2013)

Flipped classroom model developed by Bishop and Verleger (2013). The basic components are; Peer Tutoring, collaborative learning, problem based learning, Active learning and e-Learning.

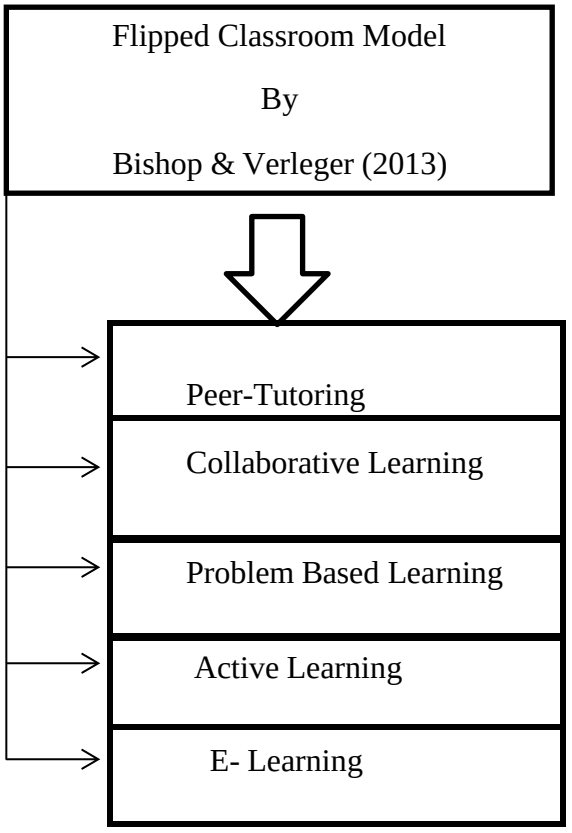

Fig. 1.2 Flipped Classroom Model by Bishop and Verleger (2013)

1.7.1.1 Peer-Tutoring

Peer- tutoring is the first component of the Flipped Classroom model. It is used to gain information or improving skills by working and sustaining with other students. In peer tutoring, students work in groups comprising six or seven members. In this element, pupils use intellectual skills or perform course content based activities. Teachers also used peer-tutoring to assist those students who need more time and individual concentration. It also called Peer- Assisted Learning strategy. It enhances endless perceptive of subject by discussion and teaches it to other students.

1.7.1.2 Collaborative Learning

This is the second component of the flipped classroom model. In this component, the learners practice in group in order to achieve tremendous objectives. It alienated task to each person of group and everyone achieves various educational objectives. Students discuss their issues related to subject in the class and solve these problems collectively. Teachers use this component to develop student's skills like critical thinking skills, self-regulated study skills, cooperative skills and self-motivation skills.

1.7.1.3 Problem Based Learning

We used this component of the Flipped classroom as a teaching method that motivates students in the learning process. The element is based on a learner-centered environment that helps students to learn the content by practice and solve critical problem concerning the subject. Students work in a team and each student performs in various ways. Teachers desire to develop self-confidence and ability to solve problems appropriately in real-life situation.

1.7.1.4 Active Learning

This strategy refers to self-study in which pupil get and use information and skills to characterize practical issues. In the classroom, learner-centered activities are conducted after analyzing the benchmark, principles and points of reference clearly distinguished by the teachers. In this learning style, learners have an opportunity that they can learn by their competencies.

1.7.1.5 E- Learning

E-learning is the important component of the flipped classroom model. Teachers facilitate the learners for utilizing online methods like watching YouTube educational videos, listening to recorded lecture, online quizzes, presentation and taking notes.

1.7.2 Students' 21st Century Skills Model by Binkley et al., (2012)

The students' 21st Century skills model develops by Binkley et al. (2012). This framework based on foundational, Meta, and humanistic skills. Foundational skills involved creativity and innovation skills, problem-solving skills, and collaboration skills. Meta skills involved information and ICT skills, communication skills and integration skills. Humanistic skills are based on career and life, Global Awareness and Cultural Competency skills.

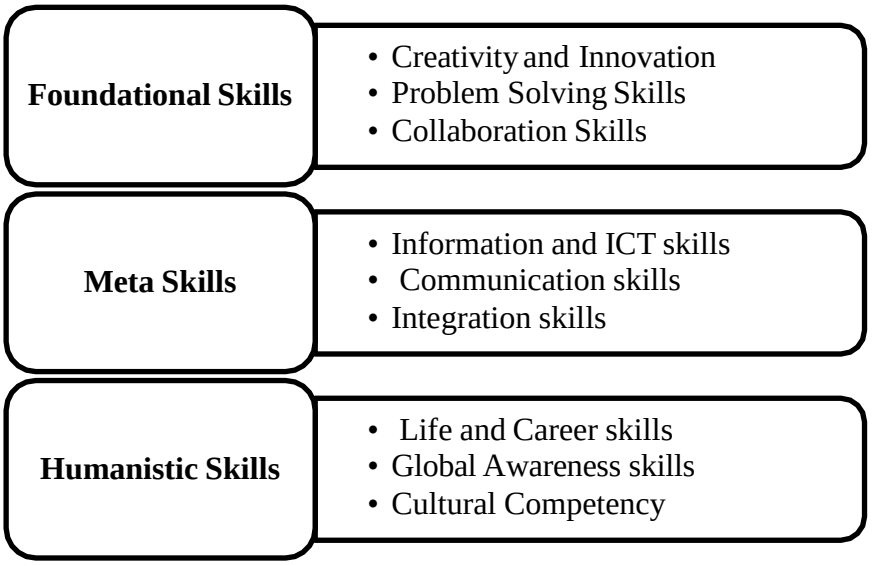

Fig. 1.3 21st Century Skills Model by Binkley et al., (2012)

1.7.2.1 Foundational Skills

Foundational skills refer to the capacity and essential requirements of the students that are important to know. Subcategories of foundational skills are as follows;

1.7.2.1.1 Creativity and innovation Skills

Creativity is the skill to think about the solution of a problem in various modes. It enables the students to solve difficult issues. Creativity is the basic part of 21st century skills. Creativity enables the learners to apply a wide expansion of information and abilities to evaluate, explain or improve thoughts. Innovation skills enable the learners to build up new and unique ideas that are beneficial for them to avail new opportunities.

1.7.2.1.2 Problem Solving Skills

These skills refer to the capability to envision, express and resolve mutually difficult and simple issues and take decision related to accessible knowledge. These skills involve critical thinking skills to collect, analyze, solve a problem, and make a plan. These skills are as the main part of the working place to ensure essential problematic solution and create a job environment efficiently. Problem-solving skills are related to higher order thinking (Cognitive skills) that are part of 21st century skills.

1.7.2.3 Collaboration skills

These types of skills enable the learners to understand others' point of views. Collaboration skills require working together and share their knowledge. It is the capacity to assist and discuss with the students to achieve educational objectives. The requirement of this skill is the capacity of communication and interaction with others. Communicative skill is the ability to share and express ideas to communicate with others effectively. In collaboration skills, the students can develop adaptableness, promptnessand understanding among team members.

1.7.2.2 Meta Skills

Meta skills related to cognitive competencies that included active participation of students and using various mental abilities in the whole learning process. Meta activities include arrangement, assessing and judging improvement to complete a target. The sub-categories of these skills are as;

1.7.2.2.1 Information Communication Technological (ICT) Literacy Skills

These skills are defined as competency and information related to computer utilization and innovative efficacy. Information Communication Technological literacy differs from computer programs skills that emphasize on designing and coding skills. Digital literacy is an important part of 21st century skills. It defines a capability to evaluate and build up facts and figures through innovative tools. The main purpose of this category is to inquire data, systematize, and practice by using a digital medium.

1.7.2.2.2 Communication Skills

These skills help the learners to present and get various types of information. These skills are based on listening clearly to others' views, speaking and understanding that enables the learners to differentiate how they can communicate face to face or through electronic means.

1.7.2.2.3 Integration skills

The arrangement of over two skills that used within a class like reading skill, writing skill, speaking skill and listening skill as well. We can use these skills for valuable extensive task in class.

1.7.2.3 Humanistic Skills

These abilities refer to self-actualization. These skills have societal and universal perception. People learn from society and their environment. Sub-categories of this type are as follows;

1.7.2.3.1 Career and Life Abilities

These universal skills are important for a successful change in the workplace. There is an opportunity for teachers to develop adaptability in the students. It provides an opportunity to create stability in students for being responsible member of citizen. Career and life skills comprise three elements; administer and organize individuals' occupation successfully, organize and manage interrelated knowledge and generate all needed information.

1.7.2.3.2 Global Awareness

It enables a person to make a comparison between other cultural learning environments. Global awareness capacity merges the information and fundamental aptitudes for individual to explore the opportunities around the world.

1.7.2.3.3 Cultural Competency

It included personal abilities through effective conversation, cooperation, or appreciation of others' ideas and opinions. It refers to the capacity of individual to interrelate and build a strong relationship with diverse people. Cultural environment involved values, traditions or attitude towards life style of different people. It is an essential element of students' 21st century skills.

1.8 Significance of the Study

The study would be favorable for teachers to increase their competencies by using a flipped classroom method. Teachers pay attention to instruct all learners separately instead of focusing the entire group of students. In the flipped classroom, teachers not just convey course-content information to students, but it is also essential for them to ensure that all learners acknowledge and have dynamic knowledge. By this study, a teacher suggested to discover students' skills and their intellectual, societal and financial status. It gives an opportunity to change the teaching method for improving their constructive role in the education field. By flipping the classroom, teachers have less load work. The study would be beneficial for the teachers to accumulate several sources that are useful for future activities. It would also be helpful for teachers to give quick feedback in the class and give equal attention to all students. The study would be important for students to develop 21st century skills (Foundational skills, Meta skills and humanistic skills) and use these skills in the classroom and in their practical life. In traditional class, teachers forced students to follow those instructions that are set by teachers. The teachers are focus to complete the entire course in allocated class time. The teachers suggest the students to look at educational learning material before the class to prepare well for class activities.

In Pakistan, we have been following the same teaching methods and curriculum for many years. This research would be considerable for curriculum wing to intend a plan and make probabilities for the appliance of the flipped method in all education phases. Flipped method develops students' higher order thinking skills (HOTS). This research provide a pathway and give instructions to upcoming investigator to carry out research for assessing the flipped classroom model and its effect on student's learning outcome, interest and skills. The study would be useful for teachers' trainers to add flipped classroom method in professional instruction projects. The flipped mode is a new teaching method and teachers need more time for preparation and conduction of class activities. It is the need of time that teachers must train well before flipping the class.

1.9 Methodology

Methodology was consisted of research approach, research design, population, sampling technique, research instruments, data collection and analysis of data.

1.9.1 Research Approach

The approach of the current study was quantitative research. This approach focused on measuring the data collection in term of statistical form. By using this approach, the researcher quantifies the opinions, views, facts and attitudes by collecting data in a numerical form and converted it into statistical techniques. The researcher used quantitative approach because it can generalize the results on the large population.

1.9.2 Research Design

The researcher used Ex-Post Facto research design for the current study. This research design is truly co-relational, where the researcher identifies the consequence or relationship among variables after its happening. The researcher desired to measure the effect of flipped classroom in developing 21st century skills at postgraduate level.

1.9.3 Population of the Study

Population of this study was based on 586 students' enrolled spring (session 2021) in Management Science programs at three public sector universities (NUST University Islamabad, Bahria University Islamabad and COMSATS Institute of Information Technology, Islamabad) that applying flipped classroom method. So the students of Management Science of these three public sector universities were the population of this study. The researcher retrieved information regarding public sector universities of Islamabad from website of HEC (Higher Education Commission, 2021) and strength of the students taken by administration of three universities.

Table No 1.1

Population of the Study

Sr #	Name of Institutions	Programs	No of Students Enrolled spring (session 2021)
1	National Universityof science and Technology Islamabad	Management Science	215
2	Bahria University Islamabad	Management Science	176
3	COMSATS Institute of Information Technology Islamabad	Management Science	195
	Total		586

The Table No 1.1 shows the name of three public sector universities of Islamabad and programs that applying flipped classroom method and students numbers enrolled spring (session, 2021) in Management Science Programs.

1.9.4 Sampling

For this study, the researcher used censes sampling technique in which data gathered from each person of the entire population. In pilot testing, the researcher collected the data from 40 students. After excluding 40 respondents, the sample size of the population was 93%. The researcher distributed 546 questionnaire among the students by which respondents returned 520 questionnaires. Thus, the rate of returned was 95%.

Table No 1.2

Sample Distribution Detail

Total Population	**No of Respondents (Pilot Trial)**	**No of Respondents (Final Data)**	**Rate of Return**
586	40	586-40= 546	520 (95%)

The above Table No 1.2 demonstrated the rate of returned of the research. Total population of the study was 586. For the pilot trial, the researcher collected the data from 40 respondents. After excluding pilot trial data and 40 respondents, the sample size was 546 that were 93% of the population. The researcher distributed 546 questionnaires and returned 520. Therefore,the rate of returned was 95%.

1.9.6 Research Instrumentation

1.9.6.1 Flipped Classroom Assessment Scale

The researcher used an adapted five point Likert scale questionnaire of the flipped classroom by Aljaraideh, (2019) for collecting data. There are five sub-sections of the flipped classroom method. The researcher adapted this questionnaire to measure the effect of flipped classroom in developing 21st century skills at postgraduate level. The researcher modified items regarding the present study.

Table No 1.3

Flipped classroom Assessment Scale

Variable	**Sub-variables**	**Items**
Flipped classroom	Peer-Tutoring	8
	Collaborative Learning	8
	Problem Based Learning	8
	Active Learning	8
	E- Learning	8

The above Table No 1.3 shows total no of items of flipped classroom assessment scale. The five sub-section of this scale name as Peer-Tutoring, Collaborative learning, problem based learning, active learning and E-learning. Total items were 40, and each section had8 items.

1.9.6.2 Developing 21st Century Skills Assessment Scale

The researcher collected data with the help of an adapted questionnaire related to developing 21st century skills by Todd and Kelley et al., (2018). The questionnaire was based on six sub-sections.

Table No 1.4

Developing 21st Century skills Assessment scale

Variable	Sub-variables	Items
Developing 21st Century Skills		
	Creativity and innovation Skills	7
	Problem Solving Skills	7
	Collaboration skills	7
	Information Communication Technology (ICT) skills	7
	Communication skills	7
	Integration skills	7
	Life and career skills	7
	Global Awareness skills	7
	Cultural Competency	7

The above Table No 1.4 revealed total no of 21st century skills development assessment scale. Total no were 63. The scale was based on three sections named as Foundational skills, Meta skills and Humanistic skills and each section had three sub-sections. Each section had 7 no of items**.**

1.9.7 Validation of Instrument

Validity is the degree to which a test is appropriately measured for what it invented to measure. For tool validation, the researcher consulted five experts of education department. The experts validated the tool by checking its content and construct validity. They suggested important and relevant suggestion regarding tool. After incorporating these required suggestions, the experts sign the validation certificate.

1.9.8 Pilot Testing

The researcher used pilot testing as a minor description before conducting the study. It is used to predetermine an instrument and testing a design or hypothesis. For pilot testing, the researcher collected the data from 40 respondents of the population. The researcher visited the required universities and distributed the questionnaire to 40 students. By face-to-face interaction, the researcher got 100% respond from the students. So, the rate of return for pilot trial was 100 %.

1.9.9 Reliability of the Instrument

Reliability refers to the consistency of the test. After final data collection, the reliability value of the research instrument was checked. The Cronbachs' Alpha reliability of the flipped classroom scale was (.92**) that shows fairly reliable in term of item-total correlation. The Cronbachs' Alpha reliability value of 21st century skills development scale was (.96**).

1.9.10 Data Collection

The researcher collected the data through an adapted five point Likert scale questionnaire as an instrument tool. The researcher visited the target department and interacts with the students face to face. Before visiting the required universities, the researcher got an approval letter for data collection from the management of the institutions. During distribution, the researcher interact the students and convinced them that there is no personal information based questions. So, they respond positively and show interested for the questionnaire.

1.9.11 Data Analysis

Table No 1.5

Data Analysis

Sr #	Objectives	Research Questions	Null Hypotheses	Statistical Techniques
1	To measure the level of 21st Century skills development at postgraduate level	1. What is the level of 21st century skills development at postgraduate level?		Individual Score Mean
2	To examine the practice of flipped classroom approach at postgraduate level	2. What are the practices of Flipped classroom approachs at postgraduate level?		Linear Regression
3	To measure the effect of flipped classroom in developing 21st century skills at postgraduate level		$H_0$1. There is no significant effect of flipped classroom in developing 21st century skills at postgraduate level	

Table No 1.4 shows the research objectives, research questions, Null hypotheses and statistical tests. To analyzed first objective that was related to levels of 21st century skills development, the researcher used individual scores as a statistical test and first objective addressed the research question that was "what is the level of 21st century skills development at postgraduate level"? For objective two that was related to practicing of flipped classroom method, the researcher used mean and second objective addressed the research question that was "What are the practices of flipped classroom approach at postgraduate level"? For the third objective that was related to measure the effect of flipped classroom in developing 21st century skills, the researcher used linear regression for analysis and this objective addressed $H_0$1 the Null hypothesis "There is no significant effect of flipped classroom in developing 21st century skills at postgraduate level".

1.10 Delimitation of the study

The delimitation of the study was as follows;

1. Three Regular public sector universities (NUST, Bahria and COMSATS Institute of Information Technology, Islamabad) that are applying flipped classroom as a teaching method.
2. Participants were the students of Management Science Programs only.
3. Students of postgraduate level only.

1.11 Operational Definitions

1.11.1 Flipped Classroom

Flipped classroom operationally defined as the new emerging teaching method that focused on the use of online resources' to delivers the learning materials with the students to enhance their independent learning outside of class followed by active learning activities and teachers facilitation during class time.

1.11.2 Peer- Tutoring

In peer-tutoring, students support other students in learning process. It is based on acquiring skills and knowledge through helping and discussion with other class fellows. In peer-Tutoring students teach to one another. The following steps used in peer-tutoring; pairing, teaching and practice.

1.11.3 Collaborative Learning

Collaborative learning is an instructional method in which students work in small groups to accomplish a common learning goal under the guidance of the teacherin term of group projects, peer review and debate.

1.11.4 Problem Based Learning

Problem based learning is a teaching method that used complex and real world issues as a subject matter to encourage students for developing problem solving skills and learn concept instead of just absorbing facts. In this method, students assign a task related to problem. They collaboratively analyze, discussed and suggested the solution. In this way, they used their concept to solve the problem.

1.11.5 Active Learning

Active learning is a teaching approach that involves students with the course material through discussions, problem solving, case studies and role play etc. Students asked to engages in their learning by thinking, discussing, investigating and creating.

1.11.6 E-Learning

A learning system based on formalized teaching with the help of electronic resources is known as E- learning. Students get information and knowledge through multiple resources of the Internet. Teachers facilitate their students to use E-learning method such as to watch educational YouTube videos, to listen to recorded teachers' lectures, quizzes and presentation.

1.11.7 21st Century Skills

Students' 21st century skills refers to a broad set of knowledge, skills, work habits and character traits that are considered important to success in modern world. These skills are an important part of the success in 21st century. These skills facilitate the learners to learn course content by discovering, identifying and application of new facts and knowledge. In the present study, the researcher measure the level of developing 21st century skills It is need of educational institutional to focus these skills and instruct the students in order to make a successful person in the society. The 21st century skills have three main sections that are foundational skills, Meta skills and humanistic skills.

1.11.8 Foundational Skills

Foundational skills refer to the fundamental skills that are related to basic literacyand numeracy skills. These skills essential requirements of the students that are important to know. Subcategories of foundational skills are as follows;

1.11.9 Creativity and innovation Skills

Creativity is the ability to produce or generate new ideas, approaches and solve the problems. As operationally these skills related to the ability to identify, to take risk and apply new approaches and to work with others effectively to generate new ideas and solutions.

1.11.10 Problem Solving Skills

This research operationally defined problem-solving skills that are related to higher order thinking (Cognitive skills) that are part of 21st century skills. This skill enable the students to analyze the problem, collected information related to solution of the problem, evaluate the solution in term of itsfeasibility, effectiveness and implement and make a decisions.

1.11.11 Collaboration skills

These types of skills enable the learners to understand other's point of views. Collaboration skills require working together and share their knowledge. It is the capacity to assist and discuss with the students to achieve educational objectives. It involves communicate, listens other clearly, share ideas and openly feedback and contribute the group discussion.

1.11.12 Meta Skills

Meta skills are related to cognitive skills that enable the students to learn other skills in a better way and improve the existing skill. Developing these skills helps the individual to become more effective learner, problem solver, communicator and to face the challenges of life in a better way.

1.11.13 Information Communication Technological (ICT) Literacy Skills

Information Communication Technological literacy is the ability to use digital tools to define problem clearly, asses the information efficiently and evaluate the sources. The main purpose of this category is to inquire data, systematize, and practice by using a digital medium.

1.11.14 Communication Skills

The skill refers to the ability to convey information by using different modes of communication such as verbal communication, non-verbal communication and written communication. It is the ability of students to show how to interpret, send and receive information. These skills are based on listening clearly to others' views, speaking and understanding that enables the learners to make differentiate how they can communicate face to face or through electronic means.

1.11.15 Integration Skills

Integration skills are combination of core language skills like reading skill, writing skill, speaking skill and listening skill. These skills are used for valuable extensive task in class.

1.11.16 Humanistic Skills

These skills refer to a set of personal qualities that are essential for effectivecommunication, collaboration and relationship in various settings such as self- awareness. These skills have societal and universal. People learn from society and their environment. The research defined subcategories of this type are as follows.

1.11.17 Career and Life skills

These skills are important to achieve goals, adapting to change. There is an opportunity for teachers to develop adaptability in the students. It provides an opportunity to create stability in students for being responsible member of citizen. Career and life skills comprise three elements; administer and organize individual's occupation successfully, organize and manage interrelated knowledge and generate all needed information.

1.11.18 Global Awareness skills

It enables a person to understand and engage with the diverse culture across the global, to know the perspective and issues that exists across the world like knowledge of global issues, languages proficiency and work collaboratively with diverse background people.

1.11.19 Cultural Competency skills

It included personal skills through effective conversation, cooperation, or appreciation of others' ideas and opinions. It refers to the capacity of individual to interrelate and build a strong relationship with diverse people. Cultural environment involved values, traditions or attitude towards life style of different people. It is an essential element of students' 21st century skills.

CHAPTER 2

REVIEW OF THE RELATED LITERATURE

The chapter consisted on review of literature related to flipped classroom and developing 21st century skills. The researcher divides the chapter into three sections. The First section was based on general introduction of independent and dependent variables, second section was based on theories and models of both variables and third section involved related researchers of flipped classroom and developing 21st century skills.

Section. 1 General Introduction Related to the Research Area

2.1 Flipped Classroom Method

Baker (2000) started flipped classroom at teaching and learning international conferences and after this study, flipped classroom converted into ‘’Inverted classroom’’. The researcher used the flipped classroom method as many educational strategies such as blended learning and holistic, based learning strategy that create flexible and resourceful learning environment for the students (Joanne, 2014). The Flipped classroom method derived from the concept in which students learn by using electronic means at home and during classroom. They discussed the previous knowledge with their teachers and classmates. In this way, students took part individually (Zownorega, 2013). In flipped classroom method, the teacher gives directions and provided guidelines to students about their course work. The teachers freely connected with students more frequently and give instruction individually. The

flipped method permits both students and teachers to utilize their time. It shows that teachers' spends more time with students to make them active learners.

2.1.1 Elements of Flipped Classroom

As Rutkowski and Moscinska (2013) explained that Flipped classroom had four basic elements, such as flexibility in learning process, learning culture, intended contented and proficient teacher.

2.1.1.1 Flexibility in the Learning Process

The requirement of flipped classroom is to create a flexible environment for students to learn new things according to their choices. The teachers provide flexible schedule in which students can easily complete their tasks and activities in the classroom.

2.1.1.2 Learning Culture

The flipped classroom reverse instructional mode to student-centered learning process. Teachers enhanced class time for discussion the topic and solve students' course content problems.

2.1.1.3 Intended Contented

An intended contented means teacher decides which type of content is more important for teaching. The purpose of the flipped classroom is to prepare students for solving their own problems and self-regulated study.

2.1.1.4 Proficient Teachers

There is a need for proficient teacher who creates effective teaching and learning environment, arrange the classroom, observe the students during discussion, give feedback timely and diagnosed students' problems. In the flipped classroom, the role of proficient teacher is more necessary than in the usual class.

F	L	I	P
Flexibility in learning process	Learning Culture	Intended Content	Proficient Teachers

Fig 2.1 Elements of Flipped Classroom (Rutkowski & Moscinska, 2013)

The present education system preferred the flipped classroom in which students are a central part of teaching and learning process. By this method, students have many opportunities to make their concept and work independently. The flipped classroom method facilitates those students who missed their classes because of some reason. They have a choice to cover up their course content by watching educational videos, listening to recorded lectures, discussing with teachers and peers and getting learning materials by using other digital resources. According to Bergmann and Sams (2012), learning materials uploading and sharing with students make teachers more professional as it save times of both students and learners. The teachers focused on practical tasks in class instead of repeating previous lectures.

2.1.2 Practices and Principles of Flipped Method

Educational institutions used a flipped model in various styles. In a few tasks, teachers preferred recorded lectures and educational videos as a homework assignments while in altered practices. Bergmann and Sams (2012) defined some changes of the flipped model in their book “Flip Your Classroom”. Because of these changes, they established a new model that is “Flipped Mastery Model” over the usual flipped classroom model. According to this model, the teacher directed to students to use different sources of learning and focused on reading books, videos, links and other electronic means. These sources facilitated students to develop their independent learning skills.

The flipped classroom method used in many fields like physics, mathematics, chemistry, biology, engineering and nursing. Baepler and Walker (2014) defined in his study the effectiveness of flipped classroom for the students of chemistry. Turan (2015) applied the flipped classroom method at primary education level and proved that the flipped classroom method is more flourishing and has positive effects on students' interaction instead of conservative classroom.

2.1.3 Learning Strategies of Flipped Classroom

The flipped classroom method encouraged the students to actively participate in the class. The strategies of the flipped classroom method are as following;

2.1.3.1 Learning Environment

The flipped class environment has different opinions. A few teachers examined flipped as learner-centered while others defined it as an advanced learning model. Learning environment is a physical setting in which students learn and doing practical work under the observation of their teachers. The students prepared themselves before the class by watching educational videos and listening to recorded lectures and during the class, they discussed and practice with their fellows. Teachers have an option whether they used electronic mean. According to Bergmann and Sams (2012), flipped classroom is just moving from teacher- centered to learner-centered later on using electronic means to improve students' learning.

2.1.3.2 Active Learning

Teachers encouraged students to take part in the class. They are allowed to share their ideas or discussed with teachers and peers for more explanation. In active participation, students perform various activities, such as reading, writing and discussing their knowledge. McKinney (2010) defined that active learning engages students to perform physical tasks and consider them how we can perform them.

2.1.3.3 Collaborative learning

This type of strategies enhances students' involvements. Johnson (2009) examine that collaborative strategy motivated the students to mutual their opinions and learning experiences. The teacher divided students into groups and they allowed to be discussed, compared, critical analysis and assess others' information. The role of teacher in collaborative learning is mentor and supporter. The students take part actively and used their knowledge to improve their higher order thinking skills (HOTs).

2.1.3.4 Brainstorming

Students are divided into groups and are given a specific topic for discussion. Teacher guide them to think and suggest a solution of the problems. The teacher advised students to support each other. Brainstorming technique is useful to develop students' creativity and they discovered various ideas related to a topic.

2.1.3.5 Short Presentation.

Students are prepared themselves before the class as self-regulated study and during the class teacher gave them 5 to 10 minutes to present their previous knowledge in front of the entire class. Teachers provide positive feedback and encouraged students to share their thoughts (Lalka, 2015).

2.1.4 Instructional Approaches (Traditional and Flipped Classroom)

According to Bachiller and Badia (2020), flipped classroom is known as the transforming approach of the traditional instructional approach in which teachers give a lecture and students listen passively. In traditional methods, teachers give homework individually. While in the flipped classroom method, teachers shared learning materials with the students before the class and then in class they discussed that material in a form of prior knowledge with teachers and other students. The purpose of class discussion is to clear concepts and get

possible responses to difficult questions. After the class, the students have an opportunity to use multiple resources of learning like self-learning activities, e-learning or pair and share activities.

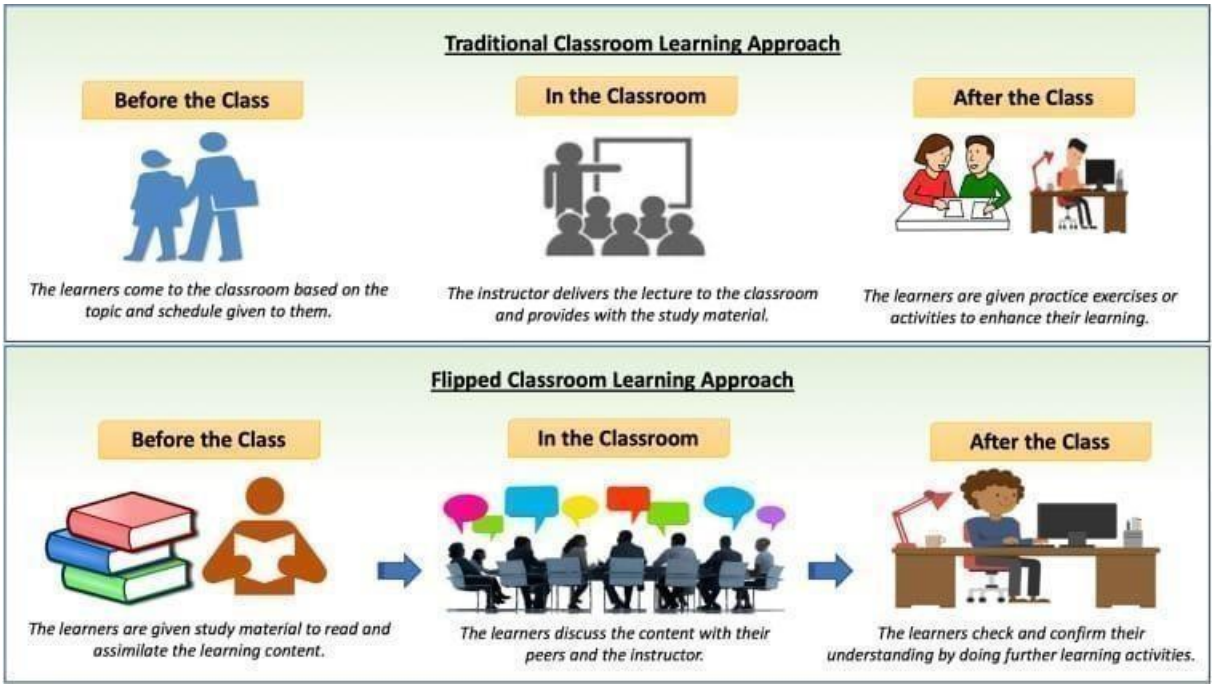

Fig 2.2 Instructional Approachs (Traditional and Flipped classroom) by Bachiller and Badia (2020)

The above figure shows traditional classroom method in which teachers planned the content that they deliver in the class and students are given tasks as a home assignments or projects. In flipped classroom, teaching method is applied according to the students' preferences. The students reading the content as a pre-class activity, within the class they discuss that content and then assess their knowledge by doing practical tasks. By flipping the classroom, the students become more responsible. They identified some positive effects of flipped classroom are as follows;

2.1.4.1 Teachers Expectations

As in the flipped classroom method, the students complete work as an active learner. Students become responsible in term of select, access and learn something new. Teachers are expected them to learn by doing activities with their peer.

2.1.4.2 Self-Paced learning

Course content or learning materials shared with the students as online sources. They have choices to access data by using multiple resources. Students are become capable of reading, defined, recognize and incorporate at any place and own time. Teacher forced them to follow the allocated or planned time schedule.

2.1.4.3 Peer- Discussion

In the flipped classroom method, students have a lot of time to discuss and cooperate with the teachers and peer. In this way, group discussion improves their communicative skills. They can express their thoughts and ideas effectively.

2.1.5 Challenges of Flipped Classroom

Teachers faced some challenges for flipping the class at the postgraduate level. According to Ash (2012), teachers need more time to apply the flipped classroom method. New teaching method can be practiced by only the person who has knowledge and experience about it. For uploading videos and recording lectures, teachers need to learn innovative skills. Several educational institutions faced financial issues to train their staff members. Bergmann and Sam (2012) recognized that students faced problem in self-learning. They cannot continue homework independently and without the guidance of teachers. While a few students are support the flipped method as it saved their time but slow-learners faced many difficulties to resolve their academic issues. Nielsen (2012) considered that students' family background also affected the flipped learning method. Some students have no facility of electronic means. Therefore, all those students are totally depending on campus digital tools to complete their work.

Zainuddin (2015) explained that teachers prefer traditional method instead of using flipped method. Teachers felt more satisfied with the lecture delivering method. In the lecture method, the teachers impart more information in limited time while flipped classroom demand more time in planning and conducting learner-centered activities. Someone easily attracted students to quality educational videos. Teachers have a choice to recommend different websites. Students can easily access and watch educational videos related to their course. Parents' education and interest also effects flipped learning method. There is inequality in completion students' home assignments. For this purpose, the flipped classroom provides a flexible learning environment for students for collaborative learning. Students do work under the observation of their teachers.

2.1.6 Benefits of Flipped Classroom method

Flipped classroom method has several benefits for teachers and students. Fulton (2012) defined that students learn new content by using digital tools as watching video and listing recorded lectures at home. By flipping the class, teachers give attention to student equally. It motivated students to ask some relevant questions or look for additional help in overcoming difficulties. The flipped classroom method promoted group study within the class. It empowers students to spend time with their peers and teachers. Cisco (2011) defined that the flipped classroom method improves students' collaborative learning skills. This method encourages the students to well prepare before the class and during class shared their ideas and knowledge with other students. In this way, students can learn quickly through think, pair and share process. The flipped classroom is beneficial for those students who missed a lecture, in this way student can easily access and learn in their claim time (Ahmed, 2016).

In traditional class, students interact with their teacher as primary sources of information while flipped method provides various sources. They can investigate new thing by utilizing various resources. Herreid and Schiller (2013) conducted a study on

15,000 people from various fields of science, engineering, technological and mathematician, almost two hundred people shared their views about benefits of flipped classroom. These benefits are as; Student spent more time with their subjects and used digital tools within the class. The flipped classroom method encourages students to learn, think, shared and evaluated their performance. Flipped method increases students' interaction and participation in the class.

By Zainuddin (2015) students get positive feedback from their teachers. Flipping the classroom enhances students' motivation and confidence. As students well prepared before the class so they can interact and discussed confidently with teachers and fellows. Ozdamli and Asiksoy (2016) expressed that teacher can easily diagnose students' problems and needs by using flipped method. Teacher interacted and solved students' learning complexity that is not possible during traditional learning environment. In traditional class, teachers are forced to complete their course within the class time while students remained passive. Flipped method provides a flexible learning environment both for teacher and students.

2.2 Students' 21st century skills

The requirement of educational institutions is to teach and prepare students to become a succeed person within the modern world. By Taylor (2012) students' 21st century skills are learned in various circumstances and these skills used to manage, communicate and adjust in the society. Social skills have a visible role within the advance era. Students should be capable of exchange and coordinated the knowledge and skills that they learned in different circumstances. As Pellegrino and Hilton (2012) students need to make a difference in social, emotional and intellectual skills. The students who can adjust to the social, innovative and financial trouble of this century and apply these skills to solve their problems will have a sound and positive life. MclntyreOdoms (2015) defined the requirement of people is just simple education while the demand of

present students is to educate them with relevant data that enhanced their skills. Wang (2008) defined several 21st century skills. These skills are as following;

1. Problem- solving and critical thinking skills
2. Collaboration skills
3. Flexibility and adaption
4. Entrepreneurial skills
5. Integration skills (speaking and writing)
6. Analytical skills
7. Innovative skills

2.2.1 Critical thinking skills

A critical thinking skill refers to the capability to envision, expressive and resolve mutually difficult and simple issues and take decision related to accessible knowledge. These skills involve collecting, analyze, solve a problem, and make a plan. These skills are the main part of the working place to make sure essential problematic solution and create a job environment efficiently. Analytical skills related to higher order thinking (Cognitive skills) that are part of 21st century skills.

2.2.2 Collaboration skills

Collaboration skills also called teamwork that is the capacity to assist and discuss with the students for achieving educational objectives. The requirement of this skill is the capacity of communication and interaction with others. Communicative skill is the skill to share and express ideas to communicate with others effectively. In collaboration skill, students contribute individually as adaptableness, promptness and understanding among team members.

2.2.3 Flexibility and Adaptation

Adaptability defines as skill to accept the changes. This skill helps the students to adjust to new workplaces and to face new challenges. The requirement of this skill is to use new ideas and several responsibilities. Flexibility means to continue work in various situations.

2.2.4 Entrepreneurial Skills

Entrepreneurial skills are the persons' ability to implement their opinions or thoughts practically. It involved critical thinking skills, teamwork skills, takingrisk and innovative skills. By developing these skills, individual can be able to decide making and apply this plan for achieving goals. Some entrepreneurial skills are as follows;

2.2.4.1 Strategic skills

It is a foremost vital skill that is helpful for the individual to find out the solution of the problem. When individual have a skill to think deliberately or strategically, they find out many opportunities.

2.2.4.2 Time Management

Time management skills are a necessary goal for the organization. To develop this skill, an individual need to plan, manage and give priority to tasks. It helps the individual to complete their tasks effectively.

2.2.4.3 Efficiency

This skill accepts great implementation or enhances performance. After managing time, we focus a person on accomplishing objectives. Self-motivation can improve efficiency and proficiency.

2.2.4.4 Resilience

There are many difficult situations faced by an individual in which he challenges rejection or burnout in his business field. Entrepreneurial skills help the individual face the challenges effectively.

2.2.4.5 Communication skills

By utilizing this skill, people can communicate and deal effectively with their clients. Speaking skills are an important part of a successful business.

2.2.4.6 Teamwork and Leadership

As an entrepreneurial leader, a person needs to lead their team and take decision regarding their business. By team working, all members are motivated and take an interest in sharing their ideas.

2.2.4.7 Integration skills

The arrangement of over two skills that used within a class like readingskill, writing skill, speaking skill and listening skill as well. We can use these skills for doing valuable task in class.

2.2.4.8 Innovation skills

Innovation skills enable the students to build up new and unique idea that benefit for them to avail new opportunities.

2.2.4.9 Analytical skills

Analytical skill refers to envision, expressive and resolve mutually difficult and simple issues and take decision related to accessible knowledge. These skills involve critical thinking skills to collect, analyze, solve a problem, and make a plan. These skills making sure essential problematic solution and create a job environment efficiently.

Davis (2016) identified in his study that the 21st century skills required to use and introduced within the workplace. The outcomes of the study show that the essential skills that need to be used in the working place are critical thinking skills of the workers. After that, collaborative problem solving and adaption skills are the foremost. Students as a twenty-first century learners are motivated and responsible for their own learning. This process makes them accurately self-motivated and confident in learning. To force the students towards learning, they had gotten to be introvert and discourage (Zhao, 2007). Students are efficient in core competencies prior to complete their degree. As Pellegrino and Hilton (2012) defined that during the learning process, learners seek knowledge and then exchange it in a new condition.

2.2.2 Role of Teacher and Learning Environment

Pearson (2014) defined that teachers' role moves from knowledge impart to skills guidelines. Twenty-first century skills changed the teaching method in which teachers apply and instructed the students. Learning environment can be improved by developing students' skills that will be useful in future (Wagner, 2012). Classroom environment and teachers are a central part of the learning process. There are various teachers' qualities. The following qualities are as;

1. To focus on students' involvement and knowledge
2. Make sure cooperative and group based learning
3. Especially focused on students' inspiration and feelings towards learning
4. To ensure individual differences among students
5. Provide positive feedback to students

Robinson and Aronica (2015) stated that the education system has three basic components such as; teaching method, curriculum, and evaluation. Teaching can change and implement on the education system. Teacher must be a facilitator in teaching and learning process. According to Miyamoto et al., (2015), developing students' intellectual skills has positive effects on group discussion, participation and

students' performance. Intellectual and social competencies are important for enhancing financial and economical outcomes. Education empowers the students to develop four main competencies like; education must be capable the students to take responsibility and work independently, to develop cultural skill that is necessary for students to respect their culture and others, to build up global awareness in the students. Teachers should build up four basic responsibilities, such as the following;

2.2.2.1 Teachers' Expectation

Teachers have essential desires towards students' achievements. When the teacher expects from student to do excellent tasks, they definitely work and are more motivated toward learning. There is a need to develop sound association among teachers and students (Robinson & Aronica, 2015).

2.2.1.2 Teachers' Engagement

Teachers' engagement in teaching and learning process is to consider basic responsibility. They should create useful learning environment in which students can easily learn (Robinson & Aronica, 2015).

2.2.1.3 Facilitate the Students

Teachers have various teaching modes. Sometimes, they teach students in groups or in face-to-face session. Teachers continuously alter and adjust their strategies according to the demands of students. Workable teaching is possible when students can adapt, evaluate and respond easily. Students are curious by nature. That way, we consider investigation based learning more influential. As Taylor (2012) defined inquiry based learning as an authentic learning. This type of learning motivated and encouraged students to do works in several techniques like group discussion, cooperation and in a natural setting. All these types are useful for students to complete their tasks independently.

2.2.1.4 Empower the Learners

Teachers are not just instructors; they are facilitators and provide gaudiness to students in developing self-confidence and self-motivation. They encouraged the students to work in groups and empower their skills. Teachers urged the student to think logically instead of memorizing data.

Section. 2 Theories and Models Related to Flipped Classroom

2.2 Theories and Models related to Flipped Classroom

This section comprised theories related to flipped classroom as constructivism, cognitive and instructional learning theories.

2.2.1 Constructivism Learning Approach

Constructivism contains a solid effect on teaching approaches and strategies as an essential educational philosophy. According to Tzuo (2007), Constructivism defined the social and moral development theories developed by Piaget and Vygotsky. Teachers developed many teaching methods on the base of constructivism such as active or dynamic learning strategies. In active learning, students took part actively and completed their tasks independently. Active learning motivated the students to ask questions and discussed their knowledge with teachers and fellows (Andrews et al., 2011). This type of learning strategy makes a students' involvement possible in the learning process. Problem-solving activities, collaborative learning and inquiry based learning are considered basic examples of active learning. Flipped classroom as a dynamic strategy contends that students should be active during the lecture and tried to learn by self-regulated study (Berrett, 2012).

Flipped classroom model reverse the conservative educating system to online teaching. Teacher transferred the content to students by using means of recorded lectures and videos outside the class. During this process, for developing students' skills, teacher focused on learners-centered activities rather than teacher-centered techniques (Foldnes, 2016). According to Mvududu and Thiel (2012), constructivism

is based on four basic principles; students' learning basically depends on their previous knowledge to change and adjust the new ideas with the previous one. It focused on creating ideas rather than memorizing or collecting realities. It accepted that learning is possible when we understand prior knowledge and make a difference between new and old thoughts. Constructivism theory applied recently within the classroom by the teachers. In promoting cooperative learning, it is necessary for students to justify and shared their opinions with classmates (Ilyas et al., 2014).

As Akbar (2002) defined that constructivism theory must be a part of course and the teachers make a proficient improvement as the constructivist approach. Constructivism based curriculum will be useful for students to become an active learner. Teachers should improve the learners' skills by involving them in class activities and used available innovative tools within the classroom (Hare et al., 2005). Students are continuously enthusiastic and do efforts to discover the solution for the difficult questions. For this purpose, the classroom environment must be effective and facilitative for the students (Christie, 2005). As human beings, we have different opinions about the world. Every person learns by perception and experiences. By facing unusual condition, we tried to adjust the new situation with previous concepts (Lovett, 2008).

2.2.1.1 Characteristics of Constructivist Approach

In constructivism learning theory, students create their concepts about the surrounded world on the base of their personal observation and experiences. Xu et al., (2008) defined the main characteristics of constructivism. These characteristics are as follows;

1. Students develop their concepts on the base of prior knowledge, they explore what is necessary for them and deciding the quality and capability of their explored information through self-evaluation.

2. The learning process starts in question by approximately the authenticity of thoughts or ideas. The aim of authentic knowledge is the reclamation of conviction.
3. Students can learn effectively by social interactions
4. Constructivism learning approach changes the role of teacher from instructor to supporter and facilitator. Students are the main part of teaching and learning process.
5. Constructivist focused on learning environment so that students can learn by active participation and practical classroom activities.
6. Constructivist believed that students learn effectively by discussion with their teachers and fellows. This type of theory suggested that students must be complete their tasks in groups and collaboratively. Students shared and exchange their thoughts on the topics.
7. Constructivism motivated the students to set their learning goals and make efforts to achieve their goals independently.
8. The teachers should share their learning experiences with students in developing interest and risk-taking habit. Teachers must clarify their demands and roles of students that enhance students' involvement in learning.

2.2.1.2 Constructivist learning environment

Learning environment focused on learners' desires and instructional effectiveness. Constructivist class differs from the traditional class in term of their qualities. Teachers encouraged flexible class environment and students' creativity through collaborative learning. Teachers and students both think about the changing world and can effectively extend and investigate this change as a dynamic observer. In the classroom, the main activity is to find out the solution of a difficult problem. After finding, they build up a strong conclusion. This process increase students' interest and motivates them to investigate more related solutions. Constructivist approach focused that effective learning is possible through societal contact that gives

importance cultural environment. For developing intellectual skills, culture plays an important role. In the cultural learning environment, students learn about cultural background, different languages and societal setting. Teachers conducted students' cooperative based activities in which they discuss and clarify their facts and knowledge.

2.2.2 Cognitive learning Approach

As a learning approach, cognition focused on the human brain and effectively use of thinking. As Peggy et al., (2013) cognitive approach defined as an intellectual process by which we attain information and recognize it through experiences. This learning approach merges learning and cognition to explain the various learning processes. The purpose of cognitive approach is to consider, understand and maintain the information that we gained. As a dynamic approach, it activates students' sensational skills and enables them to assimilate and adjust previous knowledge to new concepts. Cognitive learning approach focused on previous knowledge rather than rote-memorization. It develops students' thinking skills so that they can differentiate and reflect on learning materials. According to Lopes et al., (2008), cognitive approach has various benefits for improving students' learning skills;

1. Students work through learning by doing. Learning improves their understanding instead of just memorize the learned materials.
2. It develops critical thinking skills of the students. This approach helps to foster this basic skill and enables the students to apply it for solving a difficult problem.
3. Cognitive approach enhances and improves students' confidence to tackle challenges during the learning process. By this approach, students can learn something new in a limited time. It promotes constantly gained information in any circumstances.

2.2.2.1 Zone of Proximal development (ZPD)

Zone of Proximal Development (ZPD) defined as a constructivist approach that differentiates between what students can learn independently and with the help of teachers. As Mayer (2008) contended that cognitive approach development can be possible only by learners' interactions with others. Santrock (2001) assumed that learners enthusiastically build their information by utilizing intellectual skills and cooperative skills to create their social and verifiable foundations.

2.2.2.2 Scaffolding

As Elliot et al., (2000) determined that teachers provide support or guide to students as required. Scaffolding is defined as a teaching strategy in which students work with the help of a teacher or more competent person to attain educational objectives. According to Aggarwal (2006), after developing cognitive skills students perform their tasks with no supports. They become capable to do work independently. Scaffolding strategy defined students' higher understanding level. Teachers provide guidance according to the students' need and requirements.

2.2.3 Instructional Technology

Technological tools consider a basic part of instructional procedures that is comprehensive, a coordinate method including persons, opinions, strategies and administration for examining problems and arranging execute, assess and solve out to those problems that faced in teaching and learning process. Instructional technologies give an opportunity to the students to use computer and improve their skills for superior outcomes. According to Billings and Mathison (2012), instructional technologies help the students to develop their skills and encourage them to take part actively during class discussions. In the educational system, we have different instructive strategies from theory to practice, from read materials to

presenting data and introduction to perusing in hard writing copies. Educationist has different opinions and consider that these instructive techniques are basically valuable for overcomes unnecessary hurdles faced during instructions. Mangal (2011) defined different instructional technologies that are as follows;

1. Composed printed books, handouts and worksheets, etc.
2. Print out chart and outlines
3. Attractive whiteboard
4. Computer programs
5. Execution of instructional innovative tools
6. Multimedia displays things
7. Demonstrate or flash cards
8. Slides visibility

2.2.3.1 Implementation of Technology in classroom

A few decades before, teachers just have an option to use innovative tools as supporting technique within the class. Nowadays, technology is a crucial element of teaching methods. Those teachers who used digital tools in the class to improve teaching and learning process can be able to grant help plan for enabling students to be succeeded within the innovative field (Chung, 2007). A general model prepared by Wang (2008) help the proficient teachers who used a computer in class to improve the learning process. This model is based on three essential elements; instructional method, collaborative and computer innovation. The components have an important role in improving instructional technology. Computer innovation is the basic element and other elements of instructional method and collaborative technique depend on innovation for the successful educating system. This model facilitates e-learning and guides the teachers to assess their teaching proficiency. As Hennessy et al., (2015) defined the basic strategies that are helpful for professional teachers to implement technological tools within a class and improve students' collaborative learning skills. Teaching

faculties, society and administration has sound effects on the entire instructional process. Teacher need to develop innovative skill to use technological instruments in the classroom. There is a need to motivate and encourage the teachers to use effectively technology and enables the students to improve their learning skills by using technology in a limited time.

2.2.2 Models related to Flipped Classroom

Flipped classroom model comprised two basic learning theories: social constructivist and cognitive theories. These theories are an "Umbrella" that enhances the learners' skills, concentration and competencies in instructional procedure. Constructivist theory defined that information could be a state of understanding that comes from a determined interaction of the society and environment. Students are well prepared and present their previous knowledge in the class. When they learn something new and adjust it with previous concepts, it develops a distinctive perceptive of the course content. Information or knowledge constructs again and again on the bases of human experiences and continuous learning. The second learning perspective that affects the flipped classroom model is cognitive learning. Cognitive learning theory is based on; learners' previous knowledge, learning objectives and learning environment. As in the flipped classroom, teachers shared learning materials with students so that they select learning approach according to their interest. In this way, they can categorize their intrinsic and extrinsic mechanism of cognitive learning theory.

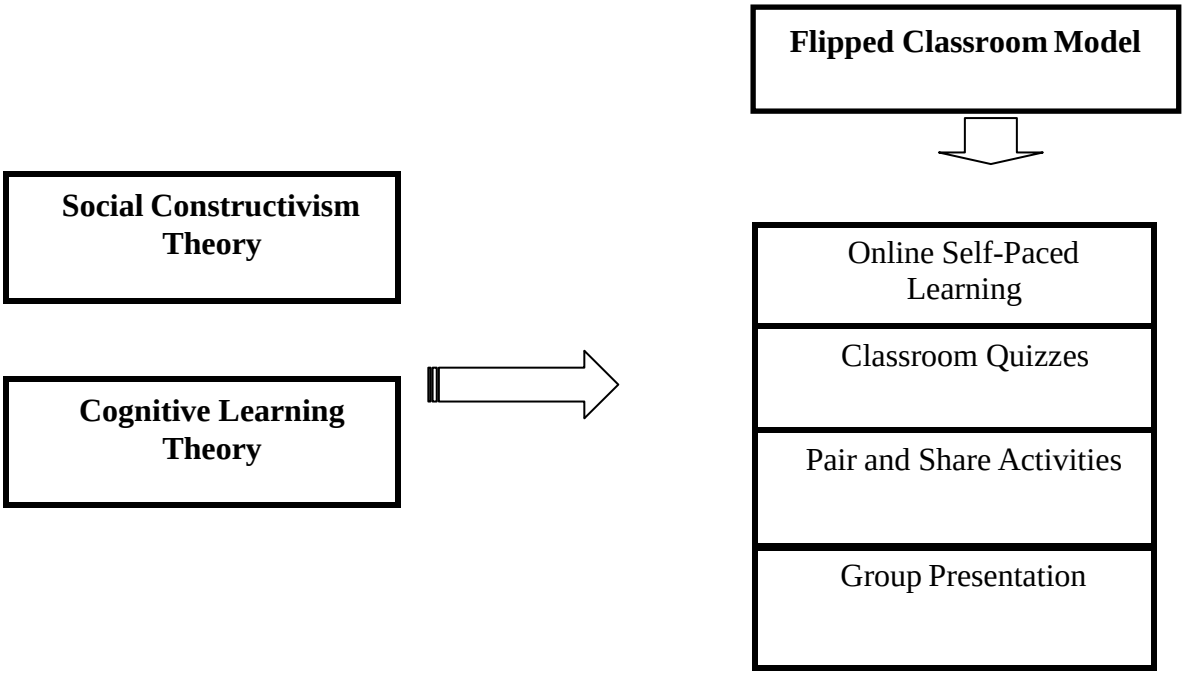

Fig. 2.3 Flipped model by Arya (2020)

The above model defined how teachers implement the flipped classroom model within the class and used the social constructivist and cognitive theory. It comprised this model of four main elements. These elements are as follows; online self-paced learning, classroom quizzes, pair and share activities and group presentation.

2.2.2.1 Online Self-Paced learning

The model show that self-paced learning mean able to learn in students' own time and plan. Student did not force to follow a pre-planned time schedule. They have the skill to complete their tasks with no guidance. Self-Paced learning has known as learning method moves from traditional to online learning. Students learn by online learning materials and prepared themselves before the class. During the class, they shared and discuss that material and learned knowledge with the teachers and fellows.

2.2.2.2 Classroom Quizzes

Class quiz defined as a general evaluation of students' knowledge. Teachers commonly used this method to check the students' understanding of the course content and learning materials. Classroom quizzes is a short test that include multiple-choice questions (MCQs), completion based test and matching tests.

2.2.2.3 Pair and share activities

In this model, this type of learning approach related to the cooperative learning in which complete their tasks collaboratively and tried to find out the solution to the problems. The requirements of this approach are; Students need to think independently, to disgust and share their ideas with other classmates and involve students to enhance their understanding about reading materials. Pair and share process starts when teachers ask a question and all members think about the required answer and then they share their opinions and discussed with their peer and teachers.

2.2.2.4 Group Presentation

According to this model, students are required to share their ideas with the entire class about their learning. It is an opportunity for the students to enhance their understanding about the content by others inquires questions. In a group presentation, teachers gave students group tasks. After completing their tasks, they present equally divided data. It is a way to listen to others and learned by listening others' ideas.

2.2.2.2 Flipped classroom Vs Traditional model

The purpose of the model was to improve dynamic learning, cooperative learning, and extend teaching allotment time. This model recommended class allot they should invest time in learner-centered activities. Flipped model helps the teachers to build up an active learning environment and guide the student for utilizing creativity in the course.

As Bishop and Verleger (2013) defined two elements of the flipped classroom method such as collaborative learning based activities within a class and online independent learning at home. Flipped classroom enhanced validity within the instructional process. The instructional mechanism is accessible to the students as a shared video to be seen in their claim time. The quality of the flipped classroom model is that content is simply available and manage by students. Some teachers faced difficulty to manage time for flipped classroom.

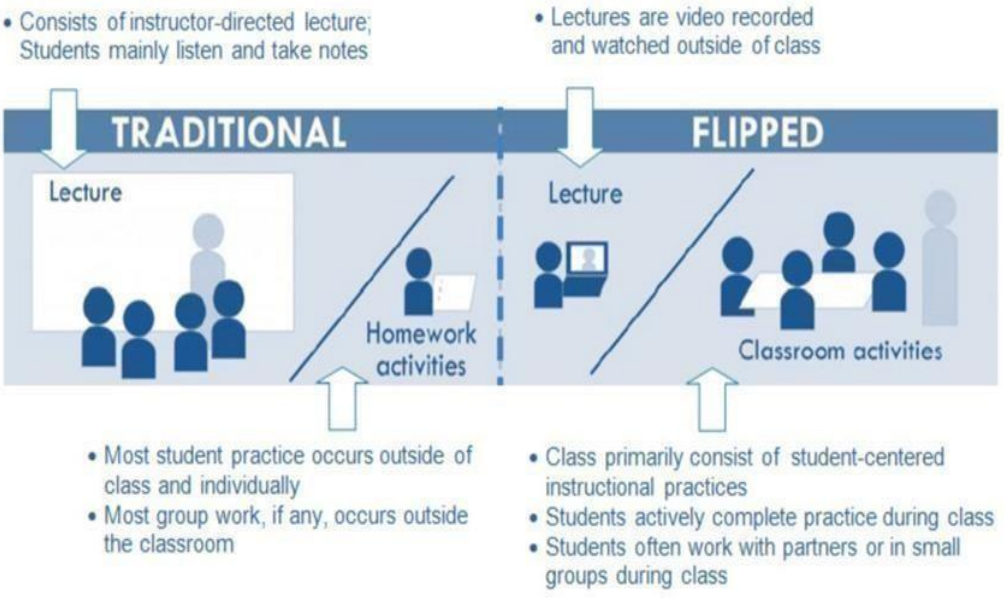

Fig 2.4 Flipped classroom Vs Traditional Classroom model by Lopes (2018)

This figure shows the difference between the flipped classroom and the traditional classroom. This figure shows some learning activities before the class that is called the flipped classroom model. These individual activities used electronic means like cell phone, tab, apps, watching videos and listening to recorded lectures. The figure defined traditional model as class activities that were conducted before the lecture, that are quizzes, re-examine some of educational videos, peer and share activities, assignments, presentations and projects.

2.2.2.3 Bloom revised Taxonomy model related to Flipped classroom

Bloom taxonomy focused on students' educational objectives by using developed conditions. Cognitive and effective are the main domains that construct learning outcomes. This taxonomy based on six levels. The action words of these levels convict the cognitive process. The levels of taxonomy based on intellectual and behavioral skills. Anderson and Krathwohl (2001) revised this classification. The model is moved from lower to higher order levels. When students used their knowledge to apply, analyze and assessment stage, they go from simple to complex stage. For flipping the class, teachers conducted learning activities for developing higher considering skills.

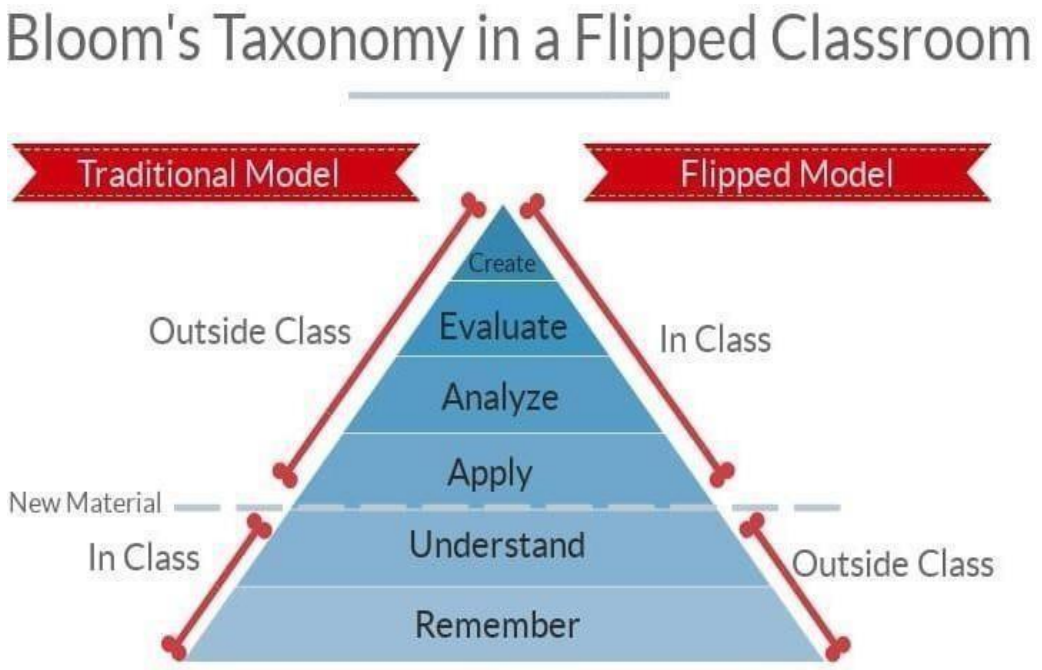

Fig 2.5 Bloom's taxonomy revised model by Ouda (2016)

The Bloom taxonomy revised model is based on two types of teaching models. First is the traditional classroom model, in which students develop recollection and understanding learning aspects within a class. In traditional class, students remained passive and just listen and remember the lecture. This type of strategy ignores their

higher order thinking skills. In the flipped classroom, students seek knowledge and understanding about the topic outside of the class. During the class, they can use their knowledge and understanding and assess their ideas. The model defined that outside the class, students increase knowledge and comprehension by utilizing electronic means like online viewing video, getting data via websites. This type of strategy helps the students to develop higher order thinking skills. It is a time saving technique as students gain any type of information by themselves and in class, they just complete their practical work. The following six levels of the Bloom Taxonomy revised model are as follows;

1. **Remembering**

It includes the review or recall of the specific learned knowledge, strategies, or structure. At level, students can write, register or characterize their gained information.

2. **Understanding**

This type of cognitive domain refers to comprehension. At this level, students can understand the meaning of learning data. Students can define the learned knowledge in possessing wording. Clarify, defined, review, and rewording are the examples of understanding.

3. **Application**

It refers to higher order thinking skills. At this level, students used and apply their knowledge and skills in realistic condition. Students can choose, exchange, and employ employment information.

4. Analyze

At this level, students can split the information into parts or components. Students recognize categories and connect the related information.

5. Evaluation

Evaluation is a higher level of a cognitive domain in which students can evaluate the importance of learning material and teaching methods. Students can judge their learning ability. It is useful for the teachers and students to evaluate the teaching approach and then change according to the situations. Examples are; evaluated, suggest analysis and validate.

6. Create

This is a last stage of higher level of understanding in which learners can make new things on the base of prior knowledge. Learners can generate new ideas, design and plan.

2.2.2.4 Flipped Classroom Model By Sharom (2021)

The model showed features which is active delivery of information before the class so the students will have extra time to do activities in class. Next, the teacher will become the facilitator to guide thestudents rather than dispensers of facts and students will become active learners rather than passive learners who listen to the information given. With the usage of online sharing platform such as Google Classroom, this will create a permanent archived tutorial of the class content. Students will have the opportunity to learn independently. Thus, the students would have extra time to complete the task and activity during class time.

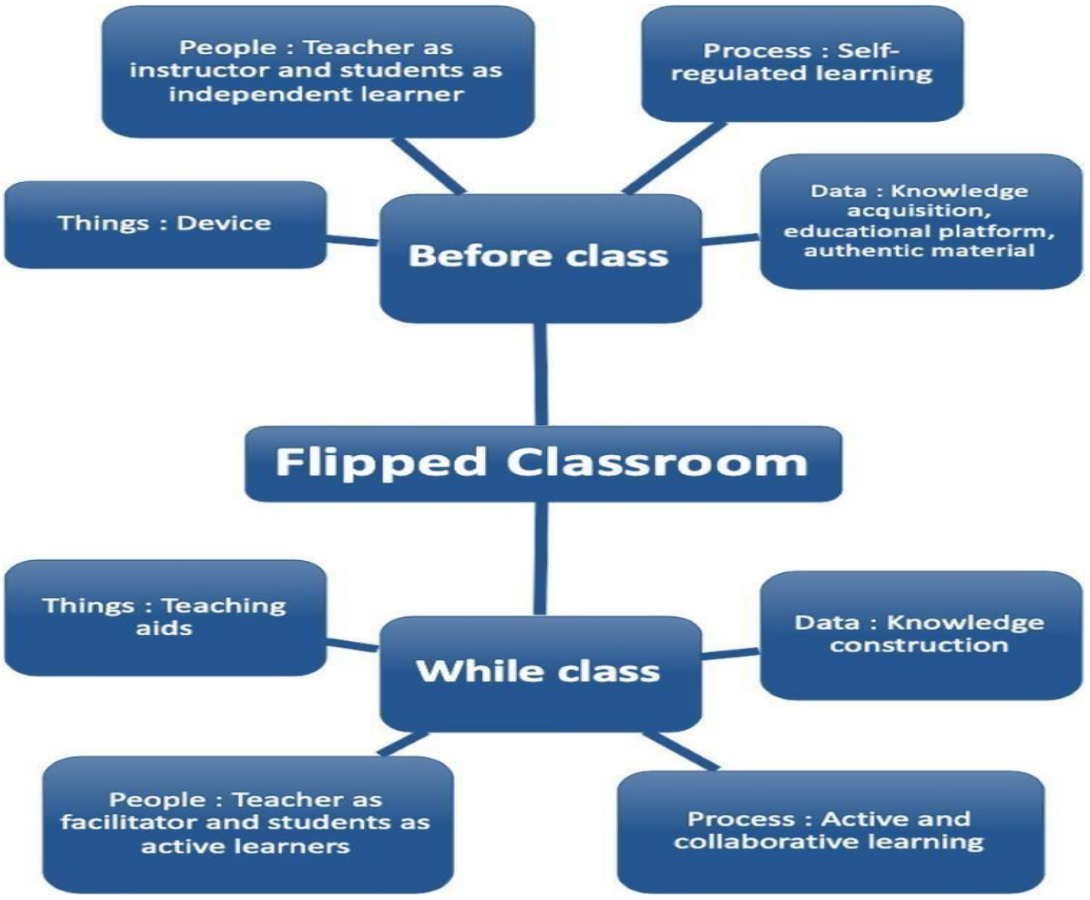

Fig 2.6 The flipped classroom model by Sharom et al., (2021)

The model of flipped classroom based on the four elements of flipped classroom model which are things, people, process and data. There are two parts in a flipped classroom setting, which are before class and while class.

2.2.2.4.1 Before the class

In before class setting, the things involved are devices that the students can use at home such as laptop, computer, smartphone and tablet. Next, the people refer to the teacher and students. The teacher will provide the students with instructions for the task before the lesson that they need to do. The students' act as an independent learner as they only need to watch the video and follow the teacher's instruction. They are responsible for their own learning, thus making them as an independent learner. This activity describes the teacher's role as an instructor. All activities out of the class is flexible, regardless of place and time, depending on the students' academic levels and individual needs

2.2.2.4.2 While Class

After the pre-class task was done, the students will proceed with in-class activities. The example of things element in while class activity is teaching aids such. In this stage, the teacher will act as the facilitator while students will become active learners which represent the people. The students will receive guidance from the teacher during class interaction and activities. Teachers can improve interaction with students, monitor and scaffold individual development, and give direct feedback. The process of flipped classroom involves active learning and collaboration.

2.2.1 Theories and Models related to 21st Century skills

2.2.1 Multiple Intelligence Theory

Multiple intelligence theory proposed all individuals are different in term of intelligence. This theory defined various human intellectual types. These human intelligences types were as following;

2.2.1.1 Spatial-visual intelligence

The person who has this skill can visualize things in a better way. These people are experts in making charts, maps, recording and photographs. This type of individual has a strong skill of decision making about their career.

2.2.1.1 Linguistic-Verbal Intelligence

These types of people are perfect in communication skills. They can use words in a better way, both in writing and communicating. They have skill to express their thoughts and shared their knowledge.

2.2.1.2 Logical- Mathematical Intelligence

These types of individuals have a strong ability to think rationally. They have an ability to solve their problems logically.

2.2.1.3 Linguistic-Verbal Intelligence

These types of people are perfect in communication skills. They can use words in a better way, both in writing and communicating. They have skill to express their thoughts and shared their knowledge.

2.2.1.4 Logical- Mathematical Intelligence

These types of individuals have a strong ability to think rationally. They have an ability to solve their problems logically.

2.2.1.5 Bodily Kinesthetic intelligence

Bodily kinesthetic intelligence based people have strong psycho-motor skills. They perform well with expression and physical faction.

2.2.1.6 Musical Intelligence

These types of people have skill to understand the difference between voice, pace, and tempo.

2.2.1.7 Interpersonal intelligence

These people can keep positive relationship and communication with other people. They have a capacity to motivate, encourage, and understand the surrounding world. Intrapersonal mean self-actualization. These people are skilled in self-motivation and self-confidence. They can understand their own feelings.

2.2.1.8 Existentialist or naturalistic intelligence

These types of individuals are enabling to take an interest in nature. They have an ability to explore and understand their environment.

2.2.1 The Partnership for 21st century skills model (2013)

This model shows basic subjects that incorporate art, English, arithmetic, financial matters, natural science, historical matter and sociology. The model is based on three types of categories. These categories are learning and innovation, life and career and information communication technology-based skills. The Partnership for 21st century skills model (2013) based on three basic categories of students' skills. The primary category was learning and innovation skills that involved creativity, critical thinking, problem solving, communication, and collaborative skills. The second category was information communication technological skills (ICT) that based on data proficiency and media education. It related the last category to life and career skills that incorporate adaptability and versatility, self-direction, social and cultural skills, administration and obligation. The model provides guidance for teachers to apply these skills that incorporate 21st century benchmarks, proficient advancement, and learning situations.

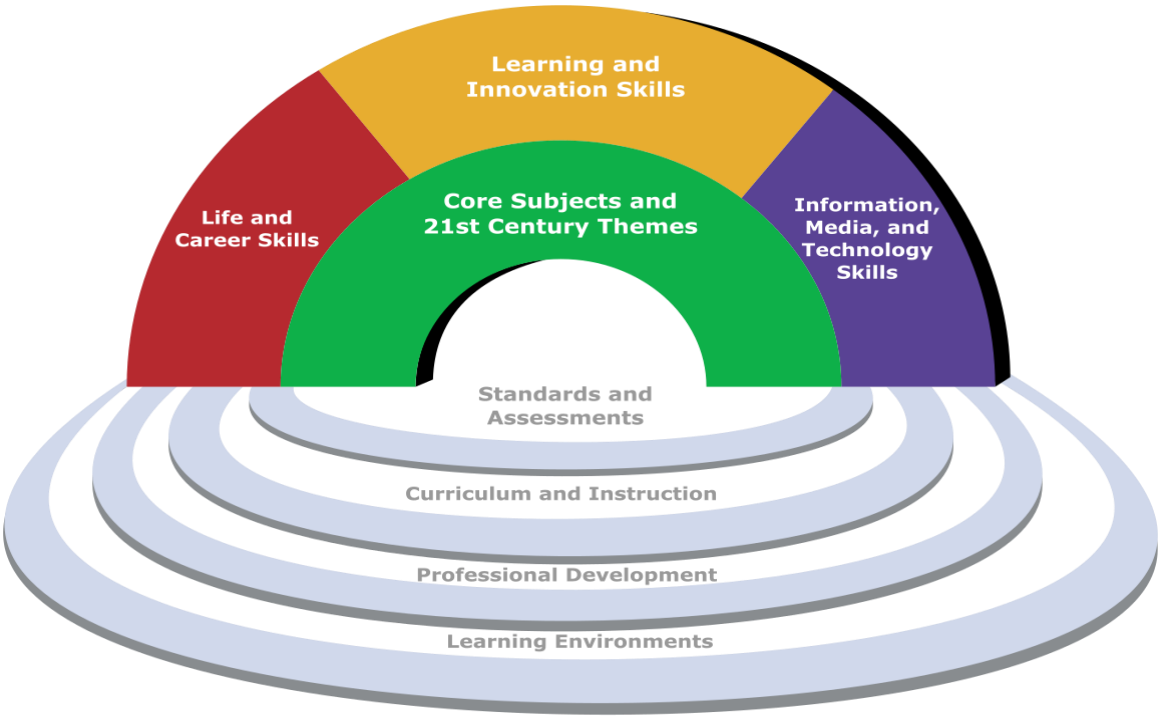

Figure 1 - P21 Framework for 21st Century Learning

Fig 2.6 Partnership For 21st Century Skills Model By Bashir (2013)

2.2.1.1 Learning and innovation skills

This category was based on collaborative, creative, and innovation skills. Teachers use various learning styles to facilitate the students. Students shared the learned knowledge with others (Schwartz & Fischer, 2006).

2.2.1.1.1 Collaborative Learning skills

In collaborative based learning activities, students have a choice while they convince others or shared their ideas (Perkins, 2010). Those students who used collaborative skills, they learned and perform well as compare to other students.

2.2.1.1.2 Creativity and Innovation skills

Creativity is the skill to think about the solution of a problem in various modes. It enables the students to solve difficult issues. Creativity is considering basic part of 21st century skills. According to Vance (2010), creativity enable the students to apply a wide expand of information and skills to evaluate, explain or improve thoughts. Innovative tools would gain information and knowledge in developing crucial and problem- solving skills.

2.2.1.2 Information and Communication Technology (ICT)

This section based on computer literacy and media education. According to Penual et al., (2000), the academic performance of students that taught by digital tools is better than traditional teaching method. Integrating technology is useful for transforming instructional skills of teachers and students.

2.2.1.2.1 Computer Literacy Skills

Computer literacy differs from computer programs skills that emphasize on designing and coding skills. As Penual et al., (2000) defined digital literacy is an important part of 21st century skills. It defined a skill to evaluate and build up facts and figures through innovative tools. The main purpose of this category is to inquire data, systematize, and practice by using a digital medium.

2.2.1.2.2 Media Education

Media education or information communication technology (ICT) has a positive effect on average students. They motivate, engaged and take an interest in their study and enhanced their performance.

2.2.1.3 Life and Career skills

This section classified into the fundamental mechanism of 21st century skills. These skills are as follows; global awareness and cultural skills.

2.2.1.3.1 Global Awareness skills

As Lovett (2008) demonstrated that there is a need to be aware the higher level students about the globalization nature and worldview. Bales (2005) defined knowledge as the global worldview that enhances the students' understanding regarding other cultures. According to Friedman (2005), the students need to develop global awareness skills that are important part of 21st century economy.

2.2.1.3.2 Cultural Competency skills

Juwah (2013) defined that students can develop cultural skills by group base learning activities. In the group study, students shared their ideas and opinions.So it was a best way to know the diverse cultures. Gragert (2011) focused that instructional programs have to structure by the educational institutions that help to support various cultural skills. Cultural environment involved values, traditions or attitude towards life style of different people. It is an essential element of students' 21st century skills.

2.2.2. 21st Century Skills Framework or Students in Basic education Levels Buasuwan et al., (2022)

The model developed by the committee that consisted of high-level policymakers with different functions under the Ministry of Education, representatives from agencies related to education provision, UNESCO (United Nations Educational, Scientific and Cultural Organization), UNICEF (United Nations International Children's Emergency Fund, Right to Play, private/business sectors and the research team from Kasetsart University. The aim was also to simplify and develop a holistic framework that is: relevant to youth' needs; measurable with a clear distinction of values, skills, and characters; includes both foundational and transferable skills. Key stakeholders were invited, using purposive sampling, to comment on the background, rationale and conceptualization of the 1st draft framework. Policymakers, policy implementers and academics were also invited to reflect upon what emerged from the grassroots level to shapea skills framework that aligned with the national and global agendas. Participants were selected in consultation with OBEC (Office of Basic Education Commission) and UNICEF (United Nations International Children's Emergency Fund) based on their role relevance, expertise and experiences working in the field of education or child development, and partnership with the Office of Basic Education Commission and UNICEF. The eleven groups participated in the consultation;

1. Representatives from various units of Ministry of Education (three groups)
2. Other related government agencies working in relation with youth in BasicEducation Level (one group)
3. Association and professional organizations related to education of youth in BasicEducation (one group)

4. International organizations and embassies (two groups)
5. Representatives from various units of Ministry of Education (three groups)
6. Other related government agencies working in relation with youth in BasicEducationLevel (one group)
7. Association and professional organizations related to education of youth in BasicEducation (one group)
8. International organizations and embassies (two groups)
9. Policy implementers (one group)
10. Workforce sectors (one group)
11. Civil society e.g., NGOs (one group)
12. Academics (one group)
13. Focus Group with high-level influencers
14. To refine the framework and to ensure engagement of high- level influencers, the second draft was shared with a purposive sample of key social, policy, and academic influencers, in consultation with OBEC (Office of Basic Education Commission) and UNICEF (United Nations International Children's Emergency Fund). Most of these influencers belong to various high-level committees of national organizations.
15. Directing Committee Approval and Recommendations The final step was to gain approval from the directors

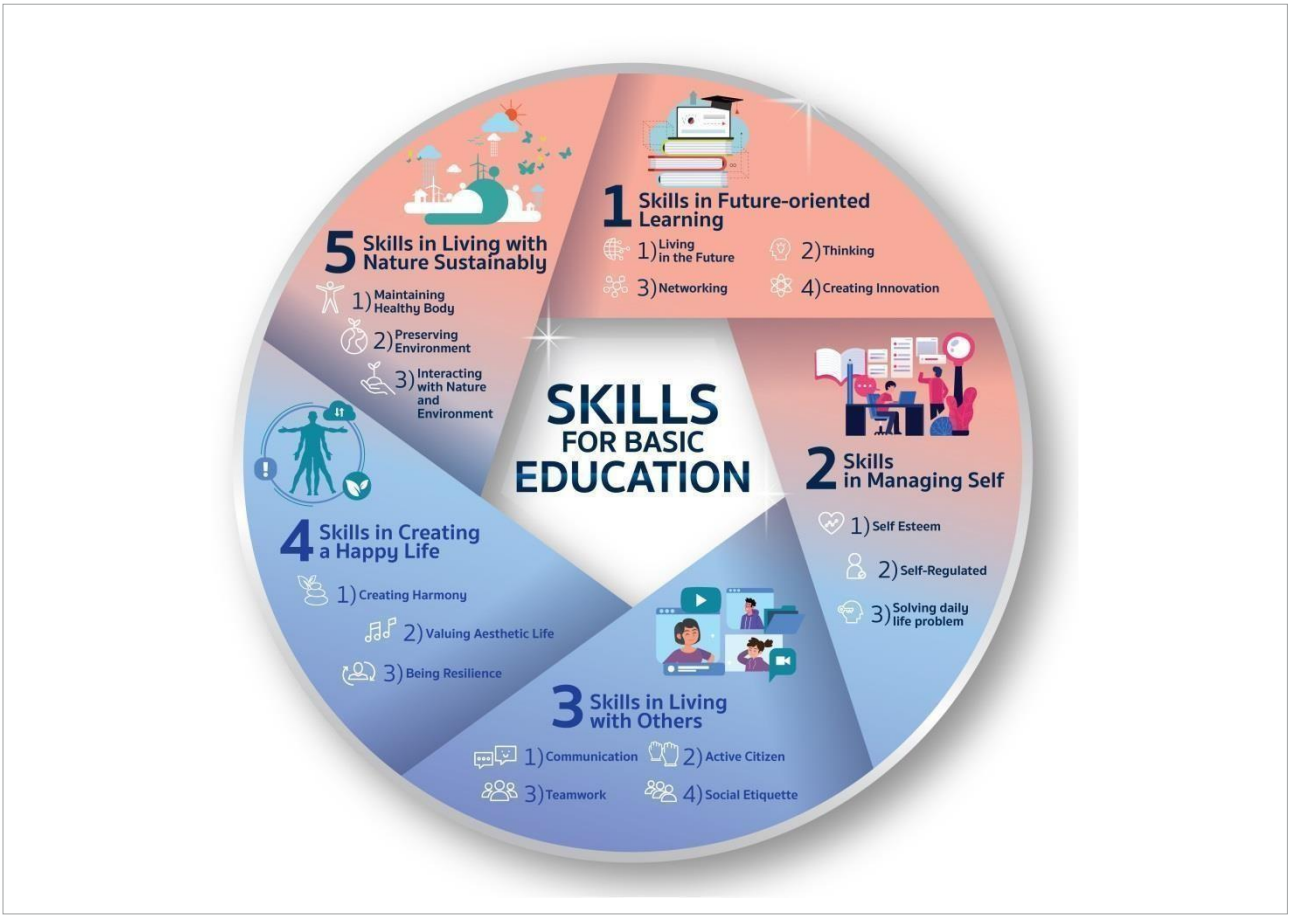

Fig 2.7 Skills framework for students in basic education levels Buasuwan et al., (2022)

Classifications of the skills framework

2.2.2.1Skills in future-oriented learning

It refers to the ability to perceive and process both abstract and concrete information through investigation, research, experiment, and learning exchange. It involves making connections with prior learned knowledge and forming new meaning, perspectives and experiences and being able to estimate changes for further application, decision-making, and problem-solving in the future. It involves four sub-sections;

2.2.2.1.1 Living in the future

The ability to adapt to changes in technology, digital technology, science, the environment, economics, and society; the ability to increase efficiency in technology and learning, working and living and able to preserve meaning and valuable ways of human being.

2.2.2.1.2 Thinking

The intellectual ability to process information for situations, reasons, solving problems, making decisions, creating new ideas which comprise foundational thinking skills, and high-order thinking skills.

2.2.2.1.3 Networking

The ability to communicate, connect with groups of people or organizations with common interests, to exchange information or learn and practice in activities together through the free and equal structure of a network organization.

2.2.2.1.4 Creating innovation

The ability to apply knowledge, imagination, creativity, and collaboration to create new things. These can be concepts, approaches, inventions, and products that have value through meeting the needs for solving problems and include entirely new ideas.

2.2.2.2 Skills in managing the self

The ability to understand and perceive value in oneself, to be responsible for one's own life, to develop, control and direct oneself to achieve personal goals, and the ability to service and manage problems or risks faced in the present or future. Skills involves in this component are:

2.2.2.2.1 Self Esteem

The ability to be self-aware and to value one self, have faith in oneself or clearself-perception and self-respect. All of these are processed through self- evaluation of one's abilities and success and expressed through positive attitudes about oneself.

2.2.2.2.2 Self-regulation

This skills refer to the ability to improve one's own behavior, to achieve goals that are driven through intrinsic motivation to direct one's own ability and behaviors with determination.

2.2.2.2.3 Solving problems in daily life

The skill refers the application of experiences that have been processed through observations, data collection, data analysis, and interpretation and drawing conclusions to solve problems rationally. It refers the ability to ask for help, look for alternatives and make decisions in complex problem-solving or critical situations appropriately.

2.2.2.3 Skills in living with others

These skills involve the personality, behaviors and actions of a person that are expressed through attitudes and social interactions with others and society that are appropriate to the situations and cultures in which they live. Skills under this component comprise:

2.2.2.3.1 Communication skills

The ability to speak, act and use signs to convey own meanings, feelings and needs as appropriate to target groups, cultures and situations. It is the ability to receive and interpret verbal and non-verbal language, actions, interactions and symbols, to create shared communication in different contexts effectively and

achieve the goals of communication.

2.2.2.3.2 Active citizenship skills

It refers the awareness of oneself as a valuable member of a society or a country; having rationales, exercising roles and respecting rules and human rights; being self-responsible

2.2.2.3.3 Teamwork skills

It refers to being a good member of the team, having leadership and skills to work in groups; being responsible for one's duties and groups, using one's own strengths to achieve group tasks and helping other group members to achieve shared goals.

2.2.2.3.4 Social Etiquette skills

It related to being aware of and applying the verbal and non-verbal expressions and behaviors that are considered by others as being polite in certain contexts and situations.

2.2.2.4 Skills in creating a happy life

The ability of a person to perceive and appreciate arts, culture, music, sports and ways of life in diverse social and cultural contexts. It is the ability to adapt oneself and live with others peacefully and the ability to bring one's self back from a critical condition or hardship to a normal state of mind and life. Skills under this category are;

2.2.2.4.1 Creating harmony skills

It related to the actions that contribute to equity and to the peaceful mind of each individual. This involves respect for each other, understanding each other and living together with differences and in solidarity, using peaceful means to solve conflicts and social problems.

2.2.2.4.3 Valuing the aesthetic life skills

It involves appreciation for values of life, nature and creation which are associated with emotions and the mind, including perception of and appreciation for one's own beauty and living a way of life that has value to one's self, othersand wider society.

2.2.2.4.2 Being resilient skills

The ability to solve critical problem that faced by the humans in life and to quickly find a way back to a normal state of mind.

2.2.2.5 Skills in living sustainably with nature

It giving importance to living and growing with nature sustainably by taking care of oneself in relation to one's surroundings and environment; not harming the environment or nature and living with nature interdependently through caring for one's own health in relation to nature; having awareness of environmental conservation, managing waste and energy efficiently and responsibly as a way of life. Skills under this component are:

2.2.2.5.1 Maintaining a healthy body skills

It related to taking care of one's own health in daily life, keeping hygiene and a healthy way of life, and living in harmony with nature.

2.2.2.5.2 Preserving the environment skills

These skills related to the decision making and actions that cause least harm to the environment and seeking equitable access to natural resources.

2.2.2.5.3 Interacting with nature and the environment skills

It related to the ability to live with nature without accommodation, a sufficient way of life and to maintain the ecosystem.

2.2.3 21st Century Skills Model By Stauffer (2022)

Stauffer (2022) defined the 21st century skills model that is based on twelve skills that considered students need to succeed in their careers during the Information world. These skills are intended to help students keep up with the lightning-pace of today's modern era. Each skill is unique in how it helps students, but they all have one quality in common. Each 21st Century skill is divided into one of three categories; Learning skills, Literacy skills and Life skills.

The twelve 21st Century skills are:

1. Critical thinking
2. Creativity
3. Collaboration
4. Communication
5. Information literacy
6. Media literacy
7. Technology literacy
8. Flexibility
9. Leadership
10. Initiative
11. Productivity
12. Social skills

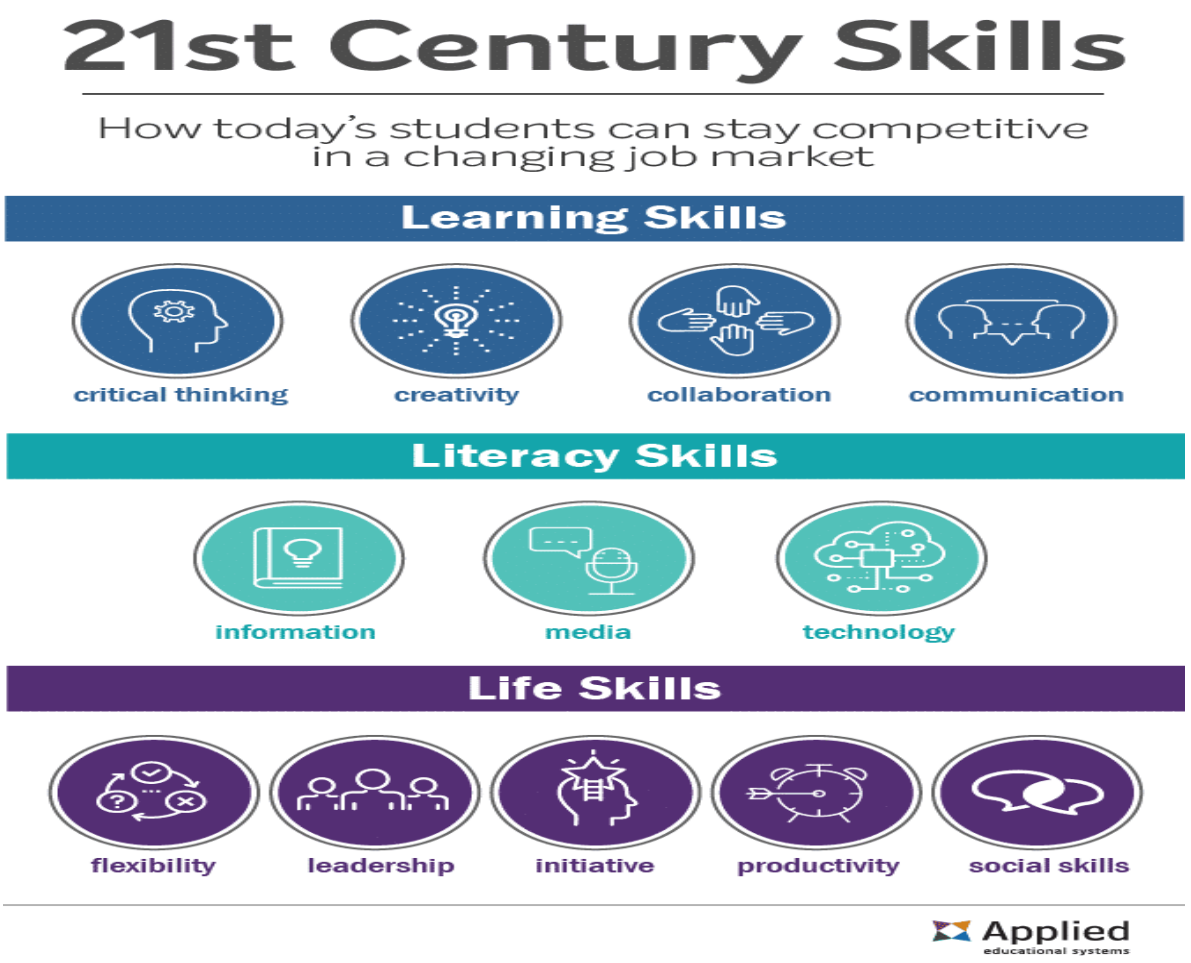

Fig 2.8 The 21st century skills model by Stauffer (2022)

The Three 21st Century Skill Categories

2.2.3.1 Learning skills

These skills refer to the ability to teach students about the mental processes required to adapt and improve upon a modern work environment. These skills also called the four C's (critical, creativity, collaboration and communication skills) are by far the most popular 21st Century skills. Mostly teachers know about these skills because these are related to common needs for students. They also vary in terms of importance, depending on an individual's career aspirations. The following sub-skills are as;

2.2.3.1.1 Critical thinking skills

These skills related to the finding solutions of the critical problems. Critical thinking is essential to improvement. It is the mechanism that prepares the students to think, create ideas and used new approaches to solve the problems.

2.2.3.1.2 Creativity skills

Creativity is equally important as a means of adaptation. This skill empowers students to see concepts in a different light, which leads to innovation. Learning creativity as a skill requires someone to understand that "the way things have always been done".

2.2.3.1.3 Collaboration skills

It means students work together, achieve cooperation, and get the best possible results from solving a problem. Collaboration may be the most difficult concept in the four C's. The key element of collaboration is willingness. All participants have to be willing to sacrifice parts of their own ideas and adopt others to get results.

2.2.3.1.4 Communication skills

It is a requirement for any company to maintain profitability. It's crucial for students to learn how to effectively convey ideas among different personality types. Effective communication is also one of the most underrated soft skills in the United States. But when employees communicate poorly, whole projects fall apart. No one can clearly see the objectives they want to achieve. Without understanding proper communication, students in the 21st Century will lack a pivotal skill to progress their careers.

2.2.3.2Literacy skills

They are sometimes called IMT (Information Media and Technology) skills, and they concerned with a different element in digital comprehension. These skills focus on

how students can discern facts, publishing outlets, and the technology behind them. There is a strong focus on determining trustworthy sources and factual information to separate it from the misinformation that the Internet.

2.2.3.2.1 Information literacy

This skill related to information that students received from using various digital resources. It involves understanding facts, figures, statistics, and data.

2.2.3.2.2 Media literacy

This skills based on understanding the methods and outlets in which information is published

2.2.3.2.3 Technology literacy

This skill involves understanding the machines that make the Information communication technology possible. Technology literacy goes another step further to teach students about the machines involved in the Information. As computers, cloud programming, and mobile devices become more important to the world, the world needs more people to understand those concepts. Technology literacy gives students the basic information they need to understand what gadgets perform what tasks and why. As a result, students can adapt to the world more effectively. They can play an important role in its evolution.

2.2.3.3Life skills

These these skills all pertain to someone's personal life, but they also related to professional settings.

2.2.3.3.1 Flexibility skills

It is the expression of someone's ability to adapt to changing circumstances. This is one of the most challenging qualities to learn for students. Flexibility

requires them to show humbleness and accept that they always have a lot to learn even when they are experienced. Flexibility is crucial to a student's long-term success in a career. Knowing when to change, how to change, and how to react to change is a skill that would pay divide for someone's entire life.

2.2.3.3.2 Leadership skills

It is related to setting goals, providing guiding to the team members, and achieving the goals collaboratively. The learners need leadership skills for several reasons. The most important is that it helps them understand the decisions that made by the manager and business leaders.

2.2.3.3.3 Initiative skills

It only comes naturally with the help of people. As a result, students need to learn it to fully succeed. This is one of the hardest skills to learn and practice. Initiative often means working on projects outside of regular working hours. The extreme initiative skills are different from person to person. Sometimes they are good grades. That goes double when initiative is practiced with qualities like flexibility and leadership.

2.2.3.3.4 Productivity skills

21st Century skills require students to learn about productivity. These related to a student's ability to complete work in an appropriate amount of time. By understanding productivity strategies at every level, students discover the ways in which they work best while gaining an appreciation for how others work. That equips them with the practical means to carry out the ideas they determine through flexibility, leadership, and initiative.

2.2.3.3.5 Social skills

These skills are considered important to the ongoing success of a professional life. Students learn these skills frequently done through the connections one person makes with others around them. This concept of networking is more active than others. As a result, today's students possess a wide range of social skills. Some are more socially adept than others. Some are far behind their peers. And some lucky few may be far ahead, as socializing comes naturally to them. But most students need a crash course in social skills at least. Etiquette, manners, politeness, and small talk still play major roles in today's world. That means some students need to learn them in an educational setting instead of a social setting.

Section. 3 Researches Related to Flipped classroom and 21st century skills

According to Restad (2013), in the flipped classroom method students do their tasks in group that is based on six or seven members. They discussed and shared their previous information about the required topics. Educational system applies a traditional method in which teachers deliver lectures and students takes a note by lectures to complete their homework. During the lecture, students remain passive and sit silently. It promotes rote memorization and students depend on their teachers rather than getting knowledge by themselves. Honeycutt and Garrett (2013) stated that flipped classroom method use as innovative instructional method is a great step towards advancement of education. This strategy enhances students' liability for active participation and homework. Flipped strategy broadly used at postgraduate level. Every person has a different point of view about this strategy. Some considered it as learning by doing based class activities while others examine it as a revolutionary method in educational center. According to Bart (2013), the center of digital education shows teachers' perception about flipped classroom by survey research. It showed that 75% of teachers shared their points of view that flipping the class takes more time than traditional. Teachers need more preparation for the flipped classroom and 85% of teachers said that their teaching attitude positively improves with this modern strategy.

The study recommended that the flipped classroom is more benefit for Economic and Science subjects. Foldnes (2013) defined that flipped classroom method transforms teachers' position of leading to supporter. Watching educational videos and take notice of uploaded lectures earlier to class session facilitate students to know concerning the expected learning activities. Students discussed their prior information with teachers and peer, after discussion teacher provides feedback, conveys the required knowledge, evaluates, clarifies, appliance or alliance all information. Teachers expected from students to practice all the learned data Jamaludin and Osman (2014) examined the using of flipped classroom for encouraging students' participation. The finding of the study shows that the flipped classroom increases students' self-motivation and they feel happy to become a part of flipped method. A study conducted by Linga and Wang (2014) showed students' views after using flipped learning strategy. The study identified satisfaction of the students, as it enhanced their academic performance and develop their skills. By using a flipped strategy, teachers make a video or recorded lectures related to their subject and shared with students. Students watched these videos and listen recorded lectures at home and next day in the classroom they discussed these materials with teachers and peer (Schwartz & Gazette, 2015). A study conducted by Stone (2012) on the viability of flipped strategy. The sample of the study was 205 students of first year. The result shows that students who attended class regularly were fifty percent, while twenty percent attend the class casually. Almost eighty percent of students provide their point of views that they used flipped video and audio with other e-learning resources. The study showed that some students support the lecture method while it satisfied others with flipped teaching mode. In the same way, Ozdamli and Asiksoy (2016) considered that flipped is a strategy to offer opportunities within the education field and gives guidance to present and future analyst. This teaching mode extends time for practice and dialog. This approach gives adaptability in education.

An experimental research conducted by Rehman (2017) to investigate the effect of a flipped classroom on students' achievement at postgraduate level in Pakistan. The focus of that study was to know the positive relationship between the flipped method and learners' academic achievement. The study found it that flipping class has involvement in the advancing Pakistani educational context and also enhance students' interaction toward education. Flipped method is more fascinating in students and teachers. It facilitates students to gain knowledge through self-study. Students can watch video and can play reverse or paused if not understood. In the educational process, teachers have an important position as a primary source of delivering knowledge in class. Through flipped mode, students are the fundamental part of the learning process. Alam et al., (2017) conducted an experimental study to investigate the impact of flipped classroom on students' performance in science subjects at elementary education level in Pakistan. The researcher selected eight class students in two sections as experimental and control group that were comprised sixty students. The study addressed the significant difference between the students' marks in pre-test and post-test by experiment. The researchers identify the positive impact of the flipped classroom on students' achievement in science subject at school level. An experimental study was conducted by Maksal (2018) to investigate the impact of flipped learning mode on the achievement of teachers at graduate level in Pakistan. The researcher conducted research on the population of teachers and students. Forty-eight teachers selected as a sample. Students divided into two groups as experimental and control group. Every group comprised twenty-four teachers. The result of the study identified that there was a significant impact of the flipped classroom on performing teachers. It shows that the flipped class environment is more encouraging traditional and teachers perform well in flipped class. Flipped considered as a dynamic learning style that empowers learners to enhance cognitive skills and actively take part in class. According to the Yen (2020), theadaptability in the educating process is benefit for

different conceivable outcomes advertised by innovation. In this manner, this technique proposal to use mixed strategy whereby virtual assets like recording or hand writing data used to spread information and physical classes used to solidify information by practices and intelligently exercises like understanding of problem solution, dialogs and cooperative work elements. A study conducted by Cosculluela et al., (2021) to identify the utilization of the flipped classroom prior to or within Covid- 19 and how technology effects on the development of 21st century skills at university level. The purpose of the study was to define the experience of students with flipped teaching mode within the Covid-19.

According to the Center of learning and education (2012), teachers engage the students to discuss and practiced the course content within the flipped classroom. These types of exercises increase students' understanding and develop their critical thinking skills. A study conducted by Tucker (2012) exposed that the flipped classroom is a beneficial for students to prepare themselves before the class and then during the class take help ofthe teachers to solve tricky or difficult questions. The flipped classroom helps the students to improve self-regulated skills. The study defined that in the flipped classroom; students have many options to interact and discussed with teachers as well classmates that improve their communication skills. Enfield (2013) conducted a study on undergraduate students that taught by using multimedia. The researcher selected fifty students as a sample. The purpose of that study was to explore the effects of the flipped classroom model on self-regulated learning capacity. Many steps were used to complete the research. First phased of the study was that the students must view the lecture video before the class, the second step was to take a short oral test during the class. The third phased was to be ensured active participation of all students andconducted group discussion based activities. At the end, students respond positively to the flipped classroom model. Some constructive impacts are as follows; Enhanced learned attendance in the class, improve students' self-motivation and students easily completed a task with the help of discussion. Enfield (2013) additionally expressed the opinions of teachers that students take more interest in the flipped classroom

instead of the traditional class. Ryan and Reid (2015) defined the effects of flipped materials on chemistry students. The researcher tested flipped learning materials in 2014 and then recruitment in 2015. The researcher divides the students into two groups; first groupwas the control group, and the second was flipped. Control group was based on 206 and flipped group consisted of 117 students. Correspondingly, teachers hired for training the students. All over the semester, five exams were taken, and the outcome shows the difference between both groups' performance. The flipped group appeared predominant grades in all exams. Chen et al., (2014) contended that the flipped classroom method transforms traditional classroom method to cooperative learning environment. The main aim of the study was to know the importance of model and provide a foundation for future researches at higher education level. The outcomes of the research identified that the students were more prepared to take part. It improved their motivation and increased class attendance. Chung (2007) defined in his study the effects of flipped classroom on the performance and motivation of mathematics students at secondary school level. For this study, the researcher used pre-test, post-test, and quasi-experimental research design. The sample of the study was 82 students that were divided into two groups. The traditional teaching method taught the control group, while the experimental group taught by using the flipped classroom method. The results showed that the flipped classroom enhanced the students' performance. A survey based study conducted by Bashir (2013) to show 21st century skills between students and teachers through engaging e-learning. The researcher interviewed eight students, five teachers and three administrative to know the feasibility of learning programs and how these foster skills of teachers and students. The result of the research shows that engagement of teachers and students increase 21st core skills. These skills are cooperative skills, innovative and adaptability. Soule and Warrick (2015) identified that students' 21st century skills are necessary for the workplace achievement. The particular profession considering workforce progression in intellect, representative can grasp such posts that require communication skill. New generation needs to be developed and equipped with essential 21st century skills for facing the working place, students looking for employments got to get pertinent skills.

A case study conducted by Berry and Newton (2017) characterized 21st century skills in scholastic and social setting. The study defined that these skills empower students to improve course content skills by making, organizing and assessing the significant data from various sources and also understand assorted societies. Zhao (2007) defined the 21st century skills as a globalization context. The researcher identifies the students should be capable of proficiently arrange social contrasts and contentedly connected with the members of diverse societies. To develop this skill, people will understand the social information. The 21st century skills are important for students and teachers to sustain their life. According to Casner-Lotto and Barrington (2006), the current demand of the economic world is the skilled people that can move according to the 21st century and can easily face the challenges. The students need to be skilled in cooperative, group-based activities, flexibility and accountability. These skills are necessary for the students' practical world that will be helpful after completing their education. Communicative and cooperative learning skills considered as fundamentals for accomplishment of the twenty-first century. The Wegerif and Dawes (2004) recommended that innovative and critical thinking skills considered more demanded abilities in the worldwide. Lamb and Callison (2005) emphasized on e-learning and utilization of technological tools that are necessary for improving students' performance. Urbani et al., (2017) conducted a mixed method study on teacher education programs. The main purpose of this study was to know how teacher can develop 21st century skills with pre-service teachers and implement these skills in their classes. This study defines the duties and responsibilities of the teachers. The researchers divide developmental skills into three phases; self- develop skills; in which they can understand and develop skills as pre-services teachers, practical developmental skills teachers used and apply their knowledge and skills during the service and proficient developmental skills, here teachers can teach thestudents and improve their skills with their students. The outcome of the study was to train the teachers well for developing and implementing 21st century skills.

3.1 Analysis of Related Research Studies

The above mentioned research studies in the literature showed that mostly previous researches conducted on flipped classroom with other variables such as students' performance, achievements, subjects' specialization, teachers' perceptions and students' participation (Baker, 2000; Joanne, 2014; Walker, 2014; Turan, 2015; Lalka, 2015; Bachiller, 2020 and Fulton, 2012). Previous researches regarding 21st century skills mostly persistent in class' environments that considered a necessary element of learning and improving students' skills. These studies more focused on improved and enhanced the skills that students already have creativity skills, critical thinking skills; problem based learning skills and collaborative skills (Taylor, 2012; Hilton, 2012; Wagner, 2012; Davis, 2016; Robinson and Aronica, 2015; and Singh, 2020).

In Pakistan, few studies conducted on both flipped classroom and 21st century skills. The purpose of the studies that conducted on the flipped classroom was to know the effects of the flipped classroom on students' performance and prospective teachers' performances (Maksal, 2018; Rehman, 2017; Alam et al., 2017). The previous studies regarding 21st century skills focused on investigation of skills between students and teachers through engaging them in educational programs, implementation of 21st century skills at higher education level, comparison of 21st century skills between teachers and students of science and formal educational programs (Bashir, 2013; Khan, 2019). Therefore, it concluded that flipped classroom and 21st century skills had a lake of researches in Pakistani contexts. Both variables are globalization demands and needs of the new emerging modern era. The flipped classroom is an innovative strategy in education. To flip the class, there is a need for experts and competent teachers. The 21st century skills are important for students to prepare them for professional and working places after their education. It is an opportunity for educational institutions to develop and improved students' skills by utilizing and applying flipped classroom method.

Keeping in mind the demand and need of the current century, the researcher conducted the study. The topic was "Developing 21st century skills through flipped classroom at postgraduate level". The study carried out three main objectives. The major objective was "to measure the effect of flipped classroom in developing 21st century skills at postgraduate level".

2.3 Critical Analysis of Related To Literature

Literature review based on three sections; first section involved general introduction of the flipped classroom and twenty-first century skills. The flipped classroom introduce as a new teaching strategy in which teachers have a secondary role while students play as a primary role. In the flipped classroom, students have a lot of time to do work and practice within a class and read at home. Literature reviewed on the elements, principles and strategies of the flipped classroom. According to this chapter, the benefits of the flipped classroom were to become the students as a responsible active learner. Students become capable to search, read, analysis, recognize and select the relevant data. Literature reviewed on 21st century skills as the core skills of the students that are important skills to do practical work during and after completing the education. In the first section, the researcher mentioned core skills of 21st century skills that are defined by Wagner (2008). These skills are utilized in workplace and also support the conceptual framework model of the present study. After that, the researcher discussed the role of teacher and learning environment that explained teachers' responsibilities. It would be useful for readers to understand teachers' qualities and improve learning environment.The second section was based on theories and models of flipped classroom and twenty- first century skills. The theories that defined for flipped classroom are constructivism learning theories, cognitive learning approach and instructional technology.

The conceptual framework model of flipped classroom that was developed by Bishop and verleger (2013) consisted on constructivism learning theory and cognitive learning theory. Constructivism defined active learning strategies. The constructivism theory motivated the students to participate actively and completed their tasks independently. Cognitive learning approach promoted students' higher order thinking skills and encourage them to learn by doing. Literature reviewed on utilization of instructional technology and implementation of the technology within a class is important for flipped classroom method. The researcher defined models related to flipped classroom. The flipped model by Singh (2020) defined how teachers implement flipped classroom within the class. The main elements of flipped classroom model by singh (2020) are as; online self-paced learning, classroom quizzes, pair and share activities and group presentation. The researcher defined flipped classroom vs traditional classroom model by Lopes (2018). This model shows differentiate between flipped and traditional classroom. This model defined learning activities that are used before the class. Literature reviewed the Bloom revised taxonomy model by Ouda (2016). The model based on higher order and lower order thinking skills. The model clearly defined that in flipped classroom, students develop higher order thinking skills as they seek knowledge and understand it before the class and in class they evaluate and assess their ideas. In traditional classroom develop lower order thinking skills as it develops recollection and understanding. The latest model of flipped classroom developed by Sharom et al., (2021) based on four basic features that used in before the class and during the class. The researcher defined multiple intelligence theory by Gardner (2012) that is related to 21st century skills. According to this theory, every individual is different in term of intelligence. Human being has different personality, they learn in a different way even in the same learning environment. The model of 21st century skills was the "Partnership of 21st century skills" (2013). According to this model, students have many skills like creativity and innovative skills, problem-solving skills, collaborative skills, life and career skills, cultural competencies and global awareness skills.

The second model related to 21st century skills in basic education developed by Buasuwan et al., (2022). The third latest model related to 21st century skills developed by Stauffer (2022). These models based on three categories and total twelve 21st century skills. The third section was based on related researchers based on flipped classroom and 21st century skills. The requirement of 21st century period, teachers need to improve the core skills of students that will be beneficial for them in the practical world. These skills would be developed and enhance by implementing learning by doing process. The flipped classroom is a new method in the teaching field in which students have several opportunities to do independent tasks. This process would be helpful to develop the self-motivation and self-confidence of the students.

CHAPTER 3

METHODS AND PROCEDURES

This chapter comprised research approach, design, population, sampling technique, sample size, instrument tool with its reliability and validity, data collection and data analysis. The current chapter defines research limitations that the researcher faced during the research. Research Methods and Procedures chapter explains ethical consideration of research that is an important part of research.

3.1.1 Research Approach

The study was based on quantitative research approach. Approaches considered as a plan and research procedures that extent the process from wide assumption to detailed method of collecting, analyzing and interpretation of data. According to Creswell (2014), research approach is defined as a procedure that extends the choices from common assumption to careful strategies of gathering information. By utilizing this approach, data got by measuring persons' opinions, views, and attitudes and analyzed by using statistical techniques. Quantitative approach is used to test hypothesis by measuring and examining the relationship between variables. The researcher used this approach for its objectivity and accuracy in results. By this approach, data gathered from large no of population in a limited time. The collected data was constant, accurate, and reliable. The researcher used a quantitative approach in which researcher gave every respondent the same items, which makes sure that someone can examine realistically data. In quantitative method, the researcher used a

Close-ended statements based questionnaire in which all members selected answers from a set of responses. Aliaga and Gunderson (2002) defined quantitative research as the identifying problem by getting data in numerical arrangement and analyzing in a scientific way using a statistical approach.

3.1.2 Research Design

Research design defined as a guideline or blueprint that used for plan, implementation and procedure of data analyses. Research design is applied as an outline process that helps the researcher to get possible solutions to the research problems. The researcher used Ex-Post Facto research design for the current study. This research design is related to truly co-relational where the researcher identifies the consequence or relationship among variables after its happening. Ex-Post Facto defined research in which the researcher examines the pre-existing cause-and-effect relationship among variables without manipulating or changing of an independent variable. The purpose of Ex-post facto research was to measure or establish the relationship between two variables. The Ex-post facto research design used as alternative form of experimental research. According to Creswell (2014), Ex-Post facto research design is use when the researcher cannot control or manipulate the independent variable to study the effect on dependent variable The flipped classroom (Independent variable) used as a teaching method in a three public sector universities (NUST, Bahria and COMSATS Institute of Information Technology) of Islamabad. Therefore, the researcher used Ex-post facto research to measure the effect of the flipped classroom (independent variable) in developing 21st century skills (dependent variable).

3.2 Population of the study

The total population of the current research on 586 students' enrolled spring (session 2021) in Management Science programs at three public sector universities (NUST University Islamabad, Bahria University Islamabad and COMSATS Institute of Information Technology, Islamabad) that applying the Flipped classroom method. So the

students of Management Science of these three public sector universities were the target population of this study.

Table No 3.1

Population of the Study

Sr #	**Name of institutions**	**Programs**	**No of Student's Enrolled spring (session 2021)**
1	National University of science and Technology Islamabad	Management Science	215
2	Bahria University Islamabad	Management Science	176
3	COMSATS Institute of Information Technology Islamabad	Management Science	195
	Total		586

The Table No 3.1 shows the name of public sector universities of Islamabad and programs that applying the flipped classroom method and students numbers enrolled spring (session, 2021) in Management Science Programs.

3.3 Sampling

For this study, the researcher used censes sampling technique in which data collected from each person of the entire population. Census defined as a procedure by which researcher gathered and recorded information from all individuals of the target population. According to Groves et al., (2011), Census sampling attempts to cover the entire population and involves selecting a sample that represent the entire population in term of its key characteristics like age, gender and geographic location. The results that find out by this method consider effective and reliable as it studied all units of population. In pilot testing, the researcher collected the data from 40 students. After excluding 40 respondents, the sample of the population was 93%. The researcher distributed the questionnaire among 546 students and returned 520 questionnaires. So, the rate of returned was 95%.

Table No 3.2

Sample Distribution Detail

Total Population	**No of Participants (Pilot Trial)**	**No of Participants (Final Data)**	**Rate of Return**
586	40	586-40=546	520 (95%)

The above Table No 3.2 demonstrated the rate of returned of the research. Total population of thestudy was 586. For the pilot trial, the researcher collected the data from 40 respondents. After excluding pilot trial data and 40 respondents, the sample size was 546 that were 93% of the population. The researcher distributed 546 questionnaires and returned 520. Therefore, the rate of returned was 95%.

3.4 Tool Construction

It consisted of research tool of two sets of questionnaires. The researcher adapted the flipped classroom assessment scale to measure the effect of flipped classroom in developing 21st century skills at the postgraduate level. Twenty-first century skills assessment scale adapted to identify students' opinions towards developing 21st century skills through flipped classroom. Research tool comprised three sections; one section was demographic information, second was research variables, and third section based on five point Likert scales.

3.5 Scoring of the Research Tool

The researcher adapted the 21st century skills assessment scale to measure the levels of 21st century skills. It was based on a five point Likert scale. The researcher guided the participants to select the option given the range from 5 to 1 that originated the responses such as (Strongly Agree=5, Agree=4, Neutral=3, Disagree=2 and Strongly Disagree=1). Total items of this scale were 63. The researcher divides the individual responses into three categories of levels. The lowest score was 53 (63×1=63) and highest score was 265 (63×5=315). The researcher divides this range (63-315) in the following way;

Table No 3.3

Scoring Tool for the levels of 21st century skills

Variable	**Level of 21st century skills**	**Score**
21st Century skills	Below Average	53-123
	Average	124-194
	Above Average	195 -315

Table No 3.3 based on the levels of 21st century skills. The researcher divided the individual scores into three categories of levels, like below average, average and above average. Below average showed the range 53-123, average showed 124-194 and above average showed 195-265.

3.6 Validity of the Instrument

The researcher adapted instruments for data collection five experts of the related field. The researcher visited along with a copy of instrument tool, research objectives, conceptual framework, validation certificates and cover letter to each expert. Keeping in view of these entire things, the experts checked the content and face validity of the research tool and suggested some important recommendations and changes.

Table No 3.4

List of Expert's Tool Validation

Sr#	Experts of validation	Name of Institutions
1.	Dr. Azhar Mahmood	Chairman, Department of Education. International Islamic University, Islamabad(IIUI)
2.	Dr. Sheikh Tariq	Assistant Professor of Education Department. International Islamic University,Islamabad(IIUI)
3.	Dr. Imran Yousuf	Associate Professor of Education Department, PMAS Arid university Rawalpindi
4.	Dr. Jameela Ashraf	Assistant Professor of education department, NUML Islamabad
5.	Dr. Imran Niazi	Assistant Professor of PMAS Arid University Rawalpindi.

The above Table No 3.4 shows the name of experts who validated the tool. The researcher consulted five experts in the education department. The researcher visited and requested them to validate the tool. The experts signed on the validation certificate after incorporating all these suggestions.

3.7 Pilot Testing

The researcher used pilot testing as a minor description before conducting the study. The researcher used it to predetermine an instrument and testing hypothesis. This testing applied to a few members of the population. For the present study, the researcher collected the data from the students of one Public Sector University that was Bahria University Islamabad. The researcher distributed total 40 questionnaires among the students of management science department from Bahria University Islamabad. For collecting data, the researcher gets the permission letter from the administration of the National University of Modern Language, Islamabad. The researcher used the permission letter as a reference by the institution. The researcher visits the target university and collected the data by face-to-face method. The researcher interact the students and convinces them to fill the questionnaire as there were no personal information based questions. The respondents were cooperative. Therefore, the response rate was 100% as the students returned all questionnaires. The collected data was analyzed by using Statistical Package of Social Science (SPSS) 20th version.

3.8 Reliability of the Instrument

Reliability refers to the consistency of the test. Through pilot testing, the reliability of the tool was checked. The researcher used the collected data to test the reliability of the instrument, inter-section and total items correlation. Correlation used as a degree that measure the association among two variables. For this purpose, Pearsons' correlation coefficient was used in this study. In pilot testing, the reliability value of the research instrument that was based on two scales was checked. The Cronbachs' Alpha reliability of the flipped classroom scale was (.94**) that shows fairly reliable in term of item-total correlation. The Cronbachs' Alpha reliability value of 21st century skills development scale was (.93**). The researcher revised the tool for final data collection after the pilot testing. The items with weak reliability value are skipped by the researcher. The following tables of reliability are as follows;

Table No. 3.5

Analysis of Reliability (Sections) Pilot Testing (n=40)

Variable	Sub-Sections	No of Items	Cronbach's Alpha Reliability
Flipped Classroom Scale		**40**	**.94**
	Peer- Tutoring	8	.82
	Collaborative Learning	8	.66
	Problem Based Learning	8	.72
	Active Learning	8	.78
	E-Learning	8	.76

The above Table No 3.5 shows the Cronbachs' Alpha reliability of the Flipped Classroom was (.94**). Flipped classroom based on five sub-sections. So, the Cronbachs' Alpha reliability of sub-sections was as follows; peer-tutoring was (.82**), collaborative learning was (.66**), problem based learning was (.72**), active learning was (.78**) and e-learning was (.76**).

Table No. 3.6

Analysis of Reliability (Sections) Pilot Testing (n=40)

Variable	Sections	Sub-Sections	Items	Reliability
21st Century Skills Development Scale			**63**	**.93**
	Foundational Skills	Creativity and Innovation Skills	7	.62
		Problem Solving Skills	7	.66
		Collaboration Skills	7	.63
	Meta Skills	Information Communication Technology Literacy Skills (ICT)	7	.82
		Communication Skills	7	.76
		Integration Skills	7	.66
	Humanistic Skills	Life and Career Skills	7	.69
		Global Awareness	7	.65
		Cultural Competency	7	.61

This Table No 3.6 shows that Cronbach's Alpha reliability of 21st century skills was (.938**). The reliability of sub-sections was Creativity and innovation skills (.62**), Problem- solving skills (.66**), Collaboration skills (.63**), Information Communication Technology (ICT) skills was (.82**), Communication skills (.76**), Integration skills (.66**), Life and career skills (.69**), Global Awareness (.65**) and Cultural Competency was (.61**).

Table No. 3.7

Item Total Correlation- Pilot Testing of Flipped Classroom Assessment Scale (n=40)

Item	r	Item	r	Item	r	Item	r	Item	r
P1	.642**	C1	.654**	PB1	.575**	**A1**	**.064**	E1	.563**
P2	.704**	C2	.725**	**PB2**	**.747****	A2	.349*	E2	.471**
P3	.377*	C3	.554**	PB3	.469**	A3	.159	E3	.463**
P4	.635**	C4	.625**	PB4	235	A4	.663**	E4	.736**
P5	.613 **	C5	.480**	PB5	.199	A5	.708**	E5	.626**
P6	.671**	C6	.245	PB6	.666**	A6	.739**	E6	.641**
P7	.396**	C7	.104	PB7	.517**	A7	.685**	E7	.599**
P8	.594**	C8	.392*	PB8	.457**	A8	.570**	E8	.392*

****=** Correlation is significant at the 0.01 level (2 tailed)

*= Correlation is significant at the 0.05 level (2 tailed)

The item-total correlation table shows the strong relationship among items. Items have a strong correlation among all items; therefore, the scale used for final data collection. The strong value of correlation was (.74**) and the weak value was .06.

Table No. 3.8

Inter-Section Correlation of Flipped Classroom assessment scale (n=40)

Sections	Peer-Tutoring	Collaborative learning	Problem based	Active learning	E-learning	Flipped Classroom
Peer-Tutoring	1					
Collaborative Learning	.715**	1				
Problem-based learning	.632**	.790**	1			
Active learning	.644**	.749**	.811**	1		
E-learning	.808**	.836**	.726**	.738**	1	
Flipped Classroom	.859**	.910**	.883**	.884**	.925**	1

** Correlation is significant at the level 0.01 (2-tailed)

The above inter-section correlation table show the strong relationship between E- learning and collaborative learning that was (.83**). The lowest correlation between problem-based learning and peer-tutoring that was (.63**).

Table No. 3.9

Total Items Correlation of 21st Century Skills- Pilot Testing (n=40)

Item	**r**	**Item**	**r**	**Item**	**r**	**Item**	**r**	**Item**	**r**
IS1	.191	CS1	.448**	MC1	.442**	LC1	.414**	CC1	.556**
IS2	.383*	CS2	.610**	MC2	.605**	LC2	.614**	CC2	.513**
IS3	.631**	CS3	.596**	MC3	.605**	LC3	.336**	**CC3**	**.002**
IS4	.235	CS4	.496**	MC4	.449**	LC4	.272	CC4	.518**
IS5	.609**	CS5	.022	MC5	.383*	LC5	.495**	CC5	.270
IS6	.444**	CS6	.631**	MC6	.646**	LC6	.589**	CC6	.640**
IS7	.591**	CS7	.640**	MC7	.596**	LC7	.445**	CC7	.353*
PS1	.449**	IT1	.589**	MI1	.569**	GA1	.644**		
PS2	.373*	IT2	.411**	MI2	.445**	GA2	.297		
PS3	.475**	IT3	.601**	MI3	.555**	GA3	.440**		
PS4	.494**	IT4	.240	MI4	.314*	GA4	.236		
PS5	.092	IT5	.609**	MI5	.610**	GA5	.387*		
PS6	.606**	IT6	.442**	MI6	.596**	GA6	.585**		
PS7	.542**	**IT7**	**.685****	MI7	.485**	GA7	.644**		

****=** Correlation is significant at the 0.01 level (2 tailed)

*= Correlation is significant at the 0.05 level (2 tailed)

The above Table No 3.9 shows total item correlation of 21st century skills. The table show the relationship between all items. The correlation between .50 to 1.00 shows strong relationshipwhile .30 to .49 show medium and .10 to .29 show weak correlation. The above table showed the strong value (.68**) and lowest value was .002.

Table No. 3.10

Inter-Section Correlation (21st Century Skills Development Scale) Pilot Testing (n=40)

Sections	Creativity/Innovation	Problem Solving	Collaboration Skills	ICT Skills	Communication Skills	Integration Skills	Life & Career Skills	Global Awareness	Cultural Competency 21st century skills
Creativity/ Innovation Skills	1								
Problem Solving skills	.635**	1							
Collaboration skills	.761**	.613**	1						
ICT skills	.756**	.331**	.547**	1					
Communication skills	.738**	.609**	.778**	.566**	1				
Integration Skills	.669**	.643**	**.785****	.583**	.647**	1			
Life/Career Skills	.489**	.416**	.691**	.523**	.549**	.756**	1		
Global Awareness	.668**	.607**	.414**	.663**	.451**	.612**	.421**	1	
Cultural Skills	.404**	.534**	.476**	**.271****	.390**	.585**	.553**	.644**	1
21st Century Skills	.868**	.754**	.854**	.751**	.812**	.879**	.753**	.771**	.669**

**=Correlation is significant at the 0.01 level (2 tailed)

The above Table No 3.10 demonstrated that all sections were inter-correlated. It shows the strong relationship between communication skills and collaboration skills that was (.78**) while the lowest relationship was between cultural competency and information communication technology (ICT) skills at (.27).

3.9 Revised Instrument Tool

After pilot testing, the researcher revised the tool for final data collection. All those items that had correlation less than .30 were skipped by the researcher because of weak correlation. That removed items from flipped classroom assessment scale and from the 21st century skills assessment scale shows in the following tables;

Table No. 3.11

List of items- Finalized tool "Flipped Classroom Assessment Scale"

Sr #	Sections	Items Retained	No of Items Removed	No of Items Remained
1.	Peer-Tutoring	P1,P2, P3, P4, P5,P6,P7,P8	0	8
2.	Collaborative learning	C1,C2,C3,C4,C5,C6	02	6
3.	Problem based learning	PB1,PB2,PB3,PB4,PB5,PB6	02	6
4.	Active learning	A1,A2,A3,A4,A5,A6	02	6
5.	E-learning	E1,E2,E3,E4,E5,E6,E7,E8	0	8
	Total		6	34

Table No 3.11 shows flipped classroom assessment scale. There are 6 items with less than .30 correlation scale. These items were removed from the scale. Total numbers of items were 40. After removing 6 items, the remained items were 34 in the final scale.

Table No. 3.12

Final items list-finalized tool "21st century skills assessment scale"

Sr #	Sections	Items Retained	No. of Items Removed	No. of Items Remained
1.	Creativity and Innovation skills	IS1,IS2,IS3,,IS4,,IS5	02	5
2.	Problem solving skills	PS1,PS2,,PS3,,PS4,PS5,PS6	01	6
3.	Collaboration skills	CS1,CS2,CS3,CS4,CS5,CS6	01	6
4.	ICT skills	IT1,IT2,IT3,IT4,IT5,IT6	01	6
5.	Communication skills	C1,C2,C3,C4,C5,C6,C7	0	7
6.	Integration skills	I1,I2,I3,I4,I5,I6,I7	0	7
7.	Life and career skills	LC1,LC2,LC3,LC4,LC5,LC6	01	6
8.	Global awareness	GA1,GA2,GA3,GA4,GA5	02	5
9.	Cultural competency	CC1,CC2,CC3,CC4,CC5	02	5
	Total		10	53

Table No. 3.12 shows 21st century skills assessment scale. There are 10 items with less than .30 correlation. These items were removed from final scale. Total no of items were 63.After removing 10 items, 53 items were remained in the final scale.

3.10 Data Collection

The researcher collected the data through an adapted Five Points Likert Scale questionnaire as an instrument tool. The researchers visited the target department and interact with the students face to face. For conducting the study, the authoritative administration of the department gave permission later. The purpose behind of the latter was to allow the researcher to gather data from the required universities. Basically, the permission latter was used as a reference for the university. The researcher distributed a total 546 questionnaires among the students of management science department of three public sector universities (NUST, Bahria and COMSATS Institute of Information Technology) of Islamabad. The respondents returned 520 questionnaires. So, the rate of returned was 95%.

3.11 Data Analysis

Data was analyzed by utilizing statistical tests. There were two types of statistical techniques. One was descriptive statistics, and the other was inferential statistics. Descriptive statistics were used to systematize or organize data as charts, tables, and graphs. Descriptive statistics such as mean used and inferential statistical test likeLinear Regression in this study.

Table No 3.13

Data Analysis

Sr #	Objectives	Research Questions	Null Hypotheses	Statistical Techniques
1	To measure the levelof 21st century skillsdevelopment at postgraduate level	1. What is the level of 21st century skills development at postgraduatelevel?		Individual Score
2	To examine the practice of flipped classroom approach at postgraduate level	2. What are the practices of flipped classroom approach at postgraduate level?		Mean
3	To measure the effect of flipped classroom in developing 21st century skills at postgraduate level		$H_0$1. There is no significant effect of flipped classroom in developing 21st century skills at postgraduate level	Linear Regression

Table No. 3.13 shows data analysis statistical tests. To analyze the first objective, the researcher used an individual score. The second objective was analyzed by using the mean value. The researcher analyzed the third objective by testing linear regression analysis.

3.12 Ethical Consideration of Research

It is the basic responsibility of the researcher to follow research ethics during the study. For this study, the researcher strictly follows all rules according to the ethical principles.

The researcher got permission letter from the National University of Modern Language (NUML), Islamabad. For collecting data, the researcher requested for approval letters from the required universities (NUST, Comsats and Bahria). The researcher assured the respondents that the researcher will keep their responses and personal information hidden and secret. There was no personal question mentioned in the questionnaire by which respondents felt hesitation. The researcher did not force respondents to fill the questionnaires.

3.13 Delimitation of the research study

The delimitation of the study;

1. Three Regular public sector universities (NUST, Bahria and COMSATS Institute of Information Technology Islamabad) that applying Flipped classroom as ateaching method
2. Participants were the students of Management Science Programs only
3. Students of postgraduate level only

CHAPTER 4

ANALYSIS AND INTERPRETATION OF THE DATA

The current chapter comprised the data analysis that was gathered by using a research instrument. The study related to the effect of flipped classroom in developing 21st century skills at postgraduate level. For this purpose, the researcher used an Ex-Post factor research design and quantitative research approach. Research tool comprised two scales. One scale related to independent variable (Flipped Classroom) and the second scale related to dependent variable (Developing 21st century skills). The researcher adapted both scales pertaining conceptual framework of the study. Research tool based on three sections; one section was demographic information, second was five point Likert scale, and the third section was based on research variables. The researcher used an adapted five points Likert scale of the Flipped classroom by (Aljaraideh, 2019) for collecting data. This scale comprised the conceptual framework model of (Bishop & Verleger, 2013). There were five sub-sections and the total items were 34. These five sections named as peer-tutoring, collaborative learning, problem based learning, active learning and e-learning. The researcher used this scale to measure the effect of flipped classroom in developing 21st century skills at postgraduate level.

Todd and Kelley et al., (2018) developed a twenty-first century skills development scale. This questionnaire was based on nine sub-sections. The scale comprised the model of Binkley et al., (2012) that involved three main dimensions and each dimension had three sub-dimensions. These dimensions named as foundational skills (creativity and innovation skills, problem-solving skills and collaboration skills), Meta skills

(information communication technology skills (ICT), communication skills and integration skills) and Humanistic skills (life and career skills, global awareness and cultural competency). Total items on this scale were 53. Five experts of the relevant field validated research tool. The researcher changed questionnaire in the light of observation and valuable suggestions of the experts. After validation, the researcher conducted pilot testing to check the reliability of the instrument. For pilot testing, the researcher collected data from 40 students of the management science department. The collected data analyzed by using statistical tests and SPSS 20th version. After checking the reliability of the tool, the researcher again enhanced the questionnaire. The Data analyzed and interpret in the following sections;

Summary of the Research Instruments

4.1 Section I Description of Research Instrument (n=520)

In this section, the researcher analyzed the instrument too. Tool was based on two sets of questionnaires that were related to the flipped classroom and 21st century skills. The researcher adapted both scales. Flipped classroom assessment scale was developed by (Aljaraideh, 2019). There were five sub-sections and the total items were 34. These five sections as Peer-Tutoring, Collaborative learning, problem based learning, active learning and E-learning. Todd and Kelley et al., (2018) developed 21st century skills assessment scale. This questionnaire was based on nine sub-sections. Each dimension had three sub-dimensions. These dimensions named as foundational skills (Creativity and Innovation skills, Problem-solving skills and collaboration skills), Meta skills (Information Communication Technology skills (ICT), Communication skills and Integration skills) and Humanistic skills (Life and career skills, global awareness and cultural competency). Total items of this scale were 53. In this way, the total items of entire questionnaire were 87.

4.2 Section II Demographic Information (n=520)

The researcher related this section to analysis and interpretation of demographic information. Demographic information was based on background information like gender, institutions, programs, semesters and the age of the respondents. Researcher defined this section with the help of the table.

4.3 Section III Levels of Developing 21st Century Skills

The researcher related this section to objective no. 1 that was to measure the level of 21st century skills development at the postgraduate level. The researcher defined the level of 21st century skills with the help of individual scores and confidential these levels into three parts like below average, average and above average.

4.4 Section IV Practice of Flipped Classroom

This section was based on Objective No. 2 that is related to examine the practice of flipped classroom. Flipped classroom involved five more dimensions that are peer-tutoring, collaborative learning, problem based learning, active learning and e-learning.

4.5 Section V Contribution of Flipped Classroom in Developing 21st Century Skills

Section V based on objective no. 3, that related to two variables. This section showed a one-way relationship and analyzed by using linear regression. This objective is divided into five sub-objectives.

Section 4.1 Tool Construction

Table No 4.1

Cronbach's Alpha Reliability of Flipped classroom Assessment scale (n=520)

Scale	**Sections**	**Items**	**Cronbach Alpha Reliability**
Flipped Classroom Scale		34	.92
	Peer- Tutoring	8	.78
	Collaborative Learning	6	.82
	Problem based learning	6	.88
	Active learning	6	.85
	E- learning	8	.70

Table No. 4.1 shows the reliability of the flipped classroom was (.92). Total items of this scale were 34. The scale has five sections. The reliability of each section was as; Peer-Tutoring .68, Collaborative Learning .82, Problem based Learning .88, Active learning .85 and e-learning .70. The most reliable section of this scale was problem based learning found at (.88).

Table No 4.2
Cronach's Alpha Reliability of Developing 21st Century Skills (n=520)

Scale	Sections	Sub-Sections	Items	Cronbach Alpha Reliability
21st Century Skills Development Scale			53	.96
	Foundational skills	Creativity and Innovation Skills	5	.86
		Problem Solving Skills	6	.98
		Collaboration Skills	6	.79
	Meta Skills	Information Communication Technology Literacy Skills (ICT)	6	.90
		Communication Skills	7	.77
		Integration Skills	7	.72
	Humanistic skills	Life and Career skills	6	.88
		Global Awareness	5	.88
		Cultural Competency	5	.78

The above Table No 4.2 revealed the total reliability of developing 21st century skills was (.96). The scale comprised three major sections, such as Foundational skills, Meta skills, and humanistic skills. Each section had three sub-sections. The Cronbachs' Alpha Reliability of these sections was as follows; creativity and innovation skills at .86, Problem-solving skills .93, Collaboration skills .79, Information Communication Technology (ICT) skills .90, Communication skills .77, Integration skills .72, Life and Career skills .88, Global Awareness .88 and Cultural Competency was at .78.

Table No 4.3

Item-Total Correlation of Flipped Classroom Scale (n=520)

Item	**r**	**Item**	**r**	**Item**	**r**
P1	.367*	C5	.578**	A5	.682**
P2	.671**	C6	.706**	A6	.317*
P3	.375*	PB1	.543**	E1	.334*
P4	.450**	PB2	.702**	E2	.481**
P5	.385**	PB3	.685**	E3	.504**
P6	.466**	PB4	.552**	E4	.444**
P7	.378*	PB5	.687**	E5	.517**
P8	.429**	**PB6**	**.304***	E6	.508**
C1	.497**	A1	.682**	E7	.519**
C2	.456**	A2	.639**	E8	.387*
C3	.547**	A3	.537**		
C4	**.750****	A4	.326*		

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2- tailed)

Table No 4.3 demonstrated the total-item correlation of the flipped classroom. The scale had five sub-sections named as Peer-tutoring, collaborative learning, problem based learning, active learning and e-learning. The total items of this scale were 34 that were related to these sub- sections. It significantly correlated most of the items at 0.01. The highest significant value was at Collaborative learning (C4) that was .750**. Some items show a significantly correlated at 0.05. The weak value of item-total correlation of the flipped classroom was at problem based learning (PB6) that was .304*.

Table No 4.4

Inter-section Correlation of Flipped Classroom Scale (n=520)

Sections	Peer- Tutoring	Collaborative Learning	Problem based Learning	Active Learning	E-Learning	Flipped Classroom
Peer-Tutoring	1					
Collaborative Learning	.493**	1				
Problem Based Learning	.417**	**.833****	1			
Active Learning	.569**	.393**	**.389****	1		
E-Learning	.561**	.545**	.493**	.461**	1	
Flipped Classroom	.788**	.827**	.779**	.721**	.794**	1

**. Correlation is significant at the 0.01 level (2-tailed).

The above Table No 4.4 revealed the inter-section correlation of the flipped classroom scale. The scale had five sub-sections. The table show that all sub-section significantly correlated. The strong correlation was among problem based learning and collaboration learning that was (.833**). The weak correlation was between active learning and problem based learning that was (.389**).

Table No 4.5

Item-Total correlation of developing 21st century skills (n=520)

Item	r	Item	r	Item	r	Item	r	Item	r
IS1	.811**	CS1	.806**	IT6	.337*	MI4	.549**	GA2	.701**
IS2	**.817****	CS2	.817**	MC1	.789**	MI5	.333*	GA3	.684**
IS3	.606**	CS3	.812**	MC2	.808**	MI6	.354*	GA4	.700**
IS4	.445**	CS4	.718**	MC3	.344*	MI7	.416**	**GA5**	**.309***
IS5	.807**	CS5	.338*	MC4	.505**	LC1	.608**	CC1	.310*
PS1	.754**	CS6	.378*	MC5	.471**	LC2	.613**	CC2	.697**
PS2	.697**	IT1	.802**	MC6	.647**	LC3	.609**	CC3	.702**
PS3	.725**	IT2	.668**	MC7	.699**	LC4	.698**	CC4	.783**
PS4	.723**	IT3	.675**	MI1	.661**	LC5	.695**	CC5	.699**
PS5	.362*	IT4	.816**	MI2	.512**	LC6	.707**		
PS6	.692**	IT5	.800**	MI3	.405**	GA1	.695**		

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed)

This Table No 4.5 revealed item-total correlation of developing 21st century skills scale. Total items of this scale were 53. The higher value was at Creativity and innovation skills (IS 2) that was .817** and the low value at global awareness skills (GA 5) .309*. Most items significantly correlate at 0.01, whereas some items significantly correlated at 0.05 levels.

Table No 4.6

Inter-Section Correlation of Developing 21st Century Skills (n=520)

Sections	Creativity /innovation skills	Problem Solving skills	Collaboration skills	ICT Skills	Communication skills	Integration skills	Life & Career skills	Global Awareness	Cultural Competency	21st Century skills
Creativity/ Innovation Skills	1									
Problem Solving skills	.852**	1								
Collaboration Skills	.859**	.744**	1							
ICT skills	.810**	.767**	.777**	1						
Communication Skills	.619**	.532**	.607**	.639**	1					
Integration Skills	.479**	.482**	.420**	.536**	.522**	1				
Life/Career Skills	.675**	.483**	.581**	.522**	.737**	.425**	1			
Global Awareness	.411**	**.287****	.422**	.436**	.807**	.375**	.759**	1		
Cultural Skills	.592**	.474**	.597**	.615**	.850**	.450**	.769**	**.926****	1	
21st Century skills	.870**	.782**	.828**	.841	.871**	.659**	.819**	.737**	.855**	1

**=Correlation is significant at the 0.01 level (2 tailed)

The above Table No 4.6 demonstrated that all sections were inter-correlated. The table show strong relationship between communication skills and collaboration skills that was (.926**) while the lowest relationship was between Cultural Competency and Information Communication Technology (ICT) skills at (.287).

Section II 4.2 Demographic Information

Table No 4.7

Distribution of the respondents according to Gender (n=520)

Gender	Frequency	Percentage%
Male	261	50.2%
Female	259	49.8%
Total	520	100%

Table No 4.7 indicates the number and percentage of male and female students of Management Science. The total number of the students was 520, in which 261 (50.2%) students were Male and 259 (49.8%) students were female. The number of male students is greater than female students.

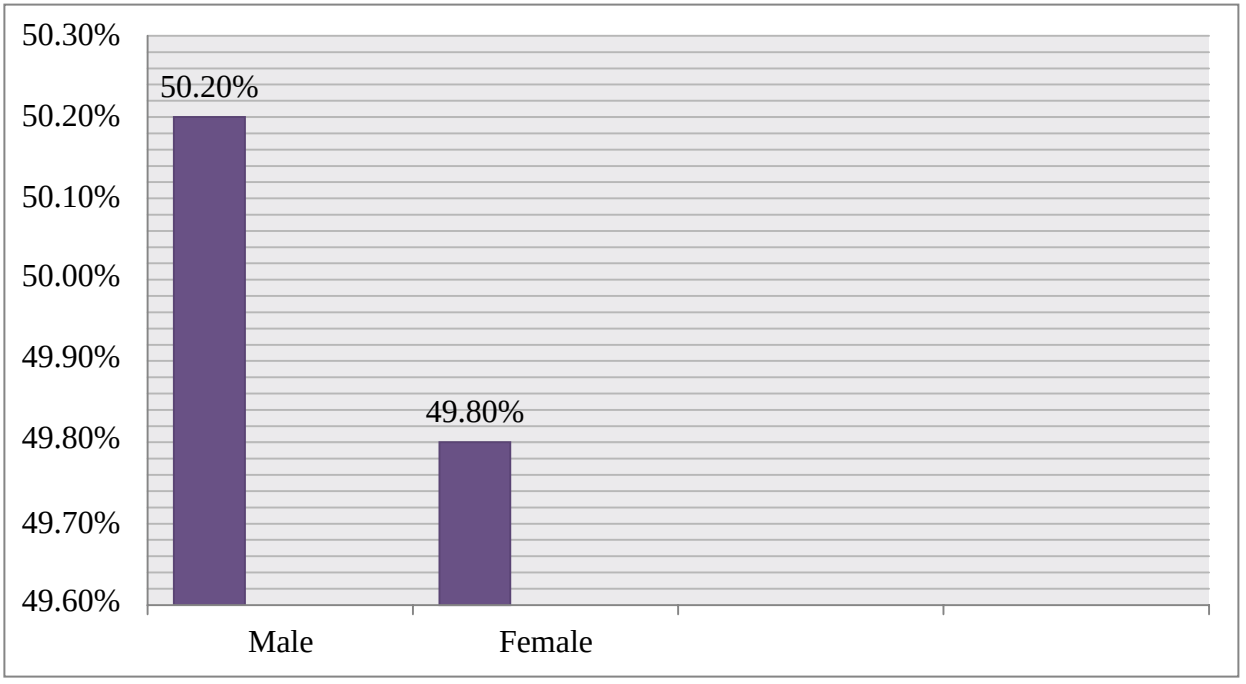

Fig 4.7 Gender Based Percentage of Students

Table No 4.8

Distribution of respondents according to Institutions (n=520)

Institutions	**Frequency**	**Percentage%**
National University of Science and Technology	253	48.6%
Bahria University Islamabad	131	25%
COMSATS Institute Of Information Technology	136	26%
Total	520	100%

The table 4.8 shows the distribution of respondents on the base of institutions. The researcher collected data from the students of three public sector universities. From NUST university Islamabad 253 (49%), Bahria University Islamabad 131 (25%) andfrom COMSATS Institute of Information Technology Islamabad 136 (26%) students took part

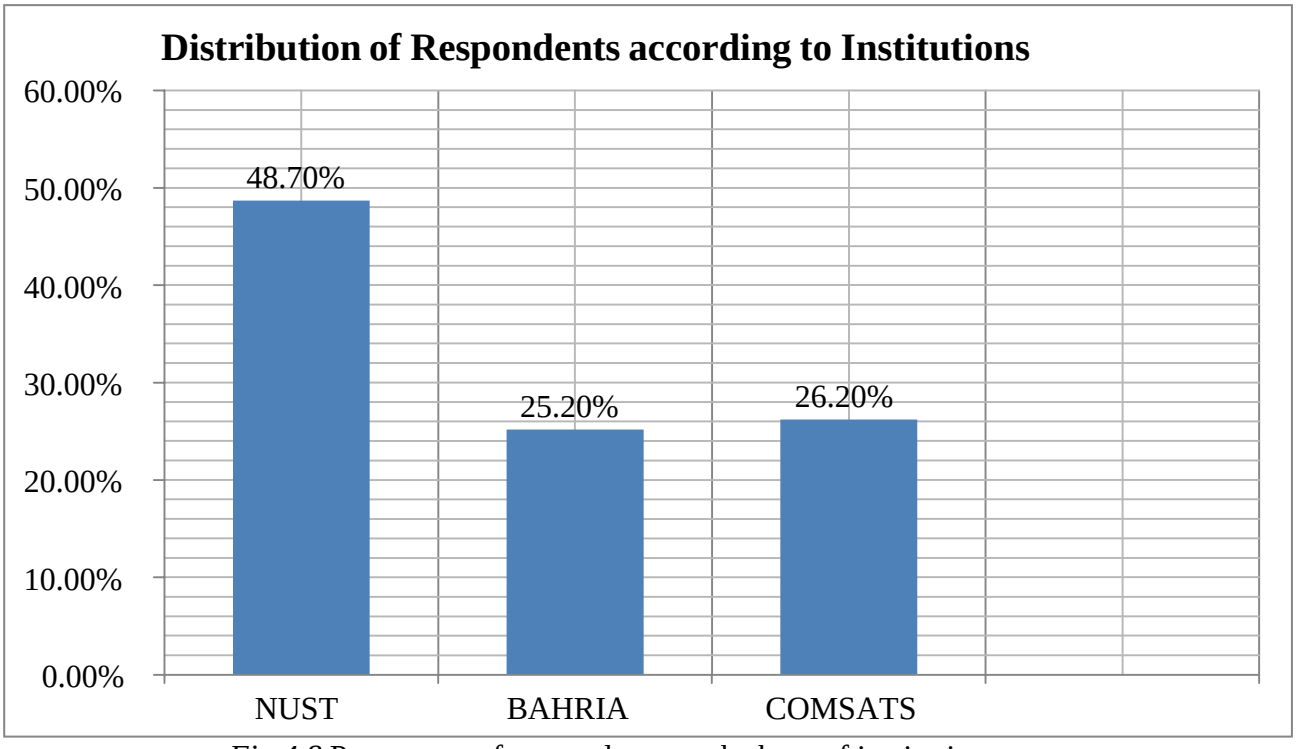

Fig 4.8 Percentage of respondents on the base of institutions

Table No 4.9

Distribution of Respondents According To Programs (n=520)

Programs	Frequency	Percentage%
Master/MBA	300	57.7%
MS/M.PHIL	155	29.8%
PH.D	65	12.5%
Total	520	100%

The Table No 4.9 shows percentage of students on the base of programs. The demographic table was based on three programs such as MBA/Master, MS/M. Phil and PH. D Programs. There were 300 (57.7%) respondents from MBA/Master, 155 (29.8%) students from MS/M. Phil and 65 (12.5%) students respond from PH. D level. The students of Master/MBA are greater than other two programs.

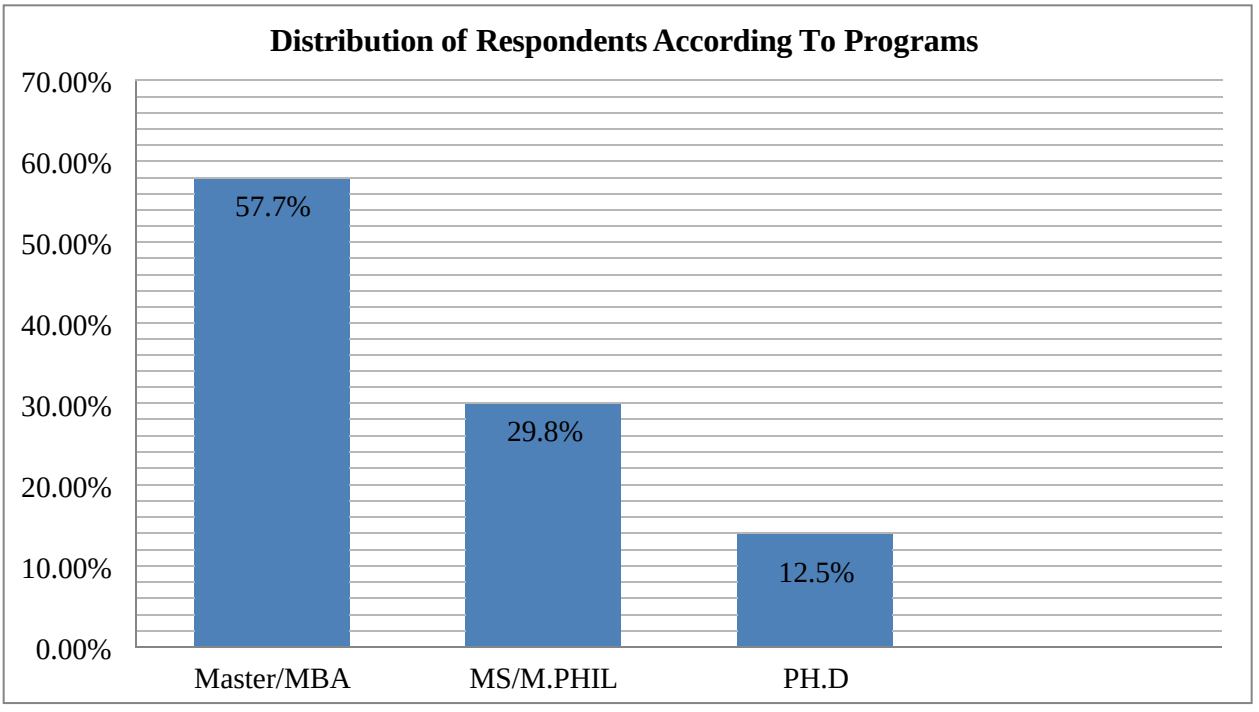

Fig 4.9 Percentage of students according to Programs

Table No. 4.10

Distribution of respondents according to Age (n=520)

Age	Frequency	Percentage%
Below 30	399	76%
31-35	95	18%
36-40	21	4%
Above 40	1	2%

The Table No 4.10 is based on the age of the respondents. There were 399 (76%) respondents were below 30, 95 (18%) were from the range of 31-35, Twenty-one (4%) from the range of 36-40 and only one respondent was above 40. The below figure 4.10 shows the percentage of the respondents.

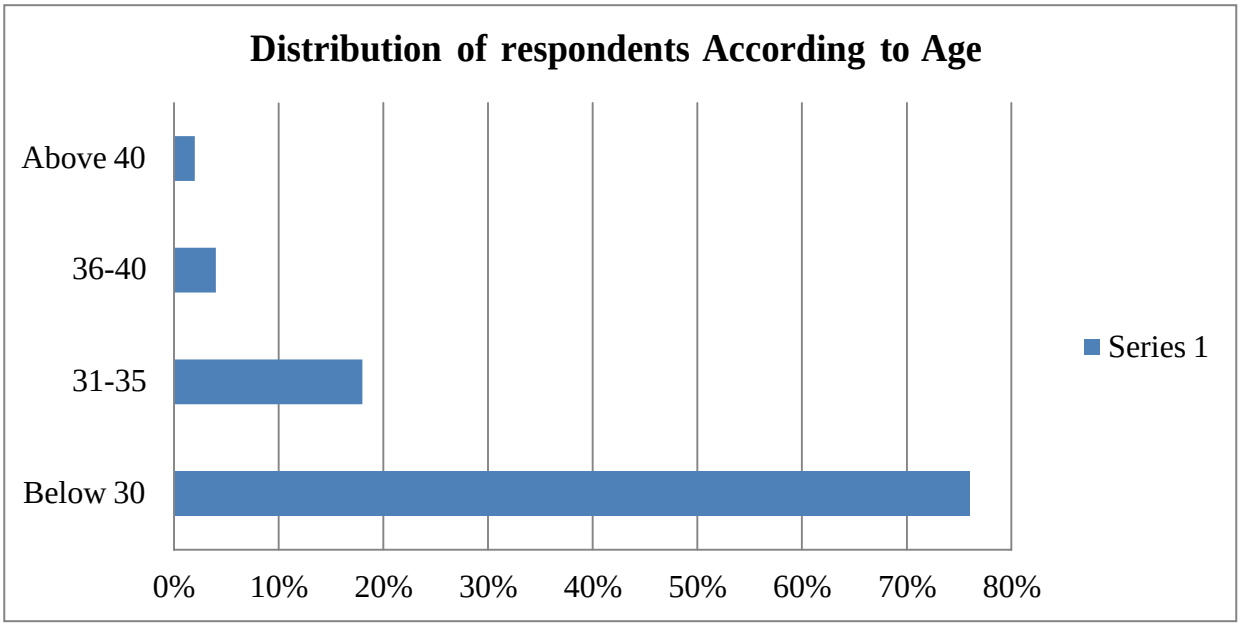

Fig 4.10 Percentage of the respondents on the base of Age

Section III 4.3 Levels of developing 21st Century Skills

Objective No. 1: "To measure the levels of 21st century skills development at Postgraduate level

Table No 4.11

Level of 21st Century Skills (n=520)

Sr#	Score	Level of 21st century skills	n	Percent%
1.	53-123	Below Average	0	0
2.	124-194	Average	30	6%
3.	195-265	Above Average	490	94%

The Table No 4.11 demonstrated the level of 21st century skills. The researcher divides the individual score into three categories; below average (53-123), average (124-194) and above average (195-265). The table shows that 490 (94%) students were at above average level while 30 (6%) were at average level. There was no student found at the below average level. The table is elaborated through figure 4.11;

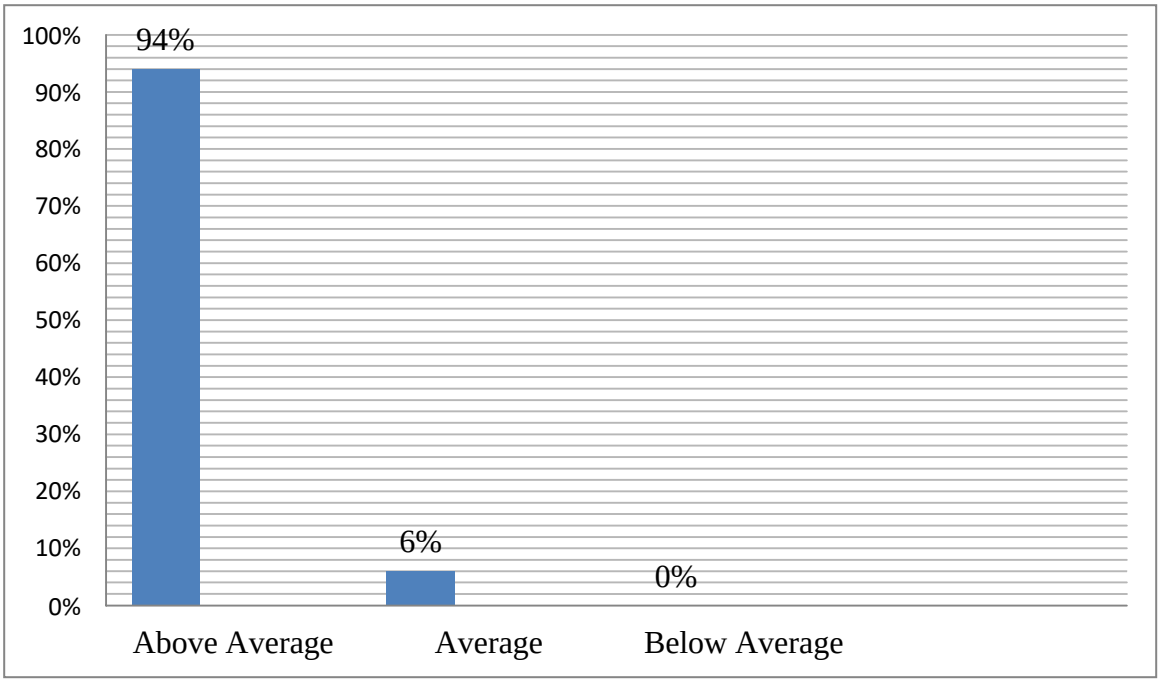

Fig 4.8 Level of 21st century skills (n=520)

Section IV 4.4 Practice of Flipped Classroom

Objective No. 2: To examine the practice of flipped classroom approach at postgraduate level

Table No 4.12

Practice of Flipped Classroom (n=520)

Sr#	Sections	n	Mean	Remarks
1	Peer-Tutoring	520	4.17	Agree
2	Collaboration Learning	520	4.09	Agree
3	Problem based learning	520	4.12	Agree
4	Active learning	520	4.22	Agree
5	E-learning	520	4.16	Agree

Table No 4.12 revealed the practicing of flipped classroom. The table analyzed objective No. 2 that was related to examine the flipped classroom approach. Table shows the mean value of five sections of the flipped classroom. These sections named as peer- tutoring, collaborative learning, problem based learning, active learning and e-Learning. The mean value of peer- tutoring was 4.17, shows that students agreed and were more interested to learn by peer- tutoring. They made plan, shared their opinions and got timely feedback from others. The mean value of collaborative learning was 4.09 that show that students agreed to practice and exercise collaboratively.

They completed the tasks as groups during and outside the class. Students divided the tasks into groups and tried to achieve learning objectives collaboratively. The mean value of problem based learning was 4.12, show respondents' interest in doing something independently. Problem based learning focused self-study, active learning and practical learning. The mean value of active learning was 4.22 that show that respondents agreed with this section. Active learning process emphasis on active participation of learners and enhanced their critical thinking skills. It related to independent and self-directed learning. The opinions of participants show their interest in active learning. They completed their tasks on time and attend regular classes. The last section related to e- learning also shows the mean values 4.16 with status of agree. E-learning is an easy way to learn without the help of others. The mean value shows that most of the respondents satisfied with the online teaching and learning process. Students can connect with teachers and other fellows by utilizing online resources. The All five sections had value 4 that shows that respondents agreed on applying the required five sections of flipped classroom. The table is elaborated through figure 4.12;

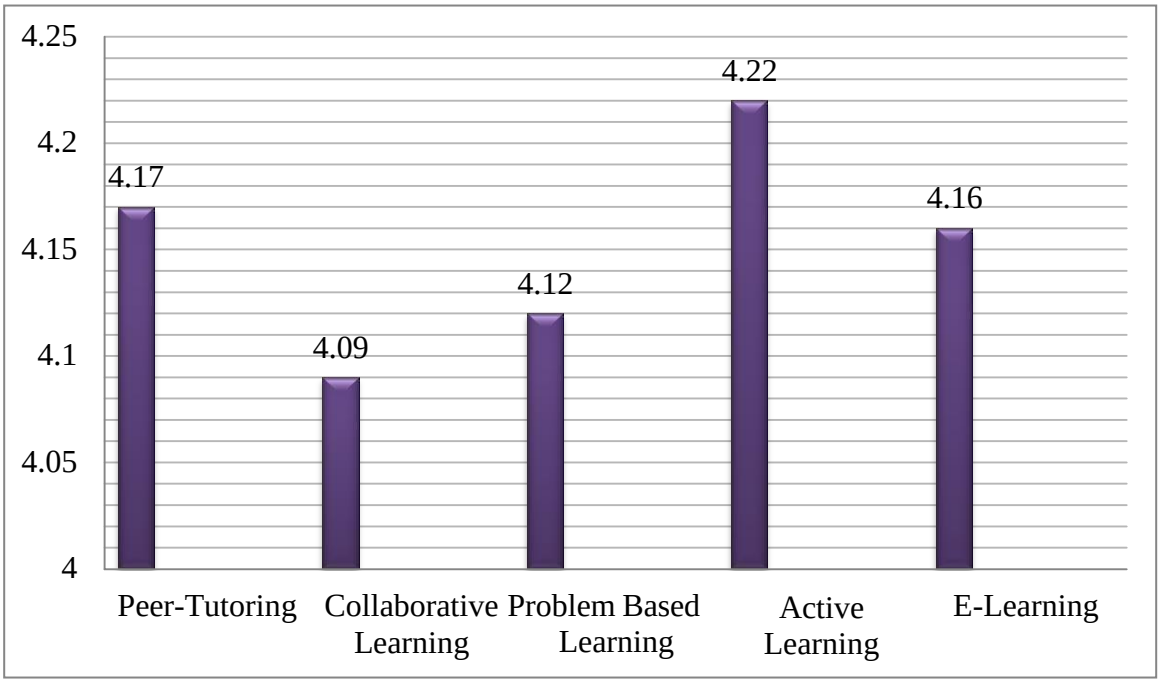

Fig 4.12 Practice of Flipped Classroom (n=520)

Section V

Objective No. 3 "To measure the effect of flipped classroom in developing 21st century skills at postgraduate level"

H_0 1. "There is no significant effect of flipped classroom in developing 21st century skills at postgraduate level"

Table No. 4. 13

Effect of flipped classroom in developing 21st century skills

Independent Variable	Dependent variable	R^2	β	t	Sig.
Flipped Classroom	21st century skills	0.443	1.168	19.872	.000

**P<0.01

The above Table No 4.13 revealed the effect of the flipped classroom in developing 21st centuryskills. The R square (0.443) value of the flipped classroom shows that the flipped classroom had 44% effect in developing 21st century skills. The Beta value (β=1.168) and t-value (t=19.872) demonstrate positive effect of independent variable independent variable and observed significant at 0.01. The result of the above table shows that the hypothesis H_0 1 "There is no effect of flipped classroom in developing 21st century skills" was rejected.

Objective No. 3 (a) "To measure the effect of Peer-Tutoring related to the flipped classroom in developing 21st century skills at postgraduate level"

$H_0$1a. There is no significant effect of Peer- Tutoring related to the flipped classroom in developing 21st century skills at postgraduate level

Table No 4.14

Effect of Peer-Tutoring in developing 21st century skills

Independent variable	**Dependent variable**	**R^2**	**β**	**t**	**Sig.**
Peer-Tutoring	21st century skills	0.353	3.952	16.827	.000

**P<0.01

As R square explains as the statistical parameter that shows how much variation observed in the dependent variable that caused by the independent variable. The result of the above Table No 4.14 demonstrate R square value (0.353) that show Peer-Tutoring had 35% effect in developing 21st century skills. The Beta value (β=3.952) and t-value (t=16.827) shows a positive significant effect of independent variable at 0.01. Therefore, the result of the table shows that the Null hypothesis $H_0$1. that was "There is no significant effect of Peer- Tutoring related to Flipped classroom in developing 21st century skills at postgraduate level" was rejected.

Objective No 3 (b) "To measure the effect of Collaborative Learning related to the flipped classroom in developing 21st century skills at postgraduate level"

H_0 1 b. "There is no significant effect of Collaborative Learning related to the flipped classroom in developing 21st century skills at postgraduate level"

Table No. 4.15

Effect of collaborative learning in developing 21st century skills

Independent variable	**Dependent variable**	**R^2**	**β**	**t**	**Sig.**
Collaborative Learning	21st century Skills	0.227	3.069	12.338	.000

**P<0.01

Table No 4.15 revealed the value of R square (0.227) that shows the 22% effect of collaborative learning in 21st century skills. The Beta value (β=3.069) and t-value (t=12.338) explains the positive significant effect of independent variable independent variable. Significance value was at 0.01. The result show that null hypothesis H_0 1 (b) "There is no significant effect of Collaborative learning related to Flipped classroom in developing 21st century skills atpostgraduate level" was rejected.

Objective No. 3 (c) "To measure the effect of Problem Based Learning related to the flipped classroomin developing 21st century skill at postgraduate level"

H_0 1 c. "There is no significant effect of Problem Based Learning related to the Flipped classroomin developing 21st century skills at postgraduate level''

Table No. 4.16

Effect of problem based learning in developing 21st century skills

Independent variable	**Dependent Variable**	**R^2**	**β**	**t**	**Sig.**
Problem Based Learning	21st century skills	0.221	4.116	12.127	.000

**P<0.01

The above Table No 4.16 shows the R square value (0.221) that shows the 22% effect of problem based learning in 21st century skills. The Beta value (β=4.116) and t-value (t=12.127) showsthe positive significant effect of independent variable at 0.01. Therefore, the result concludes that null hypothesis H_0 1 (c) "There is no significant effect of Problem Based Learning related to Flipped classroom in developing 21st century skills at postgraduate level" was rejected.

Objective No. 3(d) "To measure the effect of Active Learning related to the Flipped classroom indeveloping 21st century skills at postgraduate level"

H_0 1 d. "There is no significant effect of Active Learning related to the Flipped classroom indeveloping 21st century skills at postgraduate level.

Table No. 4.17

Effect of Active learning in developing 21st century skills

Independent variable	**Dependent variable**	**R^2**	**β**	**t**	**Sig.**
Active Learning	21st century skills	0.181	2.967	10.686	.000

**P<0.01

Table No 4.14 revealed the value of R square (0.181) that shows the 18% effect of Active learning in 21st century skills. The Beta value (β=2.967) and t-value (t=10.686) explained the positive significant effect of independent variable. Significance value was at 0.01. The result showthat null hypothesis H_0 1 (d) "There is no significant effect of Active Learning related to Flipped classroom in developing 21st century skills at postgraduate level" was rejected.

Objective No. 4 (e) "To measure the effect of e- Learning related to the Flipped classroom in developing 21st century skills at postgraduate level"

H_0 1 e. "There is no significant effect of e-Learning related to the Flipped classroom in developing 21st century skills at postgraduate level"

Table No 4.15

Effect of E-Learning in developing 21st century skills

Independent variable	**Dependent variable**	**R^2**	**β**	**t**	**Sig.**
E-Learning	21st century skills	0.351	3.810	16.741	.000

**P<0.01

The R square value (0.351) shows that E-Learning had 35% effect in developing 21st century skills. The Beta value (β=3.810) and t-value (t=16.741) shows the positive significant effect of independent variable at 0.01. Therefore, the result concludes that null hypothesis $H_0$1(e) "There is no significant effect of E-Learning related to the Flipped classroom in developing 21st century skills at postgraduate level" was rejected.

CHAPTER 5

SUMMARY, FINDINGS, CONCLUSIONS DISCUSSIONS AND RECOMMENDATIONS

In this chapter, the researcher described summary, findings, conclusions, discussions, recommendations for future studies and limitations of the present study. Moreover, the detail of this chapter is defined as follows;

1.1 Summary

The aim of the study was to measure the effect of flipped classroom in developing 21st century skills. For this purpose, the study was conducted on the base of three main research objectives. The following objectives were as follows;

1. To measure the levels of 21st century skills development at postgraduate level
2. To examine the practices of the flipped classroom approach at postgraduate level
3. To measure the effect of the flipped classroom in developing 21st century skills at postgraduate

Null Hypothesis was designed for the present study that was; there was no significant effect of flipped classroom in developing 21st century skills at postgraduate level. Conceptual framework was based on two models. One model related to the flipped classroom (independent Variable) and the second model related to developing 21st century skills (Dependent variable). The flipped classroom model was developed by Bishop and Verleger (2013). There were five sub-sections. These five sections as peer-tutoring, collaborative learning, problem based learning, active learning and E-learning and second model related to 21st century skills developed by Binkley et al., (2012) that involved three main dimensions and each dimension had three sub-dimensions.

These dimensions named as foundational skills (Creativity and Innovation skills, Problem-solving skills and collaboration skills), Meta skills (Information Communication Technology skills (ICT), Communication skills and Integration skills) and Humanistic skills (Life and career skills, global awareness and cultural competency). The research design of the present study was Ex-Post Facto and research approach was quantitative research. The total population of this study was 586 students of Management Science Programs enrolled in spring (session 2021) at three public sector universities of Islamabad that are conducting flipped classroom method. For this study, the researcher use censes sampling in which data gathered from each person of the entire population. Research tool comprised two scales. One scale related to independent variable (Flipped Classroom) and the second scale related to dependent variable (Developing 21st century skills). The researcher adapted both scales pertaining conceptual framework of the study. Research tool consisted of three sections; one section was a five point Likert scale, second was demographic information and third section was based on research variables. The five experts in the relevant field validated the research tool. The respected experts validated and suggested some important and relevant suggestions. The researcher improved in the light of given suggestions. The pilot testing checked the reliability of the scales. For pilot testing, the researcher collected the data from the 40 respondents. The researcher visited the target institution and collected the data via face-to-face interactions. After that, data was analyzed by utilizing Statistical Package for the Social Science (SPSS) version 20th. The reliability of the flipped classroom was .94 and the reliability of developing 21st century skills was .93. After pilot testing, the tool revised and prepared for the final data collection. Final scale was based on 83 items in which 34 items related to flipped classroom while 53 related to 21st century skills. After excluding 40 members of pilot trial from 586 students the remained population was 546 students. The questionnaire distributed by the researcher among 546 students, in which they returned 520 questionnaires. Therefore, the rate of return was 95%. After that, data was analyzed by utilizing Statistical Package for the Social Science (SPSS) version 20th. The reliability of the flipped classroom was (.92**) and the reliability of 21st century skills was (.96**). These statistical tests were individual score, mean, frequency, Cronbach's Alpha reliability, Pearson's correlation and Linear regression.

5.2 Findings

Objective No.1 "To measure the levels of 21st century skills development at postgraduate level"

1. The result shows that most respondents were at the above average level of developing 21st century skills. The researcher categorized the individual scores into three categories; below average (53-123), average (124-194) and above average (195-265). The table shows that 490 (94%) students were at above average level while 30 (6%) were at average level. There was no student at below average level (Table 4.8).

   Objective No. 2 "To examine the practice of the flipped classroom approach at postgraduate level"

2. The results show the mean value of all sub-sections of the flipped classroom. The mean value of Peer-tutoring was 4.17 that show agreed responds by the respondents. The students show more interest in peer-tutoring. They enjoyed learning with their peers and got timely feedback. The mean value of collaborative learning was 4.09 that show that students agreed to practice and exercise collaboratively. The mean value of problem based learning was 4.12 that show respondents' interest in doing something independently. Problem based learning focused self-study, active learning and practical learning. The mean value of Active learning was 4.22 that show that respondents agreed with this section. Active learning process emphasized on active participation of learners and enhanced their critical thinking skills. The mean values of e-learning was 4.16 with status of agree. E-learning is an easy way to learn without the help of others. All five sectionshad a value 4 that revealed the satisfaction of respondents towards the flipped classroom and its sections (Table 4.9).

   Objective No. 3 "To measure the effect of the flipped classroom in developing 21st century skills at postgraduate level"

3. The result shows that, flipped classroom had 44% effect in developing 21st century skills.

   This value shows a positive effect of flipped classroom in developing 21st century skills and observed significant at 0.01. Therefore, the result shows that the null hypothesis H01 "there is no effect of flipped classroom in developing 21st century skills" was rejected (Table No. 4.10).

   Objective No. 3 (a) "To measure the effect of Peer-Tutoring related to the Flipped classroom in developing 21st century skills at postgraduate level"

4. After interpreting the table, the findings originate that Peer-Tutoring had 35% effect in developing 21st century skills. It shows a positive significant effect of peer-tutoring in developing 21st century skills at 0.01. Therefore, the result of the table shows the null hypothesis $H_0$1. that was "There is no significant effect of Peer- Tutoring related to the flipped classroom in developing 21st century skills" was rejected (Table 4.11).

   Objective No.3 (b) "To measure the effect of Collaborative Learning related to the flipped classroom in developing 21st century skills at postgraduate level"

5. The results confirmed 22% effect of collaborative learning in 21st century skills. It was the positive significant effect of collaborative learning in developing 21st century skills and significance value was at 0.01. The result show that the null hypothesis $H_0$1 (b) "There is no significant effect of Collaborative Learning related to the Flipped classroom in developing 21st century skills at postgraduate level" was rejected (Table 4.12).

   Objective No. 3 (c): "To measure the effect of Problem Based Learning related to the Flipped classroom in developing 21st century skill at postgraduate level"

6. The findings of the table 4.13 show the 22% effect of problem based learning in 21st century skills. It shows the positive significant effect of problem based learning

21st century skills at 0.01. Therefore, the result concludes that the null hypothesis $H_0$1 (c)"There is no significant effect of problem based learning related to the flipped classroom in developing 21st century skills at postgraduate level" was rejected (Table 4.13).

Objective No. 3 (d): "To measure the effect of Active Learning related to the flipped classroom in developing 21st century skills at postgraduate level"

7. The above mentioned objective no. 3 (d) was based on the null hypothesis. The finding of the table (4.14) shows 18% effect of Active learning in developing 21st century skills. It was the positive significant effect of active learning in developing 21st century skills and significance value was at 0.01. The result show that the null hypothesis H01 (d) "There is no significant effect of Active Learning related to flipped classroom in developing 21st century skills at postgraduate level" was rejected (Table 4.14).

Objective No. 4 (e) "To measure the effect of E-Learning related to the Flipped classroom in developing 21st century skills at postgraduate level"

8. The objective no. 4 (e) was based on the null hypothesis. The finding of the table (4.15) shows that E-Learning had 35% effect in developing 21st century skills. It shows the positive significant contribution of E-learning in developing 21st century skills at 0.01. Therefore, the result concludes that null hypothesis H01 (e) "There is no significant effect of E-Learning related to the Flipped classroom in developing 21st century skills at postgraduate level" was rejected (Table 4.15).

5.3 Discussions

The researcher conducted the study to measure the effect of the flipped classroom in developing 21st century skills. The study was based on three objectives. First objective of this study was "to measure the level of 21st century skills. The findings show that most respondents were at the above average level. Bashir (2013) supports the result of the study who conducted the study "to discover the achievement of 21st century skills among students and teachers during their involvement in instructive programs. The result was the constructive development of 21st century skills among learners. Mostly students were at the above level of skills. These skills were cooperation, innovation and adaptability, etc. The respondents developed and enhanced their skills. Twenty-first century skills are a necessary part of this era. The study of Kocak and Goksu (2020) also had similar findings that originated the learners had 21st century skills. The study was to investigate the level of learners having skills and their relationship. The result shows that digital skills significantly correlated with critical thinking skills, problem-solving skills, active participation and integration skills. Most of the students were at a higher level of creativity and critical thinking skills. The findings of the present study are like the research of (VanLaar, 2019). The study was to examine levels of students' 21st century skills. The result shows students' interest in digital and communication skills. A study conducted by Kereluik et al., (2013) shows the relationship between communication and collaborative skills. Both skills considered similar to 21st century skills. The findings of that study show that communication skills are an important part of collaborative skills to build up teamwork environment. The students were at higher level as they have strong communication skills. Therefore, it is the requirement of this century to encourage students and teacher towards digital literacy. The second objective of the study was to examine the practice of flipped classroom approach. The mean value of all sub-sections

shows the status with agreed. All five sections had value 4 that shows that respondents agreed to utilize the required five sections of flipped classroom. Mostly students agreed with the active learning and peer-tutoring. A research by Jamaludin and Osman (2014) examined the utilizing of flipped classroom for encouraging students' participation that increased students' active participation in learning process. The finding of the study show that flipped classroom increases students' self-motivation and they feel happy to become a part of flipped method. Same results indicated in the study of Rehman (2017) in which students were satisfied with flipped classroom and improved their active learning skills. The focus of that study was to know the positive relationship between the flipped method and learners' academic achievement. The study shows that the flipped classroom method is more fascinating for students and teachers. It facilitates students to gain knowledge by self-study and improve their active learning skills. The students watched videos, they can play, reverse and pause if not understood. The result same as like the study conducted by Clark (2015) that show the students agreed with the flipped classroom strategy that was useful for the students to interact with the teachers and other fellows. Group-based activities increase students' connection with their peers. It also enhanced students' communication skills. Bhagat et al., (2016) explained in his study that students of higher education level agreed to apply the flipped classroom method. By flipped classroom strategy, teachers give more time and attention to those students who are slow learners. A study conducted by Mazur et al., (2015) finds out students' satisfaction with a flipped classroom instead of a traditional classroom. The flipped classroom provided them the opportunity to work with classmates and discussed learning objectives in collaborative manners. These types of activities enhanced students' achievement in curricular and co-curricular activities. The results of the third objective originated that the flipped classroom had 44% positive significant effect in

developing 21st century. The five sub-sections of the flipped classroom are; peer-tutoring, collaborative learning, problem based learning, active learning and E-learning. The results shows that Peer-Tutoring had 35% effect in developing 21st century skills, Collaborative learning had 22% effect in 21st century skills, problem based learning had 22% effect in developing 21st century skills, active learning had 18% effect and E-Learning had 35% effect in developing 21st century skills. The results of the study are similar as the study of the Scott et al., (2015) demonstrated that flipped classroom approach had a positive relationship with students' developing skills. Flipping the class promotes the active participation of students. The flipped classroom and active participation of students is useful for teachers to interact with the entire class at a time easily. The results of the study are like Robinson et al., (2015). The study revealed that flipped classroom environment is based on innovative, task-oriented, cooperative and student- centered learning. The flipped classroom method developed students' 21st century skills like technological, collaborative, critical thinking and other specific skills. The study conducted by Cosculluela et al., (2021) show the utilization of the flipped classroom before or within Covid-19 and how technology has its effects in developing 21st century skills at the university level. The study was to define the experience of students with flipped teaching mode within the Covid-19. The findings of that study revealed that there was a significantly strongest relationship among variables of 21st century skills. Most of the respondents agreed with the average score. According to center of learning and education (2012), teachers engage the students to discuss and practiced the course content within the flipped classroom. These types of exercises increase learners' understanding and develop their critical thinking skills. A study conducted by Tucker (2012) identified that flipped classroom is beneficial for students to prepare themselves before the class and then during the class take help of the teachers to

solve tricky or difficult questions. Flipped classroom helps the students to improve problem solving skills. In flipped classroom; the students have many options to interact and discuss with teachers as well classmates to improve their communication skills. Teachers and students interact towards flipped classroom as it saves times. Enfield (2013) conducted a study on undergraduate students who taught by using multimedia. The researcher selected 50 students as a sample. That study explores the effects of the flipped classroom model on self- regulated learning skills. Many steps were used to complete the research. First phase of the study was that the students must view the lecture video before the class, the second step was to take a short oral test during the class. The third phase was to ensure active participation of all students and conduct group discussion based activities. At the end, the students responded positively to the flipped classroom model. Some constructive impacts are as follows; enhanced students' attendance in the class, improve students' self-motivation and students easily completed a task with the help of discussion. That study additionally expressed the opinions of teachers that students take more interest in the flipped classroom instead of the traditional class. The present study finds out that students are more satisfied to use the flipped classroom method as it develops and enhances their basic skills like communication skills, information technology skills, collaboration skills and integration skills that are considered the most important part of higher education level. By using communication skills, the students interact with students and teachers. They become capable of communicating and work as groups. It encourages students to build up cooperative environment in the classroom. Therefore, communication and cooperative skills are similar in 21st century skills. By developing information technology skills, the present study helps the students to work as a self-regulated. Students become capable to search information by using different resources. Teachers shared learning material with

students and they prepared themselves before the lecture. During the class, they discussed their learning knowledge with teachers and other peers. It saves the time of both teachers and students.

5.3 Conclusions

The present study was based on three main objectives. The first objective was to measure the levels of 21st century skills development at the postgraduate level. The researcher concluded the result that mostly respondents were at above average level. The researcher departs the individual scores into three categories; below average, average and above average. The second objective was to examine the practice of the flipped classroom approach at the postgraduate level. They originated respondents practiced in the flipped classroom. They agreed to the concept of the flipped classroom and its sub-sections. The sections of the flipped classroom are peer-tutoring, collaborative learning, problem based learning, active learning and E-learning. It shows that students take more interest in doing work with peer. They learn and discuss by sharing their ideas with each other. By peer-tutoring, they get quick response and feedback from their fellows. The respondents were involved inpractice and complete task-oriented activities. They divide the task in the group and tried to complete collaboratively. It concluded that students were more attracted to practical activities. These activities prepare the students to take risk and complete their challenges. The practical tasks related to problem based learning. The fourth section related to active learning concluded that this type of learning engages students towards self-learning. They were interested in seeking knowledge and skills by doing. The last section related to e- learning considered a new approach to study. It concluded that e-learning is an easy way to share learning material with students. Students also get contents by utilizing various resources of E-learning.

The third and main objective of this study was to measure the effect of flipped classroom in developing 21st century skills at postgraduate level. After testing hypotheses, it concluded that there was a positive effect of flipped classroom in developing 21st century skills. There was significant positive effect of all sections related to flipped classroom like peer-tutoring, collaborative learning, problem based learning, and active learning and e-learning in developing 21st century skills. The flipped classroom is an important step taken by teachers in the education field. Implementing the flipped classroom was necessary to enhance and improve students' 21st century skills that would be helpful after completing their education.

5.4 Recommendations

The researcher has described the recommendations on the bases of discussion and conclusions. These recommendations are mentioned below;

1. Teacher may further improve students' skills by using brainstorming, think-pair-share and self-directed learning activities in teaching and learning process.
2. Teacher may continue group work, video tutorial and lab experiments to check learning practices of students.
3. Teacher may encourage the students to share their understanding by using discussion, debate and peer-instruction.

5.4 Recommendations for Future Researchers

The researcher gives the following recommendations for further research studies;

1. Researchers can extend their study to incorporate secondary and higher secondary education level.
2. Research on the flipped classroom can cover other educational department either social sciences or nature sciences.

3. Researchers can conduct a flipped classroom comparative study among public and private sector universities in Pakistan.
4. The researchers can extend their study in other geographical region of Pakistan.
5. The study used descriptive research design while future researcher can use experimental research method for more accurate and deep investigation.

5.2 Limitations of the study

1. The researcher limited the study to three public sector universities of Islamabad (NUST, COMSATS and Bahria) that used flipped classroom method. Researcher could not cover other cities or geographical areas.
2. Data collected from the students of Management science programs of all three public sector universities. Due to lack of resources and time, the researcher used an alternative form of experimental research that was Ex- Post Facto research design.
3. As the requirement of research's nature, research could not cover the entire public and private sector universities of Islamabad. Therefore, the results may not be generalized to all universities of Islamabad.

Table No 5.1

Alignment of Objectives

Objectives	Findings	Conclusions	Recommendations
1. To measure the level of 21st century Skills at postgraduate level	(94%)students were at above average level while (6%) were at average level. There was no student found at the below average level.	The researcher concluded the result that mostly respondents were at above average level.	Teacher may further improve students' skills by using brain-storming, think-pair-share and self- directed learning activities in teaching and learning process.
2. To examine the practices of flipped classroom at postgraduate level	All five sections had a value 4 that revealed satisfaction of respondents towards the flipped classroom and its sections	They originated respondents practiced in the flipped classroom. They agreed to the concept of the flipped classroom and its sub-sections.	Teacher may continue group work, video tutorial and lab experiments to check learning practices of students.
3. To measure the effect of flipped classroom in developing 21st century skills at postgraduate level	Flipped classroom had 44% effect in developing 21st century skills. This value shows a positive effect of flipped classroom in developing 21st century skills and observed significant at 0.01.	It concluded that there was a positive effect of flipped classroom in developing 21st century skills.	Teacher may encourage the students to share their understanding by using discussion, debate and peer-instruction.

3 (a) "To measurethe effect of Peer-Tutoring related tothe flipped Classroom in developing 21st century skills at postgraduate level"	The results confirmed 35% effect of Peer-Tutoring in developing 21st century skills.	It was the positive significant effect of Peer-Tutoring in developing 21st century skills and significance value at 0.01.	Teachers may divided students into groups in which high achiever guide the low achiever students to enhance their performance by using peer-instruction and group discussion. (Peer-Tutoring)
3 (b): "To measure the effect of Collaborative Learning related to the Flipped classroom in developing 21st century skill at postgraduate level"	The findings show the 22% effect of Collaborative learning in 21st century skills.	It shows the positive significant effect of Collaborative learning in developing 21st century skills at0.01.	Teachers may establish spaces and time frames that permit students to interact and reflect on their learning as needed by debt, presentation or discussion. (Collaborative Learning)
3 (c) "To measure the effect of Problem based learning in developing 21st century skills at postgraduate level"	The finding shows 22% effect of Problem based learning in developing 21st century skills.	It was the positive significant effect of Problem based learning in developing 21st century skills and significance value wasat 0.01.	Teacher may enhance student's critical thinking skills through participation and self-study. (Problem based learning)
3 (d) " To measure the effect of Active learning in developing 21st century skills at postgraduate level"	The findings show 18% effect of Active learning in developing 21st century skills at postgraduate level.	It was the positive significant effect of Active learning in developing 21st century skills and significant at 0.01.	Teacher may promote student' engagement through questioning, discussion and interactive lecture. (Active Learning)

3 (e) " To measure the effect of E-learning in developing 21st century skills at postgraduate level"	The findings show that E-learning had 35% effect in developing 21st century skills at 0.01.	It shows the positive significance effect of E-learning in developing 21st century skills at postgraduate level at value 0.01.	Students' may improve their digital skills as the object of knowledge by participating in seminars, workshops and online conferences. (E-Learning)

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Appendix A

Approval Letter For Topic And Supervisor

NATIONAL UNIVERSITY OF MODERN LANGUAGES
FACULTY OF SOCIAL SCIENCES
DEPARTMENT OF EDUCATION

ML.1-4/2021/Edu

Dated: 10th December 2021

To: Asma Akhtar
09 MPhil/Edu/S20

Subject: APPROVAL OF MPHIL THESIS TITLE AND SUPERVISOR

1. Reference to Letter No, ML.1-4/2021-Edu, dated 11-12-2021, the Competent Authority has approved the title and supervisor in 12th BASR meeting dtd 18th November 2021 on the recommendations of Faculty Board of Studies vide its meeting held on 9th September 2021.

a. Supervisor's Name & Designation
Dr Qurat Ul Ain Hina (Supervisor)
Assistant Professor
Department of Education, NUML, Islamabad.

b. Thesis Title

Developing 21st Century Skills through Flipped Classroom at Post Graduate Level

2. You may carry out research on the given topic under the guidance of your supervisor and submit the thesis for further evaluation within the stipulated time. It is to inform you that your thesis should be submit within described period **by 31st December 2022** positively for further necessary action please. ***(Time line attached)***

3. As per policy of NUML, all MPhil/PhD thesis are to be run on Turnitin by QEC, NUML before being sent for evaluation. The university shall not take any responsibility for high similarity resulting due to thesis run from own sources.

4. Thesis is to be prepared strictly on NUML's format that can be taken from (Dr Saira Nudrat, Coordinator MPhil/PhD)

Telephone No: 051-9265100-110 Ext: 2094
E-mail: snudrat@numl.edu.pk

Dr. Wajeeha Shahid
Head
Department of Education

Distribution:

Asma Akhtar (MPhil Scholar)

Dr Qurat Ul Ain Hina (Thesis Supervisor)

Appendix B

Conceptual Framework of the study

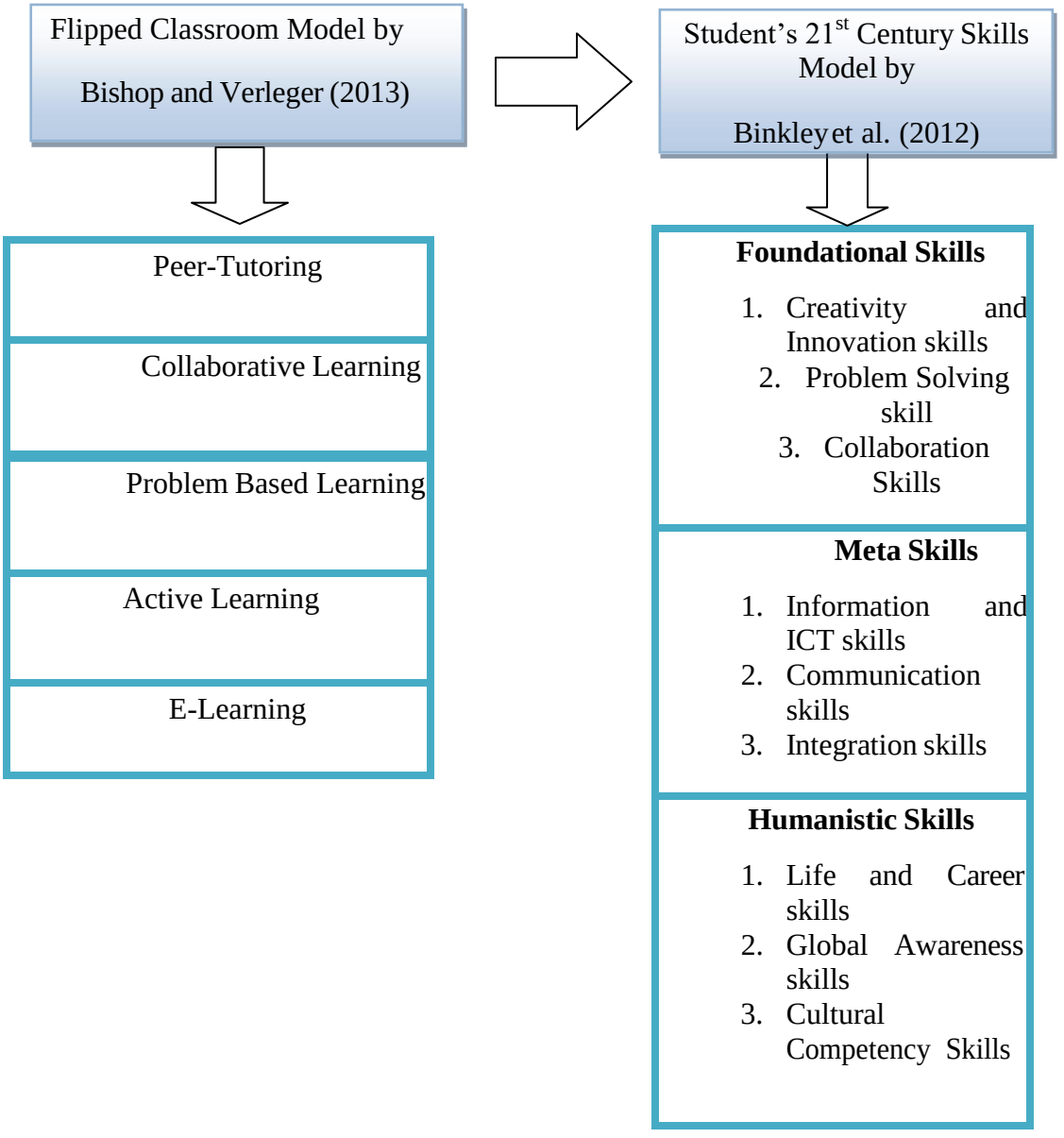

Fig. 1.1 Conceptual Framework of the study

Appendix C

National University of Modern Languages
Quality Enhancement Cell
Sector H-9, P.O. Shaigan, Islamabad, Pakistan
Tel: +92-51-9265100 Ext 2246/2247
Web: www.numl.edu.pk

Dated: June 23, 2022

Faculty of Social Sciences

Subject: Turnitin Report of MPhil Thesis of Ms Asma Akhtar (Education) 1st - Attempt

This is to state that **MPhil** thesis of **Ms Asma Akhtar** has been run through **Turnitin on June 23, 2022**. Paper ID is 1861778053 and similarity index is 05%. This is within the limit prescribed by the Higher Education Commission.

The subject similarity index report is attached for further processing, please.

(Dr. Khushbakht Hina)
Director
Quality Enhancement Cell

Dean FSS

24/6/2022

HOD Edu:

Appendix D

DEPARTMENT OF EDUCATION
FACULTY OF SOCIAL SCIENCES
National University of Modern Languages
Sector H-9, Islamabad
Tel.No: 051-9265100 Ext: 2090

ML.1-3/2021-Edu

Dated: 14-12-2021

WHOM SO EVER IT MAY CONCERN

Ms. Asma Akhtar D/O Muhammad Arif, student of Mphil (Edu) Department of Education National University of Modern Languages Islamabad is engaged in project of Research Work.

She may please be allowed to visit your Institutions to obtain the required information for her Research Work.

This information shall not be divulged to any unauthorized person or agency. It shall be kept confidential.

Dr Wajeeha Shahid
Head,
Department of Education.

Appendix E

Cover Letter for Validity Certificate

Developing 21st Century Skills through Flipped Classroom at Postgraduate Level

Subject: **Request for validity certificate**

Respected Sir/Madam

I have attached my questionnaire adapted for the purpose of research titled as "Developing 21st Century Skills through Flipped Classroom at Postgraduate Level".

Flipped classroom scale is based on the model of Flipped classroom by Bishop and Verleger (2013). This model is based on the five dimensions such as Peer-Tutoring, Collaborative learning, Problem based learning, Active learning and E- learning.

The 21st century skills development scale is based on the 21st century skills model by Binkley et al; (2012). It is consisted on three main dimensions and each dimension has three sub-dimensions. These dimensions are Foundational skills (Creativity and Innovation skills, Problem Solving skills and collaboration skills), Meta skills (Information communication technology (ICT) skills, communication skills and integration skills) and Humanistic skills (Life and career skills, Global awareness and Cultural competency).

Kindly check my questionnaires and provide your valuable suggestion for its improvement. Also certify its validity by filling the certificate attached at the end of the document.

Asma Akhtar

M. Phil Researcher, Department of Education

National University of Modern Language,

Islamabad Pakistan

Appendix-F

Validation Certificates for Tool

CERTIFICATE FOR TOOL VALIDATION

21st Century Skills Development Scale

For The Research Entitled As

DEVELOPING 21ST CENTURY SKILLS THROUGH FLIPPED CLASSROOM AT POSTGRADUATE LEVEL

By

Ms. Asma Akhtar

M.Phil Scholar, Department of Education, Faculty of Social Science

National University of Modern Languages (NUML), H-9, Islamabad, Pakistan

This is to certify that the questionnaire adapted by the scholars towards her thesis has been assessed by me and find it that has been designed adequately to assess the 21st century skills development scale that is based on the model of Binkley et al; (2012), consisted on three main dimensions and each dimension has three sub- dimensions. These dimensions are Foundational skills (Creativity and Innovation skills, Problem Solving skills and collaboration skills), Meta skills (Information communication technology (ICT) skills, communication skills and integration skills) and Humanistic skills (Life and career skills, Global awareness and Cultural competency.

It is considered that the research instrument, adapted for the research above titled, is according to the objectives of the research; assure adequate face and content validity. It can be used for data collection by the researcher with fair amount of confidence.

Name Dr. Azhar Mahmood
Designation Associate Prof.
Institute IIUI
Signature
Date

Dr. Azhar Mahmood
Chairman, Department of Education
International Islamic University
Islamabad

CERTIFICATE FOR TOOL VALIDATION

Flipped Classroom Scale

For The Research Entitled As

DEVELOPING 21ST CENTURY SKILLS THROUGH FLIPPED CLASSROOM AT POSTGRADUATE LEVEL

By

Ms. Asma Akhtar,

M.Phil Scholar, Department of Education, Faculty of Social Sciences

National University of Modern Languages (NUML), H-9, Islamabad, Pakistan

This is to certify that the questionnaire adapted by the scholars towards her research has been assessed by me and find it that has been designed adequately to assess the flipped classroom scale based on the model of Bishop and Verleger (2013), consisted on five dimensions i.e Peer-Tutoring, Collaborative learning, Problem based learning, Active learning and E-learning.

It is considered that the research instrument, adapted for the research above titled, is according to the objectives of the research, assure adequate face and content validity. It can be used for data collection by the researcher with fair amount of confidence.

Name Dr. Azhar Mahmood

Designation Associate Prof.

Institute IIUI

Signature

Date

Dr. Azhar Mahmood
Chairman, Department of Education
International Islamic University
Islamabad

CERTIFICATE FOR TOOL VALIDATION

Flipped Classroom Scale

For The Research Entitled As

DEVELOPING 21ST CENTURY SKILLS THROUGH FLIPPED CLASSROOM AT POSTGRADUATE LEVEL

By

Ms. Asma Akhtar,

M.Phil Scholar, Department of Education, Faculty of Social Sciences

National University of Modern Languages (NUML), H-9, Islamabad, Pakistan

This is to certify that the questionnaire adapted by the scholars towards her research has been assessed by me and find it that has been designed adequately to assess the flipped classroom scale based on the model of Bishop and Verleger (2013), consisted on five dimensions i.e Peer-Tutoring, Collaborative learning, Problem based learning, Active learning and E-learning.

It is considered that the research instrument, adapted for research the developing 21st century skills through flipped classroom at postgraduate level is according to the objectives of the research, assure adequate face and content validity. It can be used for data collection by the researcher with fair amount of confidence.

Name Dr. Jameela Ashraf

Designation Assistant Professor

Institute NUML

Signature

Date 28-12-2021

CERTIFICATE FOR TOOL VALIDATION

21st Century Skills Development Scale

For The Research Entitled As

DEVELOPING 21ST CENTURY SKILLS THROUGH FLIPPED CLASSROOM AT POSTGRADUATE LEVEL

By

Ms. Asma Akhtar

M.Phil Scholar, Department of Education, Faculty of Social Science

National University of Modern Languages (NUML), H-9, Islamabad, Pakistan

This is to certify that the questionnaire adapted by the scholars towards her thesis has been assessed by me and find it that has been designed adequately to assess the 21st century skills development scale that is based on the model of Binkley et al; (2012), consisted on three main dimensions and each dimension has three sub- dimensions. These dimensions are Foundational skills (Creativity and Innovation skills, Problem Solving skills and collaboration skills), Meta skills (Information communication technology (ICT) skills, communication skills and integration skills) and Humanistic skills (Life and career skills, Global awareness and Cultural competency.

It is considered that the research instrument, adapted for research the developing 21st century skills through flipped classroom at Postgraduate level is according to the objectives of the research; assure adequate face and content validity. It can be used for data collection by the researcher with fair amount of confidence.

Name Dr. Tameela Ashraf
Designation Assistant Professor
Institute NUML
Signature
Date 28-12-2021

CERTIFICATE FOR TOOL VALIDATION

Flipped Classroom Scale

For The Research Entitled As

DEVELOPING 21ST CENTURY SKILLS THROUGH FLIPPED CLASSROOM AT POSTGRADUATE LEVEL

By

Ms. Asma Akhtar,

M.Phil Scholar, Department of Education, Faculty of Social Sciences

National University of Modern Languages (NUML), H-9, Islamabad, Pakistan

This is to certify that the questionnaire adapted by the scholars towards her research has been assessed by me and find it that has been designed adequately to assess the flipped classroom scale based on the model of Bishop and Verleger (2013), consisted on five dimensions i.e Peer-Tutoring, Collaborative learning, Problem based learning, Active learning and E-learning.

It is considered that the research instrument, adapted for the research above titled, is according to the objectives of the research, assure adequate face and content validity. It can be used for data collection by the researcher with fair amount of confidence.

Name Dr. Sheikh Tariq

Designation Assistant Professor

Institute IIUI

Signature

Date 14-12-21

Dr Sheikh Tariq Mehmood
Assistant Professor
Department of Education
International Islamic University
Islamabad

CERTIFICATE FOR TOOL VALIDATION

21st Century Skills Development Scale

For The Research Entitled As

DEVELOPING 21ST CENTURY SKILLS THROUGH FLIPPED CLASSROOM AT POSTGRADUATE LEVEL

By

Ms. Asma Akhtar

M.Phil Scholar, Department of Education, Faculty of Social Science

National University of Modern Languages (NUML), H-9, Islamabad, Pakistan

This is to certify that the questionnaire adapted by the scholars towards her thesis has been assessed by me and find it that has been designed adequately to assess the 21st century skills development scale that is based on the model of Binkley et al; (2012), consisted on three main dimensions and each dimension has three sub- dimensions. These dimensions are Foundational skills (Creativity and Innovation skills, Problem Solving skills and collaboration skills), Meta skills (Information communication technology (ICT) skills, communication skills and integration skills) and Humanistic skills (Life and career skills, Global awareness and Cultural competency.

It is considered that the research instrument, adapted for the research above titled, is according to the objectives of the research; assure adequate face and content validity. It can be used for data collection by the researcher with fair amount of confidence.

Name Dr. Sheikh Tariq
Designation Assistant Professor
Institute IIUI
Signature
Date 14-12-21

Dr Shaikh Tariq Mehmood
Assistant Professor
Department of Education
International Islamic University
Islamabad

CERTIFICATE FOR TOOL VALIDATION

Flipped Classroom Scale

For The Research Entitled As

DEVELOPING 21ST CENTURY SKILLS THROUGH FLIPPED CLASSROOM AT POSTGRADUATE LEVEL

By

Ms. Asma Akhtar,

M.Phil Scholar, Department of Education, Faculty of Social Sciences

National University of Modern Languages (NUML), H-9, Islamabad, Pakistan

This is to certify that the questionnaire adapted by the scholars towards her research has been assessed by me and find it that has been designed adequately to assess the flipped classroom scale based on the model of Bishop and Verleger (2013), consisted on five dimensions i.e Peer-Tutoring, Collaborative learning, Problem based learning, Active learning and E-learning.

It is considered that the research instrument, adapted for the research above titled, is according to the objectives of the research, assure adequate face and content validity. It can be used for data collection by the researcher with fair amount of confidence.

Name Dr. M. Imran Niazi

Designation Assistant Professor

Institute Education Department

Signature

Date 15/12/2023

Dr Muhammad Imran Niazi
Assistant Professor Education
(PMAS) Arid Agriculture University
Rawalpindi

CERTIFICATE FOR TOOL VALIDATION

21st Century Skills Development Scale

For The Research Entitled As

DEVELOPING 21ST CENTURY SKILLS THROUGH FLIPPED CLASSROOM AT POSTGRADUATE LEVEL

By

Ms. Asma Akhtar

M.Phil Scholar, Department of Education, Faculty of Social Science

National University of Modern Languages (NUML), H-9, Islamabad, Pakistan

This is to certify that the questionnaire adapted by the scholars towards her thesis has been assessed by me and find it that has been designed adequately to assess the 21st century skills development scale that is based on the model of Binkley et al; (2012), consisted on three main dimensions and each dimension has three sub- dimensions. These dimensions are Foundational skills (Creativity and Innovation skills, Problem Solving skills and collaboration skills), Meta skills (Information communication technology (ICT) skills, communication skills and integration skills) and Humanistic skills (Life and career skills, Global awareness and Cultural competency.

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Name Dr. M. Imran Niazi
Designation Assistant Professor
Institute Department of Educati
Signature
Date 15/12/2021

Dr Muhammad Imran Niazi
Assistant Professor Education
(PMAS) Arid Agriculture University
Rawalpindi

CERTIFICATE FOR TOOL VALIDATION

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DEVELOPING 21ST CENTURY SKILLS THROUGH FLIPPED CLASSROOM AT POSTGRADUATE LEVEL

By

Ms. Asma Akhtar,

M.Phil Scholar, Department of Education, Faculty of Social Sciences

National University of Modern Languages (NUML), H-9, Islamabad, Pakistan

This is to certify that the questionnaire adapted by the scholars towards her research has been assessed by me and find it that has been designed adequately to assess the flipped classroom scale based on the model of Bishop and Verleger (2013), consisted on five dimensions i.e Peer-Tutoring, Collaborative learning, Problem based learning, Active learning and E-learning.

It is considered that the research instrument, adapted for the research above titled, is according to the objectives of the research, assure adequate face and content validity. It can be used for data collection by the researcher with fair amount of confidence.

Name Dr. Imran Yousuf

Designation Associate Professor

Institute Arid Uni) Rawalpindi

Signature

Date 15-12-21

Dr. Imran Yousuf
Associate Professor
Education
Arid Agriculture University
RAWALPINDI

CERTIFICATE FOR TOOL VALIDATION

21st Century Skills Development Scale

For The Research Entitled As

DEVELOPING 21ST CENTURY SKILLS THROUGH FLIPPED CLASSROOM AT POSTGRADUATE LEVEL

By

Ms. Asma Akhtar

M.Phil Scholar, Department of Education, Faculty of Social Science

National University of Modern Languages (NUML), H-9, Islamabad, Pakistan

This is to certify that the questionnaire adapted by the scholars towards her thesis has been assessed by me and find it that has been designed adequately to assess the 21st century skills development scale that is based on the model of Binkley et al; (2012), consisted on three main dimensions and each dimension has three sub- dimensions. These dimensions are Foundational skills (Creativity and Innovation skills, Problem Solving skills and collaboration skills), Meta skills (Information communication technology (ICT) skills, communication skills and integration skills) and Humanistic skills (Life and career skills, Global awareness and Cultural competency.

It is considered that the research instrument, adapted for the research above titled, is according to the objectives of the research; assure adequate face and content validity. It can be used for data collection by the researcher with fair amount of confidence.

Name Dr. Imran Yousuf
Designation Associate Professor
Institute Arid Uni Rawalpindi
Signature
Date 15-12-2

Dr. M. Imran Yousuf
Associate Professor
Education
PIR MEHR ALI SHAH
Arid Agriculture University
RAWALPINDI

Appendix-G

List of Experts for Tool Validation

Sr#	Experts of validation	Name of the Institute	Date
1.	Dr.Azhar Mahmood	Chairman, Department of Education. International Islamic University, Islamabad (IIUI)	14-12-2021
2.	Dr. Sheikh Tariq	Assistant Professor of Education Department. International Islamic University, Islamabad (IIUI)	14-12-2021
3.	Dr. Imran Yousuf	Associate Professor of Education Department, PMAS Arid university Rawalpindi	15-12-2021
4.	Dr. Jameela Ashraf	Assistant Professor of education department, NUMLIslamabad	28-12-2021
5.	Dr. Imran Niazi	Assistant professor of PMAS Arid University Rawalpindi.	15-12-2021

Appendix-H

List of Universities as Population

Sr #	University Name	Programs	Student's numbers Enrolled spring (session 2021)
1	National University of science and Technology Islamabad	Management Science	215
2	Bahria University Islamabad	Management Science	176
3	COMSATS Institute of Information TechnologyIslamabad	Management Science	195
	Total		586

Appendix-I

Approval Letter For data collection

The Head of Department,

National University of Science and Technology (NUST),

Islamabad.

Subject: Permission for M.Phil Research Data Collection from Nust Business School (NBS)

Respected Sir,

My name is Asma Akhtar and I am writing this application to seek your permission for data collection for the research program. I am M.phil student of Education Department, National University of Modern Languages, Islamabad. I would like to inform you that as a research student I am working on the topic **"Developing 21st Century Skills through Flipped Classroom at Postgraduate level"** and for which I will be requiring to collect data from students by questionnaires. This data will be used for research purposes only. I hope you will be consider this as a genuine request.

I look forward for your kind approval and request you to allow me for collecting data from the students of Nust Business school (NBS).

Thank you

Asma Akhtar (M. Phil Researcher)

Department of Education

National University of Modern Language

Islamabad

Appendix-I

Approval Letter related to Confirmation of Using Flipped Classroom

Confirmation Latter for applying Flipped Classroom Method

The head of Department,

Bahria University Islamabad,

Subject: Confirmation Latter for applying flipped classroom in the classes at Postgraduate Level

Respected Sir,

My name is Asma Akhtar MPhil scholar from National University of Modern Languages, Islamabad. I am writing this application to seek your information that my research topic is "**developing 21st century skills through flipped classroom at postgraduate level**" and for this purpose I choose management science department (Bahria Business School) to take data from students at postgraduate level. I used flipped classroom as an independent variable with its five components like peer-tutoring, collaborative learning, problem based learning, active learning and E- learning. Flipped classroom is a teaching method in which teacher shared learning data with students so that students prepared before the class and during class they discuss their learnt knowledge. I have read a published thesis of your students from management science department regarding flipped classroom that they used flipped classroom method. I wanted to know about either your departmental teachers used this method or not. For this purpose I need your sign as I need to mention this latter in the thesis as a proof.

Thanks you

Best regards
Asma Akhtar (M.Phil Scholar)
Department of Education
National University of Modern Languages, Islamabad

10/04/23

Dr. Shahid Iqbal
Head of Department
Management Studies
Bahria University Islamabad Campus

Appendix J

Approval Letter for confirmation of Using Flipped Classroom

The Head of Department,

COMSATS Institue of Information Technology,

Islamabad.

Subject: Permission for M.Phil Research Data Collection from the department of Management Science

Respected Sir,

My name is Asma Akhtar and I am writing this application to seek your permission for data collection for the research program. I am M.phil student of Education Department, National University of Modern Languages, Islamabad. I would like to inform you that as a research student I am working on the topic **"Developing 21st Century Skills through Flipped Classroom at Postgraduate level"** and for which I will be requiring to collect data from students by questionnaires. This data will be used for research purposes only. I hope you will be consider this as a genuine request.

I look forward for your kind approval and request you to allow me for collecting data from the students of Management Science.

Thank you

Asma Akhtar (M. Phil Researcher)

Department of Education

National University of Modern Language,

Islamabad

Developing 21st Century Skills through Flipped Classroom atPostgraduate level

Dear Respondents,

I am M. Phil Scholar (Education) working to conduct research on the above mentioned topic. You are requested to fill the questionnaire attached. The first part of questionnaire consists on Demographic information. The remaining part of this questionnaire deals with two variables first part is about Flipped Classroom method and second is developing 21st century skills. It is assured that your response will be kept confidential and will not be disclosed to any person or authority. The questionnaire is adapted to collect data for my research work only. Thanks for your cooperation.

Asma Akhtar (M. Phil Researcher)

Department of Educational Sciences

National Universityof Modern Language, Islamabad

Demographic Information

1.	**Gender**	Male 1				Female 2		
2.	**Name of Institutions**	National University of Science and Technology Islamabad 1		Bahria University Islamabad 2		COMSATS Institute of Information Technology Islamabad 3		
3.	**Programs**	MBA 1		MS/M.PHIL 2		PH.D 3		
4.	**Semester**	1st 1	2nd 2	3 3	4th 4	5th 5	6th 6	7th 7	8th 8
5.	**Age**	Below 30 1		31-35 2		36-40 3	Above 40 4	

Appendix-J

Flipped Classroom Assessment Scale

You are required to give your responses by utilizing options ranging from 1 to 5 indicating your preferences of responses (5=Strongly Agree, 4=Agree, 3=Neutral, 2= Disagree, 1= Strongly Disagree).

Sr #	Code	**I. Peer-Tutoring** Peer-Tutoring is a process between two or more students in a group where one of the students acts as a tutor for the other group mates. Peer tutoring can be applied among students of the same age.	**SD**	**D**	**N**	**A**	**SA**
1	P1	I like to share information with my fellows in better way.	1	2	3	4	5
2	P2	I like those fellows who appreciate me.	1	2	3	4	5
3	P3	I try to explain important points clearly when someone does not understand it.	1	2	3	4	5
4	P4	I appreciate other's ideas before sharing my opinions in group.	1	2	3	4	5
5	P5	I enjoyworking with other students in class activities.	1	2	3	4	5
Sr #	Code	**II. Collaborative Learning** Collaborative learning mean students works together in a groups and accomplish a task or to achieve a certain goal.	**SD**	**D**	**N**	**A**	**SA**
6.	C1	I discuss my information with fellows before making conclusion.	1	2	3	4	5
7.	C2	I always appreciate other's decisions.	1	2	3	4	5
8.	C3	I like people to complement me for my accomplishments.	1	2	3	4	5
9.	C4	I like to do tasks with fellows.	1	2	3	4	5
10.	C5	I have an abilityto convince others.	1	2	3	4	5

Sr #	Code	**III. Problem Based Learning** The problem is posed so that the students discover that they need to learn some new knowledge before they cansolve the problem.	**SD**	**D**	**N**	**A**	**SA**
11	PB1	I have abilityto present creative choices and solutions inthe class.	1	2	3	4	5
12	PB2	I become hesitant when faced a problem.	1	2	3	4	5
13	PB3	I have abilityto breakdown complex ideas into simple.	1	2	3	4	5
14	PB4	I concentrate on content for making my concept clear.	1	2	3	4	5
15	PB5	I explain the lecture in my own words.	1	2	3	4	5
Sr #	Code	**IV. Active Learning** It refers to technique where students do more than simplylisten to a lecture.	**SD**	**D**	**N**	**A**	**SA**
16	A1	I have sufficient knowledge about mysubject.	1	2	3	4	5
17	A2	I attend lectures regularly.	1	2	3	4	5
18	A3	I often feel bound to follow myteacher's instructions.	1	2	3	4	5
19	A4	I finish assignments in time when they are assigned.	1	2	3	4	5
20	A5	I have ability to learn by self.	1	2	3	4	5
Sr #	**Code**	**V. E- Learning** It refers to use of information communication technology (ICT) for the sake of learning. Students learn by using electronic means like YouTube videos, recorded lectures etc.	**SD**	**D**	**N**	**A**	**SA**
21	E1	I use internet verifying the available information regarding my subject.	1	2	3	4	5

22	E2	I have an opportunityto gather information from online resources.	1	2	3	4	5
23	E3	I save my time byusing online learning method formaking assignments.	1	2	3	4	5
24	E4	I take responsibility for myown learning.	1	2	3	4	5
25	E5	I look forward to learning new skills and master them quickly.	1	2	3	4	5

Appendix K

21st Century Skills Development Scale

INSTRUCTIONS

You are required to give your responses against the options ranging from 5to1 indicating your preferences of responses (5= Strongly Agree, 4=Agree, 3= Neutral, 2= Disagree, 1=- Strongly Disagree)

I. Foundational Skills							
Sr #	**Code**	**i. Creativity and Innovation Skills** Creativity is the ability to think about the solution of a problem in various modes. It enables the students to solve difficult issues. Innovation capabilities enable the learners to build up new and unique idea that benefit for them to avail new opportunities.	**SD**	**D**	**N**	**A**	**SA**
1.	CS1	I am not embarrassed to talk about myideas.	1	2	3	4	5
2.	CS2	I learn with mymistakes.	1	2	3	4	5
3.	CS3	I solve problems in different ways.	1	2	3	4	5
4.	CS4	I need to improve my ideas.	1	2	3	4	5
5.	CS5	I imagine manythings that do not yet exist.	1	2	3	4	5
Sr#	**Code**	**ii. Problem-Solving Skills** These abilities involves critical thinking skills to collect, analysis, solve a problem and make a plan.	**SD**	**D**	**N**	**A**	**SA**
6.	PS1	I rethink my experiences to develop solutions of complex problems in the class.	1	2	3	4	5
7.	PS2	I do mybest to be successful in problem solving.	1	2	3	4	5
8.	PS3	I examine mythinking by asking questions in class.	1	2	3	4	5
9.	PS4	I express my ideas in classroom.	1	2	3	4	5

10.	PS5	I always do mypart in group discussion.	1	2	3	4	5
11.	PS6	I lose self -confidence if cannot solve a problem.	1	2	3	4	5
Sr#	**Code**	**ii. Collaboration Skills** Collaboration skills require working together and shared their knowledge. The requirement of this skill is the capacityof communication and interaction with others.	**SD**	**D**	**N**	**A**	**SA**
12.	CS1	I commit to doing the necessary tasks to achieve a goal in group work.	1	2	3	4	5
13.	CS2	I prefer working in a team.	1	2	3	4	5
14.	CS3	I always do mypart when I work in a group.	1	2	3	4	5
15.	CS4	I respect different opinions of others and appreciate them for their participation.	1	2	3	4	5
16.	CS5	I take part in discussion with my friends.	1	2	3	4	5
17.	CS6	I create a sequence of tasks in a group.	1	2	3	4	5
		II. Meta Skills					
Sr#	**Code**	**i. Information Communication Technology Literacy skills (ICT)** This type of skills refers the competencies in digital tools and emphasize on designing and coding data. The purpose of this category is to inquire data, systematize and practice byusing digital medium.	**SD**	**D**	**N**	**A**	**SA**
19	1T1	I utilized electronic device easily such as computer.	1	2	3	4	5
20	IT2	I often communicate with other students via SMS.	1	2	3	4	5
21	IT3	I think internet help to improve mylearning.	1	2	3	4	5
22	IT4	I often use the internet to find useful information.	1	2	3	4	5
23	IT5	I understand the importance of taking care of mypersonal information on the internet.	1	2	3	4	5
23	IT6	I use internet for getting different opinions of different people related to mytopic.	1	2	3	4	5

Sr #	Code	ii. Communication Skills These skills are based on listening clearly other views speaking and understanding. These skills enable the learners to make differentiate how they can communicate face to face or through electronic means.	SD	D	N	A	SA
24	CS1	I gave my full attention to others what theytalk to me.	1	2	3	4	5
25	CS2	I have a skill to convey my message easily.	1	2	3	4	5
26	CS3	I listen attentivelywhat others are saying.	1	2	3	4	5
27	CS4	I maintain eye contact throughout a conversation.	1	2	3	4	5
28	CS5	I have confidence to talk with an audience.	1	2	3	4	5
29	CS6	I like to sayand listen different opinions.	1	2	3	4	5
30	CS7	I have an abilityto argue well in a discussion.	1	2	3	4	5
Sr #	**Code**	**iii. Integration Skills** It involves constructing a series of activities that use a variety of skills. In each activity, there is realistic, communicative use of language.	**SD**	**D**	**N**	**A**	**SA**
31	IS1	I listen and respect the ideas of other students.	1	2	3	4	5
32	IS2	I positively encourage the other fellows of my group.	1	2	3	4	5
33	IS3	I like to ask questions to learn something new.	1	2	3	4	5
34	IS4	I communicate effectively with my fellows during class activities.	1	2	3	4	5
35	IS5	I analyze the required information to check its authenticity.	1	2	3	4	5
36	IS6	I planned my reading schedule and able to read in the allotted time.	1	2	3	4	5
37	IS7	I am good in all activities that i do in myclassroom.	1	2	3	4	5
		III. Humanistic Skills					
Sr #	**Code**	**i. Life and Career Skills** These skills refer to adapt and adjust in workplace. The ability to work effectively in a climate of ambiguity and changing priority.					

38.	LC1	I imagine which type of job is more suitable for me after completing education.	**SD**	**D**	**N**	**A**	**SA**
39.	LC2	I always try to understand the reason on behind my weakness.	1	2	3	4	5
40.	LC3	I consider ethical values during mywork.	1	2	3	4	5
41.	LC4	I follow the given instructions during mytasks.	1	2	3	4	5
42.	LC5	I have an ability to adapt the necessary changes in my routine.	1	2	3	4	5
43.	LC6	I only do what I am absolutely required to do in my courses.	1	2	3	4	5
Sr #	**Code**	**ii. Global Awareness** It includes knowledge about local communities andlocal issues.	**SD**	**D**	**N**	**A**	**SA**
44.	GA1	I understand well another language.	1	2	3	4	5
45.	GA2	I easily adjust with new people.	1	2	3	4	5
46.	GA3	I often establish a good relationship with people of different personalities and interest.	1	2	3	4	5
47.	GA4	I participate in class discussions about world events as part of the regular instruction	1	2	3	4	5
48.	GA5	I analyse global issues together with my classmates in small groups during class	1	2	3	4	5
Sr #	**Code**	**iii. Cultural Competency** This ability refers to know about different cultures and capable themselves to adjust and contact the peoplebelong to various cultures.	**SD**	**D**	**N**	**A**	**SA**
49.	CC1	I give respect to the social and cultural laws and valuesof the society.	1	2	3	4	5
50.	CC2	I take participation in community works willingly.	1	2	3	4	5
51.	CC3	I can easilyadjust at new places and with new persons.	1	2	3	4	5
52.	CC4	I am aware of myown culture and ethnicity.	1	2	3	4	5
53.	CC5	I have social contacts with myclass fellows.	1	2	3	4	5

Appendix-L

Permission for questionnaire Usage

Permission for using research instrument Inbox

Asma Akhter 12 Feb
to yacob_yacob

I'm Asma Akhtar mphil scholar. One of my study variable is flipped classroom. May I used your developed questionnaire that you used in the article " Student's Perception of flipped classroom: A case study for private universities in Jordan" that was published in April 2019.
I'll be grateful to you

yacob_yacob@yahoo.... 12 Feb
to me

Yes you can. It's from my pleasure

Show quoted text

Reply Reply all Forward

Asma Akhter 12 Feb
I'm Asma Akhtar m.phil scholar from Pakistan. One of my research variable is

Verleger, Matthew A. 14 Feb
to me

Asma,

I've forwarded your email to the primary author (Jacob Bishop). He should be responding to you with the appropriate way to use/attribute the paper.

Dr. Verleger

Matthew Verleger, Ph.D.
Professor of Engineering
Engineering Fundamentals
Daytona Beach Campus

1 Aerospace Boulevard
Daytona Beach, FL 32114
67936
matthew.verleger@erau.edu

Embry-Riddle Aeronautical University
Florida | Arizona | Worldwide

Appendix-M

List of all Public-Sector Universities in Islamabad and Rawalpindi

Sr. #	University Name	Main campus location	Discipline	Website address
1	Air University, Islamabad	Islamabad	General	https://www.au.edu.pk
2	Allama Iqbal Open university (AIOU),Islamabad	Islamabad	General	http://www.aiou.edu.pk
3	Bahira University, Islamabad	Islamabad	General	https://bahria.edu.pk
4	COMSATS Institute of Information Technology, Islamabad	Islamabad	General	https://www.comsats.edu.pk
5	Federal Urdu University of Arts, Science and Technology, Islamabad	Islamabad	General	http://www.fuuastisb.edu.pk
6	Institute of Space and Technology(IST), Islamabad	Islamabad	General	http://www.ist.edu.pk
7	International Islamic University, Islamabad	Islamabad	General	http://iiu.edu.pk
8	National Defence University, Islamabad	Islamabad	General	http://www.ndu.edu.pk
9	National University of Modern languages (NUML), Islamabad	Islamabad	General	https://www.numl.edu.pk
10	National University of Sciences and Technologylanguages(NUST), Islamabad	Islamabad	General	http://www.nust.edu.pk
11	National University of Technology (NUTECH), Islamabad	Islamabad	Engineering and Technology	https://nutech.edu.pk

14	Quaid-i-Azam University, Islamabad	Islamabad	General	https://qau.edu.pk
15	Shaheed Zulfiqar Ali Bhutto Medical university, Islamabad	Islamabad	Medical	http://www.szabmu.edu.pk/
16	Fatima Jinnah University, Rawalpindi	Rawalpindi	General	http://www.fjwu.edu.pk/
17.	National University of Medical Sciences	Rawalpindi	General	http://www.nums.edu.pk
18	Rawalpindi Medical University	Rawalpindi	Medical	http://www.rmu.edu.pk
19	University of Engineering and Technology, Rawalpindi	Rawalpindi	Engineering	http://www.uet.e du.pk
20	ARID University Rawalpindi	Rawalpindi	General	http://www.arid.edu.k

Appendix-N

PROOF READING CERTIFICATE

CERTIFICATE OF PROOF READING

For The Research Entitled As

Developing 21st Century Skills through Flipped Classroom at PostgraduateLevel

By

Miss Asma Akhtar

National University of Modern Languages (NUML), H9, Islamabad, Pakistan 2022

It is certified that the research work with the title "Developing 21st Century Skills throughFlipped Classroom at Postgraduate Level" submitted by Asma Akhtar, has been checked and proofread for the Language and Grammatical mistakes.

Name: Muhammad Tayyab Yaqub
Designation: Secondary School Teacher **Institute:** Govt. Boys High School, Khayabane Sir Syed, Sector 3, Rawalpindi.

Signatures:

Muhammad Tayyab Yaqub
SST (Eng)
Govt. Boys High School,
Khayaban-e-Sir Syed, Sector 3
Rawalpindi