

**“The Impact of Activity Based Learning on Students’  
Achievement. A study Among 12 Grade Science and  
Environment Student in a public School in Oman”**

أثر استخدام استراتيجيات التعلم القائم على النشاط على المستوى التحصيلي  
للطلاب. دراسة على طلاب الثاني عشر في مادة العلوم والبيئة في إحدى المدارس  
الحكومية في سلطنة عمان.

by

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**Dissertation submitted in fulfilment  
of the requirements for the degree of  
MASTER OF EDUCATION**

at

**The British University in Dubai**

**June 2019**

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## **Abstract**

In recent years, there has been an ongoing debate about the impacts of using activity based learning strategies instead of traditional learning strategies in the classroom, what is more appropriate to increase student's motivation and attainment. The purpose of this study was to determine the influence of activity based learning on students' achievement in comparison to passive learning and detect students' views towards activities. A study conducted in a public school in Oman. For this purpose, mixed research method was utilized. Quasi-experimental research design with pre-test and post-test was used in the research. Sample of this study include 24 twelve grade male students. They were divided into two groups control and experimental group. The first group received traditional learning and the second group was taught through activity based learning strategy. After that, focus group interviews were hold with 8 participants from experimental group for the qualitative data. Independent sample t-test was used for analysing the quantitative data, whereas content analysis technique was implemented for the qualitative finding. The result of the study indicated that activity based learning had a positive effect on students' achievement. Students believe that activity based learning enhance understanding, increase a sense of responsibility, create attractive learning environment and increase achievement.

**Keywords:** Activity based learning, science and environment, achievement, student perception.

## الخلاصة

في السنوات الأخيرة كان هناك جدلاً حول تأثير استخدام استراتيجيات التعلم القائم على النشاط بدلاً من استراتيجيات التعلم التقليدية. الهدف من هذه الدراسة كان التعرف على تأثير استراتيجيات التعلم القائم على النشاط على المستوى التحصيلي للطلاب. وأيضاً التعرف على آراء الطلاب حول هذه الاستراتيجية. دراسة تم تطبيقها في مدرسة حكومية في سلطنة عمان. ومن أجل تحقيق هدف هذه الدراسة تم استخدام منهج مختلط مزيج بين المنهجين الكمي والنوعي. في المنهج الكمي تم تطبيق دراسة شبه تجريبية تحتوي على اختبارين قبلي وبعدي. العينة شملت 24 طالباً من الذكور من الصف الثاني عشر. ولقد تم تقسيم الطلاب إلى مجموعتين: مجموعة تجريبية ومجموعة ضابطة. المجموعة الضابطة تم تدريسها باستخدام استراتيجيات التعلم التقليدية، بينما المجموعة التجريبية فقد تم تدريسها باستخدام استراتيجية التعلم القائم على النشاط. بينما في المنهج النوعية فكانت الأداة المستخدمة عبارة عن مقابلة نقاشية جماعية مع 8 طلاب مشاركين من المجموعة التجريبية. البيانات الكمية تم تحليلها باستخدام برنامج تحليل البيانات (SPSS) ، بينما البيانات النوعية تم تحليلها باستخدام أسلوب تحليل المحتوى. النتيجة النهائية لهذه الدراسة خلصت إلى أن استراتيجية التعلم القائم على النشاط لها تأثير إيجابي على المستوى التحصيلي للطلاب. ويعتقد الطلاب أن هذه الاستراتيجية تعزز الفهم، وتنمي الإحساس بالمسئولية، وترفع المستوى التحصيلي للطلاب وتخلق بيئة جاذبة للتعلم.

## **Dedication**

To my father and mother

To my beloved wife, for all her support at every step

To my brother Khalid, for his unlimited help

To my mentor, Solomon David

To my beautiful sisters

To my angels Roda & Maryam

## **Acknowledgement**

To begin with, uncountable thanks to Allah Almighty for blessing me so much that I cannot thank Him enough, even if I try it every day.

Words cannot express how grateful I am for your kindness and generosity. I will always remember your guidance and support. Thank you, Dr Solomon David for all your help and encouragement without you I will not reach this point

You're a great boss and mentor. Thank you Mr. Said AlKaabi for helping me out; I really appreciate your kindness and support.

Thanks to my dear parents for all their love, trust, prayers and sacrifices in making me who I am today.

My beloved Wife Ruqia, your support throughout my study shows just how incredible of a wife you are. Your warmth, generosity, kindness, support and love mean the world to me. You have always been my strength throughout the times. I want to thank you for being my wife.

I have immense gratitude for my brothers and sisters, without your support I could never do it. Thank you for helping me out.

Thanks to all relatives, friend and others who shared their support and encouraged me. (especially Atia for her prayers and support), Thank you.

I would also thank my supervisor, Mr. Humod Almabsli, who reduce my burdens and always encouraged me to believe that I can do it!!!

Thanks to BUID for providing with this opportunity and facilitating at each stage of guidance throughout my learning journey.

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# **Chapter 1: Introduction**

## **1.1 Overview of The Chapter**

This chapter outlines background information for this research, including information about education system in Oman and activity based learning strategy. It also addresses the problem statement and the aim of the research. Then research question and research hypothesis were outlined. The last two parts of the chapter articulate rationale and overall structure of the study.

## **1.2 Background and Motivation to The Study:**

### **1.2.1 Education System in Oman**

Oman is an Arabian Gulf country, shares borders with Saudi Arabia from the west, United Arab Emirates from the northwest and Yamen from the South. Oman population was estimated 4.74 million in 2017. According to United Nations (2010), there has been an accelerated evolution in Oman from a poor country to a very wealthy country. Started from 1970 when His Majesty Sultan Qaboos bin Said led the Sultanate. The view of Sultan Qaboos from the beginning was to boost the country away from its isolationism by exploit the natural resources of the land and prepare will trained educated human resources. To ensure the development of the economy and provide a good honourable life for all Omani citizens.

One of the most important field his majesty focused on was Education, because he realized its vital role in prosperity of the country. In the field of education, Oman's education system witnessed a rapid development. There were only 3 schools in Oman in 1970 most of its cadre were expatriates. Currently, the numbers of schools in Oman are 1148 as announced by the ministry in the 2018/2019 academic year, the vast majority of teachers are Omani teachers (Alshikri 2019). There was high percentage of illiteracy in 1970, around 66% of adults in Oman were illiterate (AlMaskari et al. 2016). After Sultan Qaboos ruled Oman, the school becomes free and mandatory for every child in the country. There were two training centers launched in 1975 to provide specialized

teachers for the increasing numbers of schools. Later, many education colleges and institutions were opened to prepare more specialized professional Omani teachers. All children in Oman get free access to basic education, 100% of them progress to post basic education. World Bank in 2001 reported that education system in Oman has a rapid development from 1970 to 2000 as unprecedented by any other country (Al Balushi & Griffiths 2013). Education management in Oman is highly centralized, Ministry of Education is authorized to take the majority of decisions. The visions and plans of the Ministry of Education formulated in parallel with the 5-year National Development Plan which address the aims and projects of the country in those 5 years. Take in consideration the timeframe of the accomplishment process. The responsibilities for each department and their targeted tasks are precisely specified.

Education system of schools in Oman is Basic Education system was first implemented in 1998 to replace the old general education. To emphasize student-centred and activity-based learning pedagogy rather than teacher-centred and passive learning pedagogy. According to AlMaskri, et al. (2016) the central style of basic education system is activity-based learning. Also, hands on tasks integrated to provide Active classroom. The Basic Education is intended to provide (Al Shabibi & Silvenoinen 2018, p.40):

- “1. Integration between theory and practice, thought and work, education and life.
2. Comprehensiveness in developing the aspects of personality.
3. The acquisition of self-learning skills in the context of lifelong education.
4. The inclusion of the values and practices necessary for mastery and excellence in learning and teaching.
5. The means to meet the needs of human development in the context of comprehensive social development.”

Basic program starts from grade 1 to grade 10 divided into 2 cycle, first cycle consists of grade 1-4. All teachers in cycle 1 are females, boys and girls taught together in this stage. The second cycle starts from grade 5 to grade 10. The schools of second cycle are different from the school of the first cycle where all students are single sex. Schools of boys are taught by male teachers only and there are female teachers teach in girls' schools. After cycle 2 all students progress to post-basic stage (grade 11 & grade 12) which is equal to high school in other countries. There are

elective and mandatory subjects in this stage, whereas all subjects in basic stage are mandatory. At the end of 12<sup>th</sup> year students who pass get general diploma certificate. Table. 1.1 and table. 1.2 compare between the structure of old general education systems in Oman until 1998 and the structure of current basic education system.

Table. 1.1

<b>General Education until 1998</b>	
<i>Grade level</i>	<i>Stages</i>
12	Secondary
11	
10	
9	Preparatory
8	
7	
6	Elementary
5	
4	
3	
2	
1	

Table .1.2

<b>Basic Education and Post-Basic Education 1998 onwards</b>	
<i>Grade level</i>	<i>Stages</i>
12	Post-Basic
11	
10	
9	Basic Education (Cycle Two)
8	
7	
6	
5	
4	Basic Education (Cycle One)
3	
2	
1	

Table 1&2: comparison between the structure of general education and basic education (Adapted from Al Shabibi & Silvennoinen 2018, p. 263).

Beside the reform of education system, reforms in the Omani curricula had taken place. The Ministry of Education in Oman gave a special attention to the content of the school curricula and teaching strategies. Curriculum General Directorate in the Ministry established the national curriculum based on learning objectives on each subject which are specified by committees consist of teachers, supervisors, experts, consultant and curriculum officers. They design curriculum which prepare students for academic institutions or practical world of work along with behavioural and values objectives (Issan & Goma 2010). The content developed to catch up with the areas of technology and knowledge taught in developed countries, taking consideration of student background and their thinking level. Regarding the teaching method, teachers are asked to shift from memorization and note learning to more active teaching methods. Training workshops were

introduced to train teachers to implement activity- based learning and move away from classic teacher-centered method (Issan & Gomaa 2010).

To meet this trend the Ministry of Education in Oman has introduced an ambitious national project to improve Omani teachers' professional development by launching the Specialized Centre for Professional Training of Teachers (SCPTT). The main goal of (SCPTT) is to prepare Omani teacher to implement modern teaching method, improve teachers' performance and develop their teaching skills through effective professional development courses. It offers training courses for principals, vice- principal, new teachers and expert teachers. For example, expert teachers join a two-year program consisting of 4 training periods. It targets to enhance their teaching skills and learning capacities to qualify them to become leaders of change in their schools.

### **1.2.2 Targeted Curriculum**

This research targets the Science and Environment curriculum which is taught in Oman in the post-basic education grade 12. It's one of the elective subjects that offered in the post-basic education. Students whom not taking biology, chemistry or physic they have to choose this subject starting from grade 11. By the time students reach grade 11, they have already completed ten years of basic education from grade 1 to grade 10. And have studied General Science in all the ten years. Science and Environment subject contain different topics in different field of science, physic, chemistry, biology, astronomy and renewable energy resources. This paper chose this age group because they are at the last station in the school and the most of them are losing their motivation. And this subject was chosen because low achieving students prefer it and think it is easy way to collect marks. For that reasons its worthy to involve grade 12 students whom taking Science and Environment to examine the improvement that will happen after the implementation of activity-based learning.

### **1.2.3 Activity Based Learning**

One of the most important challenges that face educators globally is how to qualify competitive passionate students to be ready for job market. For that reason, pedagogue must search for best ways to actively engage students in the classroom. Through that, teachers will emphasize the

understanding of the delivered knowledge and develop problem solving skills and critical thinking (Younis 2018). Decision makers think how to motivate students to create innovative solutions for the challenge that they face and move beyond just gaining knowledge passively (English& kitsantas 2013). Students in classroom learn through two ways actively or passively. They learn passively by being receptacles of knowledge which mean they have no role in the learning process. On the other hand, students learn actively by participating in the learning process not only listening. Seating passively in the class will cause attentiveness and lose of concentration. Students can be involved actively by using different types of strategies like group discussion, open question techniques, personal exploration, critical thinking, experiment, presentation, debates or role playing. There are many ways that teachers can implement in the classroom to ensure that students gain the targeted skills and knowledge which predicted to prepare person for real life world. One of the best kinds of these ways is activity- based learning. According to Bhalli, Sattar & Asif (2016) best teaching and learning methods are those which make the students active contributors in the classroom.

Activity based learning refers to tasks that are offered in the classroom. Engagement in learning process and students' participation is the role element in activity- based learning (Prince 2004). The best definition for activity- based learning by Bonwell and Eison (1991, p.19) is anything that involves students in doing things and thinking about the things they are doing. If the activity- based learning could be defined as a fruitful learning that will help students to grasp the required outcomes which are defined by the teacher himself (Kassir 2013). Singal et al. (2018) described actively based learning commonly as student–centric which aim to provide challenging learning tasks, engaging and flexible learning for all students. Activity based learning provides scaffolding to students and make them connected to their classmates which enhance effort and motivation positively (Deci & Ryan 2000). According to Quin (2012) activity based learning which used sometimes interchangeably with another terms like cooperative leaning, collaborative learning, problem based learning or inquiry based learning typically defined as any educational strategy that engage student actively in the learning process. It includes a wide range of interesting activities. The student will be fully involved instead of receiving knowledge passively .

The main purpose of activity- based learning in contrast to traditional learning is to change the focus from delivery of the content and teacher to the students and active interaction (Kudryashova et al. 2016). Activity- based learning has many positive sides such as fostering students' literacy, engaging them in learning. It was suggested that activity- based learning strategies view students as active participants in classroom, self-regulatory skills enhanced such as active planning, monitoring and evaluating (Loyens, Magda & Rikers 2008). Activity based learning engage students intellectually with the content through adoption of critical thinking, synthesis and analysis. Promoting relationship, activity- based methods help students to move away from basic comprehension and memorization, shift toward active thinking style such as evaluate, analyze, apply and create which are at the top of bloom's taxonomy (Edwards 2015). Also, Quin (2012) claims that activity- based tasks that related to an observed phenomenon which student can observe in daily life that has different explanations can positively increase motivation.

Activity based style of teaching is a methodology depend on one of education principle which is learning through activity (National Council of Educational Research and Training 2011). There are some characteristics associated with the implementation of activity- based learning strategies in the classroom:

- Emphasis on enhancing student skills not on transmitting information.
- Involvement to higher order thinking like planning, synthesis, analysis and evaluation.
- Student fully engaged doing tasks.
- Guide students to explore their own values and attitudes.

#### **1.2.4 Summary of Activity Based Approach**

Overall, the activity- based approach is important because it affords students not only basic concept, but to build deeper understanding and connect between different types of knowledge basis, then to become smart researchers and problem solvers. Students and teachers both play role in this learning process which is active for both. They are central members of the larger teaching and learning community, which builds knowledge by cooperation. To reach this stage successfully, the teacher should be a good leader inside the classroom and encourages students to develop deeper knowledge and ask deeper questions. At the same time teachers should avoid direct delivery of

content. Student should be actively engaged in the learning process as a researcher. This will give students space to elaborate on and implement their new knowledge. This kind of actions drive interest in learning and increase motivation. This is only possible to happen when a community is built in which teamwork can actively applied.

### **1.3 Problem Statement:**

The purpose of this study is to investigate the impact of activity based learning on students' achievement and explore students' perception about this kind of methodologies. There is an increased demand for education reform, because of rapid change and advancement in the world today. As technology is becoming more advance, there is something newly discovered every day. To interact with the huge amount of knowledge or even to create new knowledge, the learners should have open minds to be ready to handle complex situation, ask deeper question and investigation (Dannawi 2013). One of these reforms could take place in the teaching methods as a key factor to increase students' engagement and motivation which will lead to better achievement. Past studies indicate various reasons for reduced students' achievement: less motivation, unqualified teacher and boring teaching strategies (Ahmad et al. 2015).

It is known that the best books, and materials around the world will not make students interested about learning and willing to study hard if they are unmotivated. Unfortunately, Classes become dull and excitement decreased among students because they are not motivated. Changing the way of teaching is one of the factors that would bring excitement to the learning process and thus, increase motivation. One of the effects of reduced motivation is drop of students' achievement. Grade 12 students in Sultan Qaboos school in Buraymi got low grades in Science and environment subject, more than 50% of students got D in term 1 of academic year 2018/2019. For that reason, this study examines if there is a proof of improvement that could happened after the implementation of activity-based learning.

### **1.4 Aim and Objectives:**

The main objective of this study is to investigate the influence of the implementation of activity-based learning strategy on students' achievement. Three objectives derived from the main One in this research; first, to understand the impact of activity-based learning on students' achievement in previous literatures. Second, to investigate the impact of activity-based learning on students' achievement through quasi-experimental design. Third, to understand the experience and perception of students whom have exposed to activity-based learning.

### **1.5 Research Questions:**

This research is conducted to present a framework analysis about activity- based learning method impact on student achievement. The main question of this mixed methods design research examined the influence of activity- based learning strategy impact on students' scores:

- Is there any impact of activity-based learning on students' achievement?

The following sub-questions were addressed in this paper:

- What are the impacts of activity- based learning approach according to existing literature?
- Is there any difference in students' results between test after traditional method and test after activity-based method?
- What are students' perceptions about their experience with activity-based learning?

### **1.6 Research Hypothesis:**

This research was conducted to prove the following hypothesis:

Activity based learning method has significantly positive impact on students' feeling and achievement.

### **1.7 Rationale and Motive:**

While different types of teaching methods have been studied and identified by another scholar such as inquiry-based learning, problem-based learning and collaborative learning. They examine their impact on students' achievement and motivation. However, there is a lack of researches that investigate the effect of activity-based learning. Except for some studies that explore the influence

of activity-based learning on motivation. In Omani context the researches on activity-based learning is almost non-existent.

This research paper will be considered as a pioneer in Omani context, because it points out to the effectiveness of activity-based learning approach on students marks in science and environment subject for grade 12 in Omani public school. Also, the results of this study will provide insight into students' perception of activity-based learning and how it affects their learning process.

### **1.8 Structure of The Study:**

The research consists of five chapters. The first chapter outlines the introduction which highlights the education system on Oman and a description of activity based learning. Then, in the introduction also, there are a statement of problems, study's aim, research questions and rationale. The second one presents the theoretical framework and a literature review of the related studies in the field that help to support the research objective. The third chapter is about the research's methodology and description of the utilized instrument is provided. It also presents the ethical issues of the research. The setbacks and limitations are also outlined. The fourth chapter shows analysis of research's sample, post-test and pre-test and focus group interviews. The last chapter will discuss the analysis of the collected data and summarize the main findings of the research. Also, a set of recommendations and suggestions are included.

## **Chapter 2: Literature Review**

### **2.1 Overview of The Chapter**

This chapter discusses the related literature. It comprises four major sections. The first one deals with conceptual analysis of the research topic. It unpacks the main topic to simpler content. It begins with the principles of constructivism and behaviourism are outlined in theoretical framework. The principle of activity based learning is grounded in constructivism and the traditional method is based on behaviourism. After that it goes through an overall discussion about teaching strategies and their effect on learning process. Then it narrows to traditional old-style method and activity based learning method. It discusses extensively the impact of activity based learning and the role of the teacher and student in this kind of learning strategies. The third section outlines previous scholarly papers that are relate to this study. The last section of this chapter concludes with gap that will be filled by conducting the empirical investigation of this research.

### **2.2 Theoretical Framework:**

#### **2.2.1 Learning Theory**

Studies of human learning led to the appearance of some of learning theories; the common and famous of which are constructivism and behaviourism. The principles underlying these theories of learning have greatly influenced education systems and instructional practices. Activity-based learning is grounded in constructivism whereas, the skills-based method to learning is started from behaviourism.

#### **2.2.2 Behaviourism**

The behaviourist school appeared first before constructivism, it largely credited to Ivan Pavlov, the Russian physiologist (1849–1936). His reflection was

originally known as contiguity conditioning. Later, the term behaviourist was presented by John Watson (1924) whose work was a progress of Pavlov's work. After that, the learning theories which share similar features are generally connected to the behaviourism's school as discussed below. Behaviourist learning assumptions emphasize the external reactions of animals and humans and suggests that learning come across structure of behaviour in which learner should go through to gain new learning (Hull 1935; Pavlov 1960; Thorndike 1913; Watson 1924). One of these theories is that human or animal behaviour is a reflexive reaction to external stimuli from the surrounding environment (Pavlov 1960). In this experiment he rang the bell at the mealtime to feed a dog; after repetitions, the dog related the ringing bell with the food time. later, the dog drooled at the sound of the bell, even when there was no food. That experiment defined that the first sign was the food and was naturally effective, considered as the unconditioned stimulus. Then, there was the second new sign the bell which considered as conditioned stimulus. The repeated link between the conditioned and unconditioned stimuli lead to a conditional reflex which was salivation.

There is another behaviourism assumption, which introduce the reflexive reaction to stimuli as behaviour come directly from organism brain (Watson 1924). He concluded that, all learning take place due to responses to environmental stimuli. learning through this theory require two factors; frequency, when number of associations repeated and increased, the bond will become stronger. And recency, which indicate the response that comes immediately after stimulation and is usually associated with it. In essence, this theory proposes that learning happens due to the accumulation of habits.

Contiguity is another but simpler learning assumptions under behaviourism's school. It explains the learning from first trial, was presented to be responsible for learning in which stimulus gains strong association bond with response from its first pairing process (Guthrie 1935). An important hypothesis emerges from this law, propose that eliminating unwanted habits can be obtained through three ways: First, is the incompatible response, it formed by linked specific response with specific stimuli. Second, is fatigue strategy, it makes an unwanted habit to be repeated until it becomes fatigue. Third, is the threshold method, introduced through signs that normally make the unwanted act to happen at a low intensity, to stop the unwanted habit from reoccurring.

Another assumption grounded to school of behaviourism, that learning happens through trial and error. It includes three major laws for this style of learning: (a) Effect law, which suggests that the responses that cause satisfaction are naturally repeated and those that raise annoyance are not repeated; (b) Readiness law, which claims that the satisfaction and annoyance depend on organism's state; and (c) Exercise law, which describes that learning is boosted by practice (Thorndike 1913).

These assumptions from school of behaviourism had significant implications on schools and teaching process. The practices related to school of behaviourism are characterized by drilling, repetition, individualized, group learning, and recently placing emphasis on inspiring and motivating students through both types of reinforcement. These practices represent the classic teaching method which used in the control group in this paper.

### **2.2.3 Constructivism**

The school of constructivist appeared early in the 20th century. It has roots in physiology and psychology (Driscoll 1994). The constructivist school differs from the behaviourist school, it differentiates in study between human behaviour and animal behaviour. The constructivist thoughts confirm that, social interaction play crucial role in cognitive development (Piaget 1970; Vygotsky 1978). A fundamental hypothesis underlies the school of constructivist is that the only way to understand human processes by considering where they appear in growth (Vygotsky 1978). This hypothesis includes a genetic or developmental strategy that higher mental procedures in the human have an origin in social processes. The assumption that mental procedures can be understood by recognizing the signs and the tools that mediate them. According to that, human actions such as learning take place according to the genetic development that occur in child's behaviour accompanied by the effects of culture which are reinforced by unique tools such as speech that facilitate learning.

Examining chronological order of action and speech help to understand human behaviour. At an early age the child's action come before his speech, whereas, in a later age the child's speech come

before his actions (Vygotsky 1978). Another vision of learning related to education from constructivist school, is that learning is more cognitive than social but involves maturational variables that are shaped or affected by the surrounding environment (Piaget 1970). This idea of learning suggests three forms of experience: (a) self-directed and rewarded exercise; (b) physical experience means to learn about the properties of an object and experience it; and (c) logicomathematical, which relates to higher kind of learning. These forms of experiences provide knowledge that is directly connected to the brain maturation and occur spontaneously. Hence, cognitive perspective of learning proposes that learning includes (a) equilibration, which is the social and physical experience that individual gains from the environment that are responsible for development; (b) assimilation, defines as the procedure of adding new experiences or mediating the old existing ones; and (c) accommodation, which is building new form of experiences by assimilating old and new ones.

A very significant assumption under the constructivist school highlighted the role of the experience assuring that individuals better learn through tasks (Dewey 1997). This assumption tells that learner when involved in activity, he/she will learn gradually the meaning of the concept and he/she can do his/her own role that ensures understanding. This theory supports to the issue that this paper will investigate and emphasize it. In education, thoughts of constructivist school emphasize the role of interaction, culture, experience, cognitive development and meaning building. Meaning building is an active procedure in which meaning is formed through personal experience and negotiation (Driscoll 1994).

Recently, constructivism's views have received greater attention by educators globally. These thoughts influence learning and instructional process. Implication of the constructivist school theories emphasizes comprehension instead of memorization. Also, it encourages group cooperation rather than individualized learning and motivates learners via providing simulation for real-life situations. There is no specific comprehensive theory responsible of learning alone but, a combination of learning theories (Jarvis & Parker 2005; Jarvis 2006). Activity based learning is grounded in constructivist thoughts, which adds value and strength to this style of teaching. The principle of activity-based learning -which was implemented as a treatment in this study to improve students' achievement-attributed to the ideas of the constructivist school of thought.

## **2.3 Conceptual Analysis:**

### **2.3.1 Teaching Strategies**

Many teachers are trying to change their teaching strategies to support writing and reading for critical thinking. They want to prepare their students not just to listen and memorize, but to solve, examine, create, question, debate, and interpret the material in their courses. Teaching strategies defines as ways, methods, styles and techniques that adopted by teacher in the class to deliver the concepts and to reach the targeted objectives. Teaching strategies are different techniques that teachers implement in the classroom to emphasize that students understand the concept easily. Teachers use different, unique, innovative teaching strategies to introduce concept to students using their gained experience and knowledge. Good teaching strategies determined by some principals that guarantee their quality, Merrill (2003) mentioned five principles for good instruction. These principles are that learning is took place when:

- 1- Students are involved in solving real-life problems.
- 2- Activation of prior knowledge grounding for new knowledge.
- 3- Demonstration of new knowledge to the learner.
- 4- Students apply the new knowledge.
- 5- Integration of the new knowledge into learner's world.

Traditional teacher-centred teaching strategies have shifted with differentiated instructions, teachers directed strategies towards students' needs for learning (Gill 2013). Teachers as Qahtani (2016) described them are facilitator, delegator, personal model and have experiences in teaching method. He advised them to use different not one teaching style since learners have different learning abilities. Tomlinson in 2014 (cited in Qahtani 2016) stated that when teacher uses different teaching method, he/she will keep all students in mind when making lesson plans with different level of abilities. Teachers should choose teaching methods as Bhalli, Sattar and Asif (2016) conclude which ensure active participation and engagement of students. Also, should adopt a variety of styles of knowledge transfer which are more student-centred than teacher-centred.

Innovation in science instruction can be reached by implementing a mixture of teaching styles and no one style is as powerful as using an integrated strategies approach. Differentiated teaching strategies revealed a positive impact on student achievement and motivation when compared with the classical teaching methods (Schroeder et al. 2007). Crawford (2005, p.10) “Although teaching is more than a set of strategies, there are some teaching methods that should be part of every creative teacher’s repertoire. Some of these are comprehensive strategies that can shape a whole lesson. Others can be combined to make a complete lesson plan”. If students are placed in an environment in which they can actively connect the instruction to their interests and present understandings and have an opportunity to experience collaborative scientific inquiry under the guidance of an effective teacher, achievement will be accelerated.

Hornig et al. (2005) published their study in international journal of consumer studies. They conducted their research by observing and interviewing three award-winning female teachers. The aim of their study was to investigate the factors that impact ideal instruction and to figure out the most creative teaching style that used by talented teachers. The chosen three teachers were asked to attend focus-group interviews to share their teaching practices and how to run class creatively. Also, every teacher was videotaped in their classrooms after taking their consent. The videos were used to observe their attitude, interactions and their teaching strategies.

The researchers found some factors that influence creative teachers like; teacher personality traits, background, motivation, life experiences and peer interaction. The participants showed some strategies that make creative lesson. They implemented student-centred methods like; role play, group activities, group discussion and drama presentation. The teachers’ role in those methods was helping student as a facilitator with large space for students to choose what they want to learn and how. Also, pre-planning should be made before implementation. Furthermore, the three teachers were good at choosing suitable multi-teaching aids for their lesson. Overall creative instruction should include; student-centred tasks, good class control, suitable multimedia, connection of subjects to reality and engage students in creative thinking.

In 2016 study, Bhalli, Sattar and Asif studied learners’ preferences about the most suitable teaching style. Data was collected using mixed methodology quantitative and qualitative. Questionnaire

was distributed to 77 students to investigate their preference for teaching strategies. For further investigation focus group interview carried out with selective students (only 15 participants). The results showed that students prefer interactive instruction, small group discussion and problem-based teaching strategies. The majority of the students rejected teacher-based one-way traditional strategy which considered boring, passive and less interesting way. Discussion in focus group interviews showed that learners prefer strategies that afford active participation of the students. The participants in the study suggested that teacher should implement teaching method which guarantee active participation of the learner.

### **2.3.2 Traditional method**

Traditional teaching approach is when instructor direct his students to memorization as a good way to learn through. Teacher addresses the learning requirement of the learner face to face. Traditional method doesn't develop students' critical thinking, decision making or problem-solving skills. This method relies on textbooks and the board as the only educational tool. Whereas, activity-based learning relies on hands on material method. McCarthy and Anderson (2000) claim that traditional teaching style directs students to focus on superficial indicators rather than focusing on basic underlying principles, consequently neglecting deep active learning. Traditional way of learning has lost its effectiveness because in this modern age there are different types of modern technologies has been invented and modern ways of learning showed up, which can help students to quick access to huge amount of information around the world. Also, the implementation of these method makes the learning fun for the learner and easier for the instructor.

Traditional teaching method has both advantages and disadvantages. Considering the advantages of traditional classroom, it is very organized process. It takes place in very well organized and formulated environment. It gives students the opportunity to engaged in live discussion with instructor, then got immediate feedback. When students work on their own, they learn how to independent and take their own decision. Also, by implementing traditional teaching method the instructor guaranteed that all important topics will be covered. instructors sometimes choose to stay with lecture style and other traditional teaching methods rather than using activity-based strategies, because of their fear of not covering the targeted educational topics and their worry of

losing control of proceedings as specified in the subject's time plan (Bhalli, Sattar & Asif 2016). In traditional way students put focus on teacher only, he talks, and they listen. Students work lonely during the activities, group works and collaboration is prevented. Communication skill of students will be weakened due to less collaboration and interaction. Traditional teaching strategy is mostly considered boring for students, they may lose their concentration and miss important information during that. Also, teacher-centred method does not help the students to express themselves, they cannot choose their appropriate way of learning. Recently, most of teacher around the world tend to shift toward student-centred approach, however some students and teachers also believe that traditional teacher-centred way is more effective way.

### **2.3.3 Activity Based Learning**

In the past few years, stakeholder around the world have encouraged the use of activity based learning approaches. One of the best expressions that describe the implementation of activity based learning, it prompted a transition from the dependent student to the independent student. Activity based learning methods are based on the active engagement of learners in learning process to acquire skills, knowledge and attitudes. The aim of activity-based learning practices is to facilitate learning for the students. Activity based learning can be a very efficient strategy to help students acquire a better grasp of the knowledge that is important to the class. Take in consideration the complexity of the exercises and controlling the level of risk is vital in the selection of activity based learning strategies that will be most creative in the class.

Activity based learning approach refers to learning process where students mentally and physically explore subject's content by forming identical situation of the work environment and handling the tools and materials that are similar to the world of work. This learning technique includes activities which enhance knowledge, skill and attitude. Also, it will help to develop students' notions about real world (Ravi & Xaviera 2007). Students in activity- based learning have the opportunity to learn through experience and individual actions. Activity based strategies help them to construct students' knowledge (Shah & Rahat 2014). Activity based learning is a crucial strategy that encourages students to think in unique ways against their problems ahead, makes it simpler for them to figure out right applicable solutions and offers self-esteem for them.

Activity based learning style is a combination of educational strategies implemented for teaching process. It is mainly run through conducting hands-on and minds-on class tasks. “Children are active learners rather than passive recipients of information” is the common notion that the idea of activity based learning model is rooted from. Piaget, Dewey and Vygotsky, psychologist from constructivism school supported this learning style, because they believed that students are active learner and not passive recipients of information.

The learning process can become long lasting and interesting, if the student has the chance to discover the surrounding environment and deal with realistic experiment. According to Dangpe and Golji (2016) Activity based learning shift the focus from the teacher to the student while learning proceeding. Tasks in learning are effective tools utilized by learners who play role in learning environments in order to realize abstract concepts and direct the learning in a more effective way (Birgin et al. 2010).

According to Hurd (2000) activity based learning approaches have been shown to be effective: energy added to the lecture and long time classes have been more tolerable. Engagment of the student in the learning process is planned to enhance understanding of the class content. Students spicially young adolescents should intellectually engaged in learning activities, physically engaged in learning activities and socially engaged in learning activities (Edwards 2015). Educators who defend the usage of activity- based leaning agree that to achieve most lasting learning will happen through interaction, engagement and direct experience with reel environment (Edwards, Kemp & Page 2014; Nesin, 2012).

Biase (2018) set some conditions for implementing activity based learning for example, it needs to respect and reflect local priorities, take in consideration the available resources, fit with the circumstances of instructors’ work, compatible with their work and offered teachers’ relative advantage – it helped not hindered them in their work. Bahadir and Ozdemir (2013) state that, learning is an active practice in activity based pedagogy, so it is needed to arrange activities according to its priority to create learning environments that guide students to learn by experiencig and doing. While boring learning environments continue to treat student as passive-

participant, the activity based method should control classroom and class time to be helpful elements in learners' engagement. It is required to keep students away from monotonous classroom environment, expand learners' flexible non-solid thinking and engage them in realistic multi-dimensional world, where things such as emotion, opinion and imagination are considered.

There are some activities can be used learning process according to Malhotra et al. (2015) such as; practical investigations, research-based activities, task-based activities, problem-based activities or project-based activities enhance learning pathway. These kinds of task encourage pupils to shape their knowledge and skills. Furthermore, active learning tasks provide students an opportunity to discover their personalities. Students in this style are provided with experiences that are same for all, so every student can contribute in discussion, regardless of their socio-economic level. Also, it induces students' thinking, because it requires an understanding of the observed action or sample instead of remembering the right answers only. It inspires questioning and analyzing of the provided events and the presented data. It sparks effect and cause intelligence and reduces dependence upon central authority.

Furthermore, utilization of activities in the classroom makes the students in the center of learning process, affords better learning opportunities, thus, students use and like the subject, makes it joyful teaching experience, provides chances to take notes on and discuss articles, and leads to enhance motivation of students (Birgin et al. 2010). Celik (2018) claims that as long as learners find the method and content used in teaching for the subjects enjoyable and interesting, they will participate actively in the learning process. Consequently, the utilization of teaching tasks through the processes in the classroom is important in terms of learning. Activities used in the teaching and learning process may help to making the learning long lasting, generating positive attitudes towards education and bringing interest for the class.

### **2.3.4 The Role of Teacher in Activity Based Learning**

Both teachers and students have onus in activity- based learning. It's important to distinguish between the role of everyone in the classroom environment. Regarding to student, should involve in open investigation and need to come up with evidence- based solutions. Whereas teacher should be open mind, answer students' inquiry and responded to students' needs (Hamanfin et al. 2014).” Since the Internet opened access to unlimited resources on any possible topic, teachers have lost their value as the major source of knowledge and students' expectations from educators in a classroom have changed dramatically” (Kudryashova et al. 2016, p. 460).

Teachers are important factor in the building of countries. They prepare students to be skilful, knowledgeable, competent and ready to lead the development journey in their country. For that reason, teachers should be will trained and prepared for teaching process. Nowadays their role has been changed in the classroom through adoption of active learning strategies. Teacher considered as a facilitator in active learning strategies. Activity based strategies provide variety of smart teaching methods for teachers. Prakash (2016) states that teachers will be able to help and teach in various way, if they can create an active learning atmosphere. Also, they will induce learning to be smart and easy. So, they should provide interactive and interesting environment to make learning better. According to Rotgans and Schmidt (2011) the characteristics of modern teacher in activity- based learning is to be friendly, good communicator, supportive and pass their love for their subject.

It has been reported that teacher in learning process is very important member as facilitator and organizer, no longer only information transmitter. The role of teacher in activity- based learning has evolved Kndryashova et al. (2016) listed some of these roles:

- Investigate students' prior knowledge and engaged them in the activities that provoke nosiness.
- Design activities should connect between past, present and future learning experiences.
- Provide tasks that inspirit exploration to generate new ideas.

- Direct students' attention to engagement, exploration and experience the concept to provide deeper understanding.
- Challenge students to extend conceptual understanding and refine their skills through experiments and additional tasks.
- Evaluate students' abilities and understanding to detect their progress.
- Motivate students to like the subject and learning.
- Give ready-made notions for the student.
- Control the process of learning, make sure that students' progress in learning and make them reflect their progress.
- Moderate the ways, facilitate learning and encourage students to apply appropriately their prior knowledge and skills.
- Lead the process of learning and provide safe environment for all students.

Prakash (2016) states that teacher is a friend and a guide for students. Students spend a lot of time in school with teacher, so teacher should know well about the qualities of the students and estimate their abilities. Teacher should be counsellor, recognizes students' problems and figure out their habits. Good teacher should know how to deal with students' issues such as low achievement, economic problems, frustration and family problems. Teacher should provide students with updated information and be familiar research field of education.

Furthermore, teacher should know how to deal with students from different background because most of the schools have students from different backgrounds and areas. Some of students are from rural regions, some from urban regions and some of them come from slum regions, so teacher has to inquire students' backgrounds to take in consideration their circumstances. Teacher should be aware of active learning strategies and active classroom's techniques. Teachers could encourage students to think critically and develop better interaction between teacher and students by using inquiring hands on tasks in science (Kassir 2013). Whereas, Younis (2018) claims that key challenge to the teacher in the activity- based learning is to move students from their initial curiosity to turn it regular practice. They provoke ideas for student how to spark the investigation

that help them to find the sought answers. Teacher look for creative ways to introduce the content of his subject to excite their interest engaging in a state of inquiry.

### **2.3.5 The Role to Student in Activity Based Learning**

The most suitable method for changing the learner's role in the classroom from passive learner to active learner is activity-based learning methodology. In active learning situation students may work in small groups to achieve targeted goals. All students are expected to participate and help the group by sharing ideas, solving problems, relate their work, arguing to reach an agreement and unite to achieve the main goals. Student in active learning take an active role, participate in the tasks, and reflecting their learning. Anything student do it in the class other than seating passively listening to teacher. This include everything start from listening to absorb information, to writing exercises which help student to react with lesson material, to more complex group exercises, to apply situations related to real life (Sandercock 2013). Michael (2006) concluded that activity based tasks help students to acquire the following qualities:

- Self-reflection.
- Self-assessment.
- Engagement.
- Physically and mentally active.
- Gaining knowledge by contributing and participating

Students express themselves in activity-based learning by gathering information to advocate their views and explain it to others, participate in group discussions and debates with their classmates. Small group discussion is more preferred than large group discussion, because researches show that when it comes to thought expression, participation, applying issues, understanding issues and status of knowledge, small group is more beneficial than large group for student discussion (Hamann, Pollock & Wilson 2012). In activity-based learning students have to take responsibilities for their own learning. They have to be familiar with the new active learning strategies, otherwise they will lose time trying figure out their role during the lesson. Role distribution is one of the values that activity-based learning instils in students, so students have to distribute the roles and missions according to individuals' skills and abilities. One more critical

role that students play in the classroom during the implementation of activity- based learning is to explain to each other and help their low achiever classmates to grasp the new concepts and prompt them to do their asked missions.

#### **2.4 Review of Related Literature:**

International literature contains various research results on the influence of activity- based learning, and its impacts on academic achievement of the students and their attitudes towards subject which is applied in. Alasi (2018) in his study investigated the impacts of activity- based learning strategy on the scores of second grade students. It was stated that students were able to understand the relationships between given data or models more correctly and easily as the activities performed. Through implementation of activities, the students explain the relationships that gotten from the problems or situation given in the activities correctly and quickly.

Another study conducted with students, it was found that activity based teaching increased the students' success in comparison to traditional teaching (Kupcu 2012). In a similar research paper, Birgin et al. (2010) compared traditional learning and activity based learning in terms of their impacts on students' development regarding some topics in the subject. In the study, it was identified that activity- based learning influences the teaching of concepts positively. This learning strategy not only made the learning experience fun, but also learning became meaningful. Additionally, Isha and Abugado (2011) examined the success impacts of different types of models of activity- based learning content of grade 3 children. They gave students posttest consist of 40 multiple choice questions for two groups control and experimental. They reported about classroom activities led the students of the experimental group to have higher posttest results in comparison to traditional learning style.

Another research conducted by Johnson (1970) on math students of secondary school inspected the influences of tangible activities on success in teaching geometrical concepts in math subject. The results showed the importance of class activities in teaching geometrical concepts and reported that tangible kind of activities will increase students' achievement even more. According to Douglas and Joke (2016), activity based learning strategies may play an important role in

improving teachers' skills and experiences of integrating technology into learning activities. In study, conducted by Bassett, Martinez, and Martin (2014), they studied the impacts of the technique of activity-based education and instructor-guided learning in science subject on student achievement. Because of the experimental study, the students with teacher-guided education got higher achievement rate than those in the activity based learning classroom. Also, they investigated students' attitudes of both groups towards the related method of learning and claimed that the attitudes of the learners with the experience of teacher-guided teaching were higher than those of the activity-based learning experience. Other scholars analyzed the influence of several activities which express subject's topic. It was concluded that learning through activities led to a notable increase in learners' performance and theoretical understanding on related to targeted topic (Rubin et al. 2014).

Celik (2018) conducted a study, the goal of his study was to examine the impacts of activity-based learning on sixth grade students' achievement of mathematics subject in comparison to traditional learning strategy and detect their attitudes towards learning activities. He found that academic achievement for both groups – control and experimental - were positively increased. As a research methodology data was collected quantitatively by introducing pretest-posttest for both groups to determine the improvement in students' results before and after the implementation of activity-based learning approach. Also, attitude scale toward mathematics activities were applied on the control and experiment groups to explore students' perception about learning activities.

The participants in this research were 78 students from grade six, they were divided into two groups randomly the first group named control group and the second group named experiment group. The experiment group received activity based learning, whereas the control group received traditional learning. The results of pretests and posttests conducted by both groups show that the mean scores improved in control and experimental groups. The mean posttest results were increased from 4.46 to 7.44 in the experiment group, whereas they were slightly increased from 4.48 to 5.79 in the control group. This means that students of experiment group were academically more successful than the students of control group. He attributed that to the motivation of the students due to direct engagement and to the opportunities that activities provide to work with tangible materials. However, students' attitude for the students who taught through activity based

learning according to the results of attitude scale was negative, although it was predicted that those students would develop positive attitudes towards learning activities. While, the attitudes towards activities increased in the control group.

## **2.5 Situating The Current Study**

The literatures of relevant studies' findings show the significance of activity based learning strategy on students' attainment and their views about activity based learning. However, there are little researches that explore the impacts of this learning strategy on both achievement levels of students and their perception regarding science activities. Consequently, there is a need for further investigation on this subject. This paper is important in terms of filling this need in the literature. According to related literature previewed, no one was found to explore the perception of student towards conducting science's activities which is predicted to increase students' scores in science classes. This paper's finding will contribute to analysing the data obtained in related researches in the field. Making them available for stakeholders to employ the recommendation, which will help to reach better quality of learning and raise awareness about accomplishing permanent learnings.

## **Chapter 3: Research Methodology**

### **3.1 Introduction:**

Based on the literature review in last chapter, there is a need for further investigation of the activity based learning in Oman. The aim of this chapter is to describe the methodology of this research paper, *The Impact of Activity Based Learning on Students' Achievement. A study Among 12 Grade Science and Environment Student in A public School in Oman*. The participants in the project are defined and data collection way are delineated. An overview of the procedure and instrument employed during the research is outlined in this section. The study was conducted with a help from one teacher, who is teaching Science and Environment for grade 12 in a public school in Oman. The teacher was familiar with an activity-based learning and the traditional teacher-centred styles. Also, a biology inspector from Ministry of Education helped the researcher in validating the used instruments for the investigation.

### **3.2 Research Approach:**

This part refers to a set of actions that are used to complete this research. In order to meet the aim of this research, a mixed approaches study paradigm on pragmatic grounds has been selected to investigate the influence of activity-based learning strategies and to explore its effects on students' achievement. For investigation purpose the scholar of this paper conducts a quantitative method using Quasi-experimental approach and conducts qualitative research using focus group discussion approach. In this research paper, a mixed technique approach has been used in order to explain and answer the research questions, also to fulfil its purposes. Alasi (2018) believes that the employment of mixed methods and analysis of quantitative and qualitative data would enhance the data validity and it is the best way to meet the complex demands of children, families, educators, the policy audiences and stakeholders.

The rationale for selecting the mixed method which has been introduced through philosophical assumptions where there is an obvious positive outcome in taking every method alone. There are many reasons for mixing different types of methods in one research. For example, the outcomes from one method can help inform or develop the other method. Alternatively, one instrument can be nested within another instrument to provide insight into multiple units or levels of analysis. There are three general types of mixed methods design illustrated by Creswell (2003); concurrent procedure, transformative procedure and sequential procedures which is implemented in this paper. In sequential procedure the researcher seeks to emphasize or expand the conclusions of one method with another method. The researcher may begin with a qualitative approach as exploratory instrument and then introduces the quantitative approach choosing large sample in order to generalize results to a population. Or alternatively, as in this paper the research may start with a quantitative approach in which concepts or theories are tested and following up by a qualitative approach involving detailed exploration with a few cases or individuals.

This is combination led to gain high level of benefits by using quantitative and qualitative method in order to reach into further depth understanding (Johnson, Onwuegbuzie & Turner 2007). This rationale offers the intention of increasing both the reliability and validity of the results (Creswell 2003). According to Creswell (2003) techniques associated with the quantitative method were those that appealed the postpositivist perspectives. The true experiments, quasi-experiments which is selected for this research and other correlated methods are included in quantitative method. A quasi experimental method is used because it is one of the approaches that are utilized when the study was already grouped (Kouta 2011). The usage of quasi experimental approach is useful because it improves the generalization process of the finding due to the statistical analysis.

On the other hand, qualitative research can include the following strategies: grounded theory, ethnographies, phenomenological research, case studies, interviews, focus group, narrative research, etc. According to Mishra (2016) Qualitative method is a generic term for research methodologies described as anthropological, naturalistic, ethnographic, or participant observer research. He described many methods used to collect data in the qualitative research approach one of them is focus group discussion. Focus Group discussion is a type of in-depth interview conducted in a group of participants, whose meetings present characteristics defined with respect

to the size, proposal, composition, and interview techniques. In focus group discussion instrument the researcher make group interviewing in which a small group – usually consist of 10 to 12 respondents – the interviewer led and moderate the interview to get structured discussion of various issues of interest. The procedure of the discussion should be planned well before the actual discussion. Mostly, interviewer rely on moderator’s guide and outline to guarantee that all themes of interest are covered. A focus group discussion is a good strategy to bring people together, those people should have similar experiences or backgrounds to debate a specific issue of interest (Mishra 2016). It is highly desirable for getting information based on feelings, emotions and experiences (Dilshad & Latif 2013). The group of people among the discussion is guided by facilitator who presents topics for conversation and helps the contributors to participate in a natural and lively discussion.

The choice of a mixed methods design was made for this study because data were available quantitatively through the pre-test and post-test results and were collected qualitatively by the scholar through focus group interview with the participant students. Quantitative investigations conducted initially, then qualitative investigations following, after that compare the findings. The priority is equally distributed between both methods. This type of research method is best implemented for a shorter data collection study (Creswell 2003).

### **3.3 Instruments for Data Collection:**

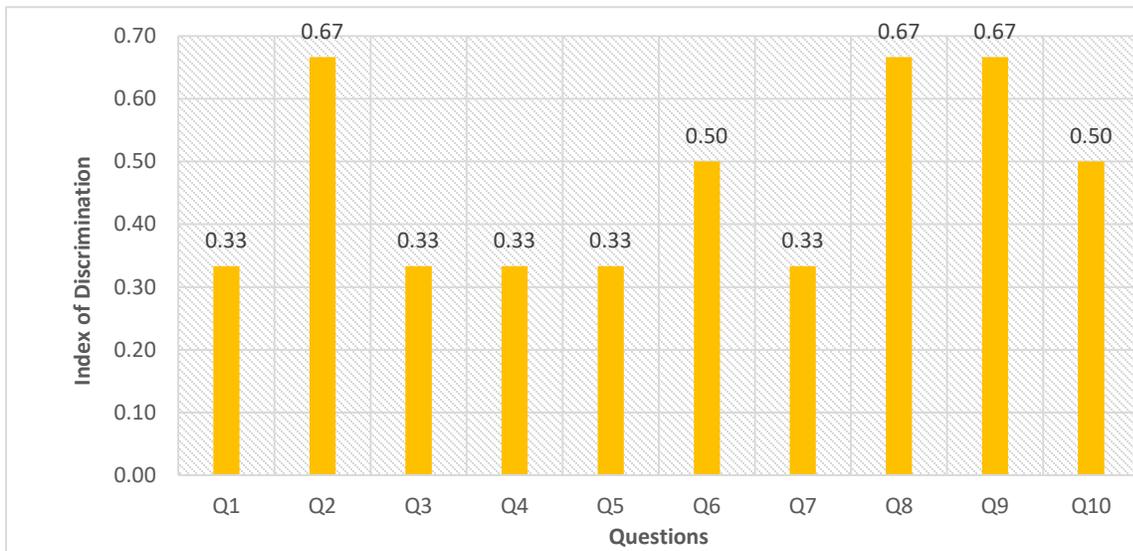
Quantitively the research will focus on the analysis of students’ scores collected regarding their exam marks in two different periods of time before and at the end of the learning session to end up with the findings and the interpretation process of the results. A quasi experimental study design with pre-test and post-test was used. In this model, two groups are formed. First group is called the control group, while the second is called the experiment group. The study was conducted after the groups’ determination.

In order to determine the impact of activity based learning on students’ academic achievement, a written test was designed by the researcher and was applied on the experiment and control groups as pre-test before the activity-based class and post-test after the learning process for both groups.

For the data collection, the test was constructed. It is the same test used as pre-test and post-test for both groups control and experimental group (appendix A). Then it was translated to Arabic. The procedure of test editing was reviewed by biology inspector from the Ministry of Education. The test was based upon one topic only (Bacterial Growth and Development) chosen from the 12th grade science and environment text book. This test consists of 10 questions 4 of them are multiple choice questions, and 6 items are short answer question. The questions are related to four levels of cognitive domain; knowledge, application, comprehension and analysis. Groups' members were encouraged to answer all items.

For the validity of the test items, a pilot test was conducted for another class grade 12 students in the same school. After the test, researcher collected the paper and corrected them. Then, analysis was running to determine item difficulties and discrimination value. According to Earnest (2014, p.6) item discrimination indicates “the degree to which an item differentiates between examinees. This differentiation is typically operationalized as the difference between those examinees who perform relatively well on an examination and those who perform relatively poorly”.

As a result of the pilot test analysis, 2 multiple choice questions whose item discrimination value was less than 0.30 were removed from the test. The test questions were 12 and then became 10 in the final form of the test. The remaining 10 question was showed to the biology inspector to take his opinion regarding the validity of the test's item. Another analysis was done (Appendix B) for samples from pre-test of control group to check index of discrimination and items difficulty. The graph 3.1 shows the discrimination value of all items. Average items difficulty of the test was 0.50 which indicated the test difficulty was intermediate.



Graph 3.1 (Post-test's Items Discrimination Value)

### 3.3.1 Pilot Testing

In order to check validation of the test in this study, pilot testing was done, and feedback was analysed. After pilot testing was applied and the items that were hard to understand or that led to confusions were corrected. In the last form of the test, the questions' number was decreased from 12 to 10 questions based on value of discrimination. One way to achieve the validity for any instrument used in any research is to introduce a pilot study. A pilot study is known as a trial run or a mini version of a study utilized in order to prepare a full-scale research and may be used specifically to check and pre-test a research tool (Dikko 2016). According to Tashakkori and Teddlie (2003) pilot studies are important in both qualitative and quantitative study.

Various scholars have highlighted the significance of a pilot study as fundamental factor to any conducted study as it ensures to spot the possible mistakes and flaws in the research instrument (Atkinson, Rose & Watson 2007) and if the concepts have been operationalized properly. This can be achieved by pre-testing the tool of the study on a small number of participants. Those participants should have the similar characteristics as those in the original study. Also, according to Calitz (2009) pre-test of questions helps to recognize ambiguous or unclear items in the research protocol while Harrison and Van Wijk (2013) add that pilot test can enhance credibility and value to the research project.

A pilot testing helps to identify how well a study instrument can reform the actual study project by specifying potential cracks and areas that may need adjustments. Pilot study in a research where an interview is used as an instrument as Dikko (2016) described them do the following:

1. Shed light on difficulties and unnecessary questions then modify or discard unwanted question.
2. Detect whether each question lead to an adequate answer and response.
3. Determine the time needed to finish the whole interview to detect whether it reasonable or not.
4. Found if responses can be properly integrated in relation to the required information.
5. Explore whether the scholar incorporated all the necessary questions to measure all concepts included in the research.
6. Help to practice and perform perfect interviewing techniques.

The researcher in this study added that pilot testing is vital because it save time and money. Also, it is important to be clear and well understood because participants can bias collected data if they do not grasp the questions.

### **3.3.2 Focus Group Discussion**

Qualitatively data was collected through focus group discussion with the students from experimental group whom thought through activity based learning to obtain their views regarding activity based learning strategy. Focus group discussion was utilized in order to gather qualitative data for the research. Focus group discussion defined by Bowling (2002) as an unstructured interview between a small group and a regulator using the outcome of group dynamic in the planned conversation to assembling detailed data and extract new ideas.

Focus group questions were assessed by one educational expert -inspector- to check validity and reliability. Validity of the questions in this research were conducted in the following steps: First, design the discussion questions based on the activity based learning principles. Then, these questions were inspected by one inspector from Curriculum and Instruction Department in Ministry of Education in Oman. The final phase of the questions' construction process was held by taking the inspector's opinions into account. Then, choose students who will volunteer for

participation. For that reason, 8 students out of 12 from experimental group were selected through non-probability convenient sampling for focus group interview.

The reliability of this process was further tested by conducting pilot testing, for that purpose an interview with the other 4 students from the experimental group. There were 4 main questions asked during the focus group discussion: "What are the advantages of activity based learning method?"; "What skills did you gain through the use of activity based learning method?", "What are the disadvantages that could appear in this method?". "What you prefer activity based learning method or traditional method?". It took 40 minutes to finish the focus group interview. The researcher took notes during data collection procedure. Moreover, the interview was recorded and transcribed (Appendix C) for documentation and revision purpose.

### **3.4 Study Population and Sampling:**

According to Mertens (2010), study sample is defined as a full set of components that consist of similar features on specific subject that is related to the standards of sampling. The population of this study consist of 24 male students. They were represented by two main groups. The first group is control group consists of twelve science and environment students from grade 12, while the other group is experimental group and consists of twelve science and environment students also from grade 12. All students are from Sultan Qaboos School in Buraymi City, which is around 250 Km away from Muscat capital of Oman. This school is recognized as implementing activity-based learning strategies in its classes, mostly in its science classes.

Students were distributed for two equivalent groups experimental group as well as control according to their marks achieved at the end of term 1 of academic year 2018/2019. The researcher keened on that each group fits all of the mixed abilities student of above average, average and below average students. The teacher who participated in this research is familiar with activity-based learning strategies and the traditional teacher centred strategies. He received training course for two years in The Specialized Centre for Professional Training of Teachers (SCPTT) to implement activity-based learning in his school. It has been indicated that, students' learning and achievement was increased due to teachers' enrolment in teacher training courses (Kouta 2011).

Vescio, Ross & Adams (2008) provided evidence on how teachers' training and development of active and professional teaching strategies lead to an influence on students' learning and classroom practices.

The teacher selected in this study joined a two-year program composing 4 training periods for science teacher in cycle two schools and post-basic education school. It targets to enhance their teaching and learning capacities to enable them to become leaders of change in their field. The first year of the program concentrate on theory and best practices in classroom for best teaching and learning experience of science, activity-based, on concept-based, question-based teaching strategies moreover reinforcing thinking and problem-solving skills. In the second year the Centre focuses on enhancing teachers' leadership skills.

### **3.5 Data Analysis Plan:**

The objective aimed to investigate the effectiveness of the activity based learning method on students' achievement in science and environment subject, moreover find out student perception about this learning style. Cause and effect relationship were there between Activities in activity-based learning style and its impact on students' achievement in science and environment. An achievement scale was utilized for the quantitative data and focus group interviews were hold for the qualitative data. While t-test was used for the quantitative findings, content analysis technique was used for the qualitative data.

In order to regulate several factors which may affect the internal as well as external validity of the quasi-experimental design, pre-test and post-test equivalent group design were utilized for this investigation to regulate these variables. The dependent variable of this study was students' scores, whereas the independent variable was teaching strategy which used for treatment purpose. One lesson was introduced via activity based learning strategy and another lesson was thought through traditional lecture method. The lesson was planned by the researcher and the teacher together (Appendix D). The activity based learning was employed as a treatment for experimental group, whereas traditional methods was employed for the teaching of control group.

The pre-test was administered for both experimental group and control groups one day before the lessons. Then post-test was administrated for both group one day after teaching the topic. The instructions were done by the participant teacher for both groups experimental and control. Experimental was thought using activity based learning and control was thought using traditional lecture style. The data for the investigation research was collected from the results of the students on pre-test and post-test. The Independent sample t-test was used to analyse the data getting mean score and standard of deviation.

After assessing the tests' papers and choosing the required tests for study and analysis of the collected data, the scholar put the scores in a software application called Statistical Package for the Social Science (SPSS). It is a specialized program for analysing the results in very comprehensive statistics (Bryman & Cramar 1990). According to (Kouta 2011) this app is a good program because it lets the user to perform a very wide range of statistics, but the user specifies the desired analysis. The numbers are shifted to spreadsheet tables and charts to explicate the results and to come up with a summary of the major findings then finally declare the major conclusion. Independent *t*-test is utilized to compare students' scores of the groups to compare between the two groups experimental and control using the independent *t*-test through the SPSS program. It generates useful numbers that can be described easily. It helps to investigate if there is any significant difference in the Mean. Independent sample t-test will help to support the scholar descriptive analysis of the research findings. For qualitative instrument, the data collected from focus group discussion will be interpreted using content analysis technique to extract the most important ideas and responses related to every question.

### **3.6 Difficulties and Constraints:**

Conducting a research is challenging process and full of obstructions such as selecting the study institutions and participants. The scholar needs to get the permission to gather controversial or sensitive data after getting from the required school or any other institution; this is considered a challenge itself. Rejection from many authorities may be happened at any phase and no support provided from a particular institution or school. While conducting this project, the researcher challenged some difficulties, such as the refusal of three schools to hosting the study two of them

girls' schools. They were afraid of that the research take long time and many trails will be repeated, and as they said they will miss semester plan. Also, they add that this kind of study can cause disruption and delays the daily plan. The third school was boy school, but they refuse because they have already 4 researches by other scholars were proceeding at the same time.

The researcher also encountered delays of getting permission from The Ministry of Education which affected and delay the starting date. Also, it affected the overall process of investigation and the current material in general. Another fact is that the results of the test sometime not reflect the real level of the students, that because of cheating cases from some students as it happened in our case. Despite, the researcher explained that the aim of the test was for research purpose and it will not affect their assessment process. For that reason, the scores were not realistic, and the class was changed. The test was repeated firmly with help from two other teacher to avoid cheating cases. Furthermore, sometimes teachers try to show their students' best work and will improved. Wherefore the researcher emphasized on the teacher to deliver unsupported work samples. The researcher is acknowledged that some sample of work could be subjected to any external help, so he estimated the percentage of corruption was approximately 10 percent of the total work. In spite of everything, commitment to the general standard of a research is not easy matter, however it is an interesting journey full of experience and ensure more success for scholars in their future profession.

### **3.7 Ethical Issues:**

The researcher in this study employed certain method in the process of gathering data required to enrich the study and answer the posed questions. The researcher asked via correspondence with the British University in Dubai to prepare letter addressed to the Ministry of Education in order to contact biology inspector and conduct the research in one of their following school. Additional letter was addressed to the Sultan Qaboos School in Oman asking for the permission to conduct investigation through testing and group interviewing with the students in the school edifice. School consent letter was signed by school principal (Appendix E). Student consent letter was distributed to the participants before the experiment (Appendix F).

Ethics is an essential element in conducting authentic and meaningful scholarly paper. Researcher should guarantee full responsibility of what is to be included inside the material during the conduct of the study, also, the scholar is asked to obey certain academic guidelines which are both institutional and professional. Schools' privacy should be respected, and confidentiality of personal information should be preserved. The researcher responded to the standards of the schools' admins instruction about the focus group interview in order to preserve its confidentiality and privacy. symbols and letters to name the students the other different paper have been taken out from the appendices. In this paper, complete anonymity of information is guaranteed, and private information of the participated school is preserved.

## **Chapter 4: Data Analysis**

### **4.1 Introduction:**

The focus of this section is to report the findings of the investigation. It includes all collected data structured and analysed using series of techniques, determining statistical analysis for possible improvement in the scores between experimental group and control group. This chapter studies the data gathered through the investigation of this study about the effect of activity based learning on students' achievement among 12 Grade science and environment student in a public school in Oman. Also, to detect students' views about their experience with activity based learning strategy. This research answers three research questions:

- What are the impacts of activity- based learning approach according to existing literature?
- Is there any difference in students' results between test after traditional method and test after activity-based method?
- What are students' perceptions about their experience with activity-based learning?

The research main objective is to examine if there is a positive impact of activity based learning on students' achievement as it is hypothesized in this paper. The data of this research was collected through literature review, post-test, pre-test and focus group interview. The literature used to answer the first question, the pre-test and post-test conducted to answer the second question and the third question was answered using focus group discussion to explore students' perception about activity based learning. The scores collected for the analysis are scores of 24 male high school students in Grade 12 in Sultan Qaboos Public School. The scores of the test were collected twice in two different settings and periods. As mentioned in previous Chapter a quasi-experimental design is implemented to answer the research second questions using Independent t – test analysis to compare the pre-test results of control group with pre-test results of experimental group. Then compare post-test results of experimental group with post-test results of control group. Independent t – test analysis was conducted via SPSS program. The acquired qualitative data from the focus group interview was interpreted via content analysis. According to Creswell (2012) Content analysis procedure involves the classification of collected data from the focus group discussion and identifying main concepts and codes which correlate to the research topic. Regarding that, the researcher noted down student's participations while answering the introduced questions. The relevant answers were classified taking activity based learning principles into consideration. After that, the researcher created the final themes by clustering the most repeated expressions from the respondents. Then, the codes representing the themes were determined. In the analysis process, one field expert and two experts from the Curriculum and Instruction department were asked to challenge the plausibility of the themes and the codes in regard to the data (see Table 2).

#### **4.2 Scores Analysis:**

Post-test and pre-test were conducted to answer the second question of the research questions, which was Is there any difference in students' results between test after traditional method and test after activity-based method?. Before and after the treatment, the same test was introduced for the students. It was translated to Arabic as the curriculum language is Arabic. The papers were collected and assessed by the researcher. The tests result of both groups control and experimental group were analysed by using independent- sample t-test.

### 4.2.1 Pre-test Score Analysis

At the beginning, students of both groups were examined one day before the lesson. Test paper then assessed and analysed by the researcher. Table 4.1 shows the difference in means in pre-test exam for both group control and experimental group. This test was conducted before implementing activity based learning strategy. After that, independent t-test analysis of pre-test scores for both groups was conducted via SPSS (Appendix ). The statics from table 4.1 shows no significant difference between pre-test scores of both groups. The mean of control group is 4.79 and 4.96 for experimental group. Standard of deviation is 1.88 for control group and 1.45 for experimental group. So, we can conclude that both groups were at the same level before the implementation of activity based learning strategy.

**Groups Statistics**

Table.4.1		N	Mean	Std. Deviation	Std. Error Mean
Pre-test	control	12	4.7917	1.87639	.54167
	experimental	12	4.9583	1.45318	.41950

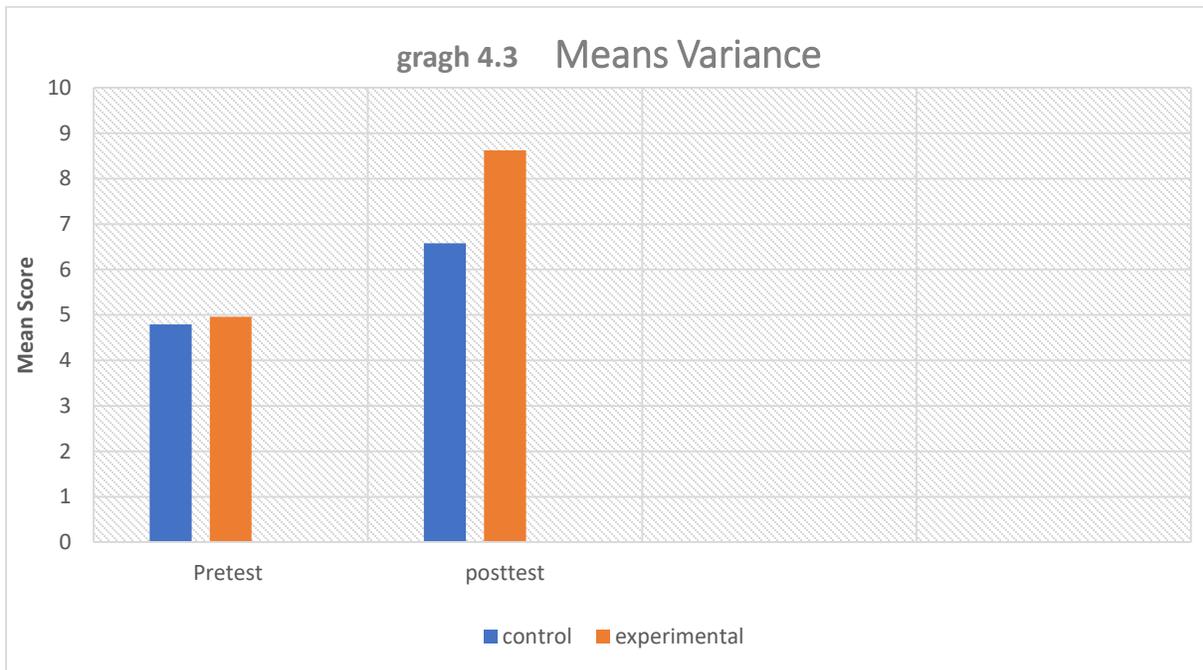
### 4.2.2 Post-test Score Analysis

After the treatment introduced for one group only, 12 students in the experimental group were taught through activity based learning. Other 12 student from control group were taught through classical way. The post-test was introduced to both groups to investigate the impact of the treatment on students' achievement. Students' papers from experiment group (Appendix G) and control group (Appendix H) were marked and analysed. Independent t-test analysis of post-test scores for both groups was conducted via SPSS (Appendix ). Table 4.2 present the average scores of post-tests for both groups. It indicates that the mean scores increased in both groups. However, there are a significant increase in the mean score of the experiment group. It increased from 4.79 to 6.58 in the control group, whereas experimental group showed better improvement in the test's

result. The mean post-test score for the experimental group increased from 4.96 to 8.62. Furthermore, standard of deviation was better for experimental group, it was 1.13 which means that the level of the students was convergent. For the control group the standard of deviation was 1.36 which is less convergent than experimental group. The graph 4.3 shows the difference of the means of pre-test and post-test for both groups control and experimental.

**Group Statistics**

Table.4.2				Std.	Std. Error
	Group	N	Mean	Deviation	Mean
posttest	control	12	6.5833	1.36237	.39328
	experimental	12	8.6250	1.13067	.32640



**4.3 Focus Group Analysis:**

Focus group interview was conducted to answer the third question of the research questions, which was “What are students’ perceptions about their experience with activity-based learning?”. Eight students contributed in the discussion to get further clarify about their opinions and get better insight to the activity based learning. There were 4 main questions asked during the focus group discussion: "What are the advantages of activity based learning method?"; "What skills did you gain through the use of activity based learning method?", "What are the disadvantages that could appear in this method?". “What you prefer activity based learning method or traditional method?”. There were six themes extracted from students’ views after discussion content analysis, namely: “Enhance understanding”, “Interesting atmosphere”, “increase achievement”, “increase a sense of responsibility”, “waste time” and “teaching strategy”.

The extracted themes, codes and codes definition from the focus group interview (Appendix C) are provided in the table 4.4. Then further explanation of the mentioned themes is presented below with some of students’ participations from transcribed discussion.

Every participant student will be coded as following to identify which opinion belongs to which student: Student number 1= (S1), student number 2= (S2), student number 3= (S3), student number 4= (S4), student number 5= (S5), student number 6= (S6), student number 7= (S7), student number 8= (S8).

**Table 4.4** Themes, codes and code’s definition as extracted from students’ opinions

Question	Theme	Code	Definition of code
What are the advantages of activity based learning method?	Enhance understanding	Learning by experience	Learning is reinforced and made long lasting by direct experience.
		Peer learning	Students can learn from each other in the class.
	Interesting atmosphere	Motivation	Make interesting environment lead to more motivation

		Engagement	Interactive and fully engaged students during the class
	Influence achievement	Increase achievement	Get more score in the exam.
What skills did you gain through the use of activity based learning method?	increase a sense of responsibility	Individual role	each student has a role from the beginning to the end by role distribution
		Cooperation	Every student as a member in a group finish their duties, cooperate with others and link the work to meet the success of the group.
What are the disadvantages that could appear in this method?	waste time	Preparation	Student must be will prepared and familiar with activity based learning methods to save time and meet the objectives.
What you prefer activity based learning method or traditional method?	Teaching strategy	Preferred one	7 out of 8 students prefer activity based learning rather than traditional style.

Below is a summary of students' opinion and responses from focus group interview:

#### 4.3.1 The Advantages of Activity Based Learning Process

Enhance understanding: The participants emphasized that the understanding of the taught concept is very essential in every teaching method. Activity based learning ensure active role of student

through direct experience as in the lesson of “bacterial growth and development”. Students deal with real beneficial yogurt bacteria. They taught the name of that bacteria, its shape, how it turns milk to yogurt, procedure of yogurt preparation and what are the best conditions for bacterial growth. Hence, grasping the concept will be faster than passive learning. Also, this type of strategy – activity based learning -enhances performance by providing a realistic practical sense of the learnt topic for the student.

Moreover, direct experience then student reflection increase knowledge and develop skills.

Understanding will be enhanced because activity based learning includes the possibility to learn through fail and success. In addition, as students had more opportunity to be in touch with their friends, some student learn from each other more than from teacher. They motivate their weak schoolmate and correct their mistake especially when they work in teams, all members were required to be successful to beat other teams.

In this regard, transcribed student views about relevant theme are given below:

- “...In traditional way, I did not have direct and real contact with the things that we learn. We sit in silence in the class listen to the teacher and memorize. However, through activity based learning I can move freely in the class solving the problems, doing experiment, participate in the competitions and interact with my classmates. Usually I have a role in the class and I can quickly understand the topic.” (S2).
- “.... I can’t understand well from the teacher in lecture method class, but in activity based learning class my classmates helped me answering the questions in of the given activity. They explain concept for me, help me to solve the problem or how to run an experiment. Before they can’t because there was no speaking or interaction in the class. ” (S4)
- “ .... I studied about bacteria before in the 10<sup>th</sup> grade but I did not understand it. But, in the activity based learning class my classmate demonstrated the topic so well that I understood it easier.” (S5)

Interesting atmosphere: The second theme was interesting atmosphere guaranteed by implementing activity based learning. Students said that class became more interesting and joyful learning environments was provided. Emotional state of the student is important, so students should be happy and interested in the taking topic. when they like the lesson they will become motivated and they will become more learnable. And when they have the motivation, they will engage in all the activities during the class. They added that, generating an attractive classroom where the student feel comfortable and joyful helps to increase positive attitudes and feel less stress about learning process. Some students may have some struggles and difficulties that hinder their success in the school. Unfortunately, there are some factors that affect students that are out of teacher control. But, teachers have the ability to create a supportive, welcoming and interesting environment for students to learn and help them to overcome those problems. Transcribed student views about this theme are given below:

- "... The science class was boring. I usually sleep or talk to my friend in a faint voice. The teacher is all time speaker. I asked teacher to go to bathroom everyday to get rid of this measurable situation. However, in activity based class it's become interesting I am free to move around join my friend to solve activities and doing experiment. I can ask the high achiever about questions that I can't solve. (S6)

Increase achievement: The third theme extracted from students' views was that activity based learning increases students' achievement. Students emphasize that using activity based learning is help students to gain more score in the exams. Because information and knowledge are transmitted and stored better in the brain through this method. They added, that activity based learning strategies ensures removal of blocks that hinder new learning, it helps to retrieval information easily especially in the exams and encourages higher-order thinking skills. Transcribed student views about this theme are given below:

- "... At the beginning I faced difficulty to answer questions of the pre-test, only 3 to 4 questions that I had solved. However, at the post-test I was able to solve around 8 questions out of 10. It was easier for me." (S7)

#### **4.3.2 Skills Gained Through Activity Based Learning:**

Increase a sense of responsibility: According to student perception, activity based learning strategy can enhance students' responsibility toward their self and society. Students believe that sense of responsibility can be developed when the teacher give a space for the student to make some decisions – not all making by teacher – and allow them to choose their preferred way to learn. Also, activity based learning give opportunities for student to pursue their interests and develop their skills in different ways. Furthermore, students engaged directly in the learning process in activity based learning more than other methods. students involved in higher-order thinking tasks such as synthesis, analysis and evaluation, because students have to use these levels of thinking not only remembering as in classical method. Students agree that their responsibilities in the new method were obvious compared to the old style.

In addition, they believe that cooperation is essential value added in this kind of classes because success of members affected the team success. For that reason, students help each other in fulfilling their classmate's responsibilities. Also, some students insist to do their duties, because they are afraid to be excluded from the group. Transcribed student views about this theme are given below:

“...I had a role in the class not like before. The teacher was distributing tasks. We were asked to submit our tasks in order to understand the topic and be successful compared to other students.”

(S1)

“...Every student had a role. I finished my responsibility to not be ashamed by others. Teacher not only the one who was angry with us when we fail to do our part of mission but also our friends.”

(S5)

“...I noticed that student help each and cooperate to submit the final work. The group whom distribute the roles for every member and cooperate were faster to submit than the groups whom lies the responsibility on one or two members only.” (S8)

#### **4.3.3 The Disadvantages of Activity Based Learning Method:**

Activity based learning waste time: Some student claimed that activity based learning waste student time in accomplishing one activity and effect other content time. They argued that we don't have time for student-centred activities, due to high number of students in the class, also we don't have time to conduct more activities in the lesson because there's too much content to cover. On the other hand, other participants in the focus group discussion defended this strategy and listed the benefit of activity based strategy. And how it helps low weak student to develop and involve in the learning process. Transcribed student views about this theme are given below:

“.. all topic's contents are not covered in the class time, because too much time was consumed in class activity”. (S3)

“... In order to overcome this issue teacher should prepare student well for this kind of teaching strategy to avoid wasting time. Also, when students become familiar with this kind of strategies they will be faster in accomplishing their task.” (S7)

“... teachers should be trained well to control lesson time and to avoid any possible mistake. Also, design the activities to meet the targeted objectives” (S8)

#### **4.3.4 Student Preferred Teaching Style:**

At the end of session students were asked about their preferred teaching strategy whether traditional strategy or activity based learning strategy. Their votes were 7 to 1, seven prefer activity based learning and one student only prefers lecture style because he was used to this style of teaching.

## **Chapter 5: Conclusion**

### **5.1: Overview of the Chapter**

This chapter aims to discuss the findings of the research. First, it starts with a summary of the study. Then it presents the Key findings extracted from the analysis of the collected data, and how findings helped in answering research questions. Also, recommendations are proposed in this chapter, which made out from the theoretical and empirical findings. After that, the researcher suggests some implications constructed from the analysed data. Limitations and challenges of the current study included. Finally, the researcher claims and likes about the study are outlined as a concluding note.

### **5.2 Summary of the study:**

This research sought to shed light on the effects of the activity based learning strategy on students' achievement and detect students' views about this strategy. A study among 12 grade students of a public school in Oman. It aimed to answer the research questions and examining the hypothesis of the research. The researcher hypothesized that activity based learning method has significantly positive impact on students' feeling and achievement. Both qualitative and quantitative methods were used to determine any improvement or differences in the scores of the pre-test for

experimental group. Pre-test, post-test and focus group interview were part of the collecting required data procedure after implementing the suggested treatment. Different tools were utilized to validate the research instruments, for example discrimination value was used to check the validity of the test items. Tests result was analysed using independent sample t- test and focus group discussion was analysed to draw up the research map.

### **5.3 Key Finding:**

This research paper investigated the impact of activity based learning on twelve grade students' Science and environment achievement in comparison to traditional learning and determine their perception towards class activities. A study conducted in a public school in Oman. Three question were formulated to verify the research hypothesis. First," what are the impacts of activity based learning approach according to existing literature?", Second, "Is there any difference in students' results between test after traditional method and test after activity-based method?", and third, "what are students' perceptions about their experience with activity-based learning?".

Literature review was used to build a base for this research and answer the first question. It shows that activity based learning strategy is theoretically framed by the constructivist learning theory (Piaget 1970; Vygotsky 1978). The related discussed researches showed that activity based learning has a positive impact on the teaching and learning process. Students' interaction, feeling, motivation, engagement, comprehension and achievement, all affected positively due to implementation of activity based learning method.

The second research question was answered based on the statistical analysis of data gained. Both pre-test and post-test comparisons were conducted in the experimental group that taught through activity based learning and the control group that received classical old style education. When comparing the pre-test scores of the traditional learning control group students and experimental

group students in learning the “bacterial growth and development” topic in the 12 grade science and environment book, there was almost no difference in the mean scores between students in both groups. On the other hand, there was a noticeable difference found in favour of the experimental group students in terms of the post-test scores. Results of the post-tests for experimental and control group have shown that students in the experimental group have scored significantly higher than students in the traditional learning group. The mean difference was more than 2 degree in favour of the experimental group. In this research, it was found that the activity based learning group students were academically more successful than the traditional learning control group students.

Qualitative method was utilized to answer the third question which investigated students’ opinion about activity based learning method. Students’ feelings and perceptions were positive toward activity based learning educed from focus group interview with students from experimental group. Thus, it can be concluded that activity based strategy may increase the students’ achievement and positive perception in comparison to traditional strategy. The reason for this improvement according to student’s view could be that activity based learning enhance understanding through reinforcing long lasting learning due to direct experience. Also, they attributed this improvement to students’ role in helping each other during learning process. Another reason that could lead to this improvement is the interesting atmosphere that activity based learning generating during lesson.

This result agrees with the findings of other research where activity based learning and traditional learning were compared in terms of impacts on students’ achievement. Al Muhaimed (2013) conducted a related study in Saudi Arabia, but on teaching English language. The final statement of his study was that activity based learning helps students to acquire English language better through increasing their achievement scores. The finding of current study agree with the finding of Batdi (2014), he pointed out that the quantitative and qualitative findings of his research investigation about the impact of activity based learning had positive effectiveness on students’ academic achievement. Additionally, the finding agrees with the finding of (Celik 2018; Camaci 2012). These studies investigate the impact of activity based learning of math on student achievement. They gotten the conclusion that activity based learning strategy increases academic

success. It was also concluded that, in learning based on activities, the topics of learning were grasped better Rubin et al. (2014), teaching enriched with activities affect student perceptions positively (Kosterelioglu & Yapici, 2016).

#### **5.4 Implication:**

The result and the finding of this project recommend teachers to implement activity based learning strategy frequently when teaching science, because the finding showed improvement in students' achievement when activity based strategy used compared to traditional method. The researcher does not suggest that traditional learning method should be completely eliminated, he suggests that teachers should not be relied on as frequently. Additionally, focus group interview shed light on student opinion about their preferred learning strategy. This suggests that students' views should be considered to choose their favourable learning style. Thus, educators must meet students and discuss with them about teaching strategies to figure out the strength and weakness points in those strategies.

#### **5.5 Limitation:**

Activity based learning strategy improve students' achievements and attitudes towards this strategy. This research also shows finding that confirmed that activity based learning style may be carried out more than classical education. However, the findings in the research were limited to the male students, one school only and limited number of the students in both groups experimental and control groups. Also, this study was limited to a short period and one topic only. This research is conducted in Sultan Qaboos School in Buraymi only, so it's limited to one governate out of 11 governates in Oman.

#### **5.6 Recommendation:**

This research paper opens the door for further investigations for examining the effectiveness of activity based learning strategies in Omani context, that help provide database for researchers and educators. Moreover, expanding sample population, time of intervention or investigating another

dependent variable are potential points for future studies. Also, female schools could be included in the future investigations to examining both genders' views and achievement, as it was one of the limitations of the current research. Furthermore, the researcher believes that future conducted research could include schools from different governates in Oman to provide a full picture of the situation. In terms of teaching materials and textbooks adopted by Ministry of Education, the ministry should emphasize the learning for objectives rather than content. As some students in focus group confirmed that the time was not enough to cover all the content. That will give freedom for the teachers to choose appropriate strategy and reduce the panic of going over the time limit.

### **5.7 Concluding Note:**

The overall aim of this research was to investigate the effect of activity based learning on student achievement. The findings show a positive impact of this strategy on student attainment. Implications of this paper have addressed some aspects related to how educators can benefit from the findings of this study. Recommendations are outlined for future researches. Based on this research and this experience am confident to say that activity based learning brings the wanted change for today classes to motivate students. Finally, efforts exerted in this research are rewarded with findings reached and, hopefully, help interested educators in Sultanate of Oman, Gulf Countries and around the world to pursue beneficial education for themselves, students, and their societies.

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## Appendices

### Appendix A: The Test

**Test**

Science and Environment

(Bacterial Growth and Development)

Name: \_\_\_\_\_ Class: \_\_\_\_\_ Date: \_\_\_\_\_

---

**Part A: Multiple choice questions.**

Select the correct choice

1- The organism that can convert milk to yoghurt is called

A- Fungus B- Cows C- Bacteria D-Protista

2- The following diagram represents the procedure for yoghurt's preparation. What does (A) and (B) represent?

	A	B
A	Condensation	Addition of bacteria
B	Pasteurization	Addition of bacteria
C	Addition of bacteria	Pasteurization
D	Pasteurization	Sterilization

```

graph TD
    A[milk] --> B[heating to 85 c]
    B --> C[cooling to 45 c]
    C --> D[B]
    D --> E[yoghurt production]
    subgraph A
        B
        C
    end
    
```

3- You can notice your mother keeping the bottle of milk in the fridge after opening for the first time .Your mother is doing that because:

A- To remove humidity

B- An anaerobic respiration of Bactria in this case

C- To improve the nutritional value of it

D- To reduce the rate growth of Bacteria

4- The most appropriate temperature for Bacteria growth is

A- 20 °C B- 40 °C C- 60 °C D- 80 °C

**Part B: open ended question.**

Answer the following questions:

5- What is the unique shape of yoghurt Bacteria? and write the other shapes of Bacteria?

.....

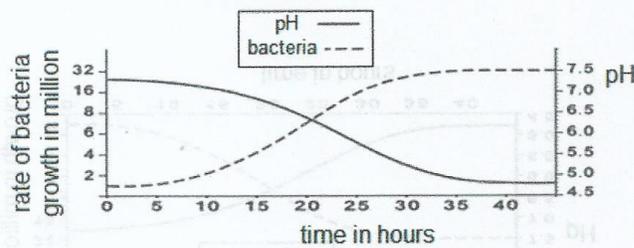
6- Is this Bacteria useful or harmful?

.....

7- Write the definition of Pasteurization and write its benefits?

.....

The following graph represents the rate of Bacteria growth in nutritional medium. study it very well and answer the given question



8- what is the Optimal PH Value for best growth of this type of Bacteria?

.....

9- Determine the type of relationship between Bacteria growth rate and PH Value?

.....

10- write two conditions that control Bacteria growth

.....

Appendix B: Analysis of Pre-test Paper

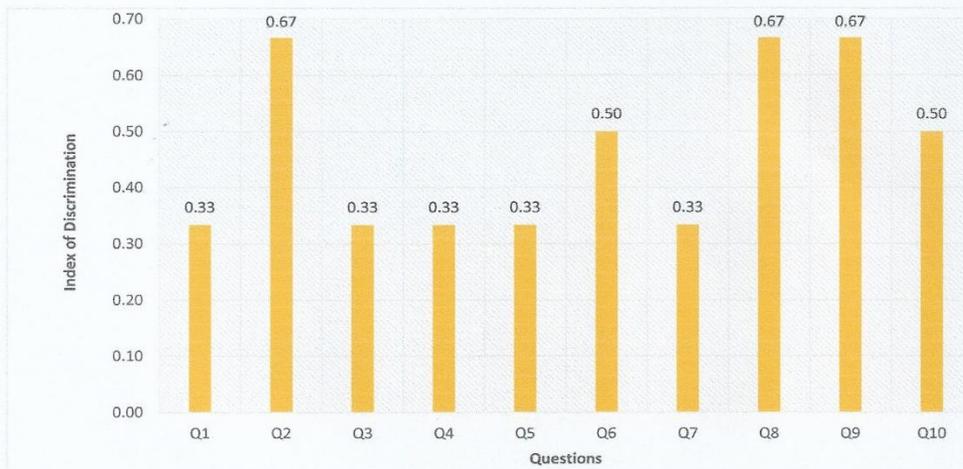
Science and Environment  
Gade 12

Pretest Paper Analysis

		Multiple Choice Questions				Short Answer Questions						Total
		Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	
	Mark	1	1	1	1	1	1	1	1	1	1	10
1	High Achiever Student 1	1	1	0	0	1	1	0	0	1	1	6
2	High Achiever Student 2	1	0	1	1	0	1	1	1	1	1	8
3	High Achiever Student 3	1	1	1	1	0	0	1	1	1	1	8
	Item Difficulty	1.00	0.67	0.67	0.67	0.33	0.67	0.67	0.67	1	1	0.50

Index of Discrimination	0.33	0.67	0.33	0.33	0.00	0.33	0.50	0.33	0.67	0.67	0.50
-------------------------	------	------	------	------	------	------	------	------	------	------	------

		Multiple Choice Questions				Short Answer Questions						Total
		Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	
	Mark	1	1	1	1	1	1	1	1	1	1	10
1	Low Achiever Student 1	0	0	0	0	0	0	1	0	1	0.5	2.5
2	Low Achiever Student 2	1	0	0	1	0	0.5	0	0	0	0.5	3
3	Low Achiever Student 3	1	0	1	0	0	0	0	0	0	0.5	2.5
	Item Difficulty	0.67	0	0.33	0.33	0	0.17	0.33	0	0.33	0.5	0.50



23.4.2019

Focus group interview

Researcher draft.1

"I would like to talk with you about your last lesson, when you taught through activity based learning. I have some questions want to discuss it with you. Your names will be invisible, your personal information will be secret, and you have the right to leave this discussion anytime. I have four questions; every student has to respond to all of the 4 questions".

Q S. No.	What are the advantages of activity based learning method?	What skills did you gain through the use of activity based learning method?	What are the disadvantages that could appear in this method?	What you prefer activity based learning method or traditional method?
S1 H.S.	I was fully engaged in the class and it was interesting lesson. I like this style of learning, I hope we do it again	I had a role in the class not like before. The teacher was distributing task. We asked to submit our task in order to understand the topic and be successful compared to others.	- nothing.	ABL
S2 N.K.	In traditional way I don't have direct contact with things that we learn. We sit in silence in class and listen to teacher and memorize. By activity based learning I can move freely in solving problems doing experiment, participate in comparison and interact with my classmate. Usually I have a role in the class and I can quickly understand the topic	we help each other and cooperate in doing class activities. I have role in most tasks.	- nothing.	ABL
S3 A.H.	we divided to groups every member in the class has a role, we distributed role to compete other group. It was interesting.	It improve the skill of dealing with laboratory tools.	All topic contents are not covered in the class time, because too much time was consumed in class activity.	Traditional method
S4 S.S.	I can't understand well from the teacher in lecture method class, but in ABL class my classmate helped me answering the question of the given activity. They explained concept for me, help me to solve problem or how to run experiment. Before they can't because there was no speaking or interaction	It help me to improve my social communication skills and cooperation skills.	- noisy class.	ABL

23-4-2019

Focus group interview

Researcher draft 2

"I would like to talk with you about your last lesson, when you taught through activity based learning. I have some questions want to discuss it with you. Your names will be invisible, your personal information will be secret, and you have the right to leave this discussion anytime. I have four questions; every student has to respond to all of the 4 questions".

Q S. No.	What are the advantages of activity based learning method?	What skills did you gain through the use of activity based learning method?	What are the disadvantages that could appear in this method?	What you prefer activity based learning method or traditional method?
S5 H.N.	I studied about bacteria before in the 10 <sup>th</sup> grade but I didn't understand it. But in the activity based learning class, my classmate demonstrated the topic so well that I understood it easier. The class was boring. I usually sleep or talk to my friend in a faint voice. The teacher is all time speaker. I asked teacher to go bathroom every day to get rid of this unbearable situation. However in ABL the class became interesting. I free to move every where to get in my friend and do task. I can ask any question.	Every student had a role I finished my responsibility to not be ashamed by others. Teacher not only angry but also our friend in the group. we were do experiment our selves and arrange material. When we finish we clean and arrange the class.	Students have to distribute duties to finish tasks quickly.	ABL
S6 A.M.	At the beginning I faced difficulty to answer Q. of pretest, only 3-4 Q that I solved. however at pretest I was able to solve around 8 Q out of 10. It was easier for me.	We learn how to deal direct with material.	- nothing.	ABL
S7 M.A.	I can remember what we make in activity based learning class. It involve work and hands-on task. And it increase my achievement	I noticed that student help each other and cooperate to submit the final work. The group whom distribute the role for every member and keep were faster to submit than the groups whom give responsibility for one student only.	In order to overcome this issue teacher should prepare student well for this kind of teaching to avoid wasting time, when student become familiar they will be faster.	ABL
S8 A.I.			Teacher should be trained well to control lesson time and avoid any possible mistake. Also design the activity to meet the targeted objective.	ABL

Appendix D: Lesson Plan

Lesson Plan

<b>Subject:</b> Science and Environment / <b>Grade:</b> 12. <b>Class:</b> 1 / <b>Duration:</b> 45 min. / <b>Date:</b> 18 April 2019 <b>Topic:</b> Bacterial growth and development. / <b>Teaching strategy:</b> Activity based learning.				
(Objectives)	(Procedures)	(Time)	(Material)	(Indicators)
-Identify the suitable conditions for bacterial growth.	<b>Grouping :</b> 12 students are divided to 3 groups; every group consist of 4 students.	5m		Students show interest. <input checked="" type="checkbox"/>
	<b>Preface:</b> I need one volunteer to eat bacteria! (when student come, feed him yogurt and explain why.	5m	yogurt spoon	Student engage in the learning process. <input checked="" type="checkbox"/>
-Distinguish between good bacteria and harmful.	<b>Yogurt preparing experiment:</b> Every group start to prepare yogurt through milk and bacteria. Bacterial convert lactose sugar in milk to lactic acid. Pasteurization has to be done to sterilize and kill other bacteria	25m	yogurt milk benzene burner glass rod fridge 500 ml beaker (2	Group complete tasks. <input checked="" type="checkbox"/> Student help each other <input checked="" type="checkbox"/>
	<b>Comparing table:</b> every group design table to compare between good and harmful bacteria. Then teacher will choose one student to talk in front of the class about his group's answers.	10m	Textbook A3 paper Liquid colors	(Assessment)  What are the suitable conditions for bacterial growth?  Give two examples of good bacteria in our life, and two examples of harmful bacteria?  What is pasteurization?

## Appendix E: School Consent Letter

### SCHOOL CONSENT LETTER

20/3/2019

Dear Sultan Qaboos School's Principal,

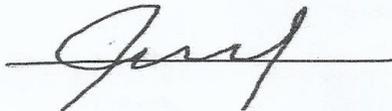
I am conducting this study in the specialization of education leadership and management from the British University in Dubai. The topic of my study is "The Impact of Activity Based Learning on Students' Achievement. A study Among 12 Grade Science and Environment Student in A public School in Oman". I would like to request permission to conduct research in your school (Sultan Qaboos School in Buraymi). As, I take your permission, I will start my investigation by contacting and meet Since and environment teacher to arrange and choose one class from grade 12 classes. Before and after treatment process, the participant students will conduct achievement test. Then focus group interview will run by the researcher to detect student perception about the employed method.

The information collected from the school will be kept confidential and will be used only for this study. If you have any question and enquiries regarding this research, please contact me. Thank you for your cooperation in conducting this academic project.

Regards,

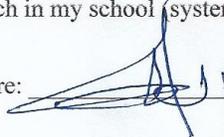
Ahmed Rashid Albadi  
British University in Dubai

Mobile:0096897788850



I have read and understand the above statements. I give my permission to allow Ahmed Rashid to conduct research in my school (system/building/classroom).

School Principal Signature:



School Stamp:



رسالة موافقة طالب للمشاركة في الدراسة

عزيزي الطالب ،،، تحية طيبة وبعد...

أنا طالب دراسات عليا في الجامعة البريطانية بدبي. تخصص إدارة وقيادة تربوية، أقوم حاليا بإعداد رسالة الماجستير بعنوان أثر استراتيجيات التعلم القائم على النشاط على المستوى التحصيلي للطلاب. ،واستقصاء آراء الطلاب حول هذه الاستراتيجية ومن خلال هذه الدراسة أطلب منك المشاركة من أجل جمع البيانات واختبار مدى تأثير هذه الاستراتيجية على مستواك التحصيلي في مادة العلوم والبيئة، ولك حرية الموافقة من عدمها ، مع العلم أن درجات الاختبار القبلي والبعدي لن تؤثر بأي شكل من الأشكال على الدرجات النهائية في المادة وعلى أي تقييم آخر رسمي للمادة، مع الأخذ بعين الاعتبار أن كل المعلومات والبيانات سوف تكون سرية وغير منشورة والاسماء أيضا لن تظهر إلا لاستخدام الباحث الشخصي. إذا كنت ترغب بالمشاركة الرجاء التوقيع على هذا النموذج وإعادته للباحث، ولكم جزيل الشكر والامتنان.

تفضلوا بقبول الاحترام ،،،

الباحث: أحمد راشد البادي

رقم الهاتف: 97788850

أنا الطالب:..... أعلاه، أوافق على المشاركة في الدراسة المذكورة

التاريخ: ١٩/٤/٢٠١٩ م

التوقيع:.....

Appendix G: Marked Post-test Sample (From Experimental Group)

**التجريبية**

اختبار تجريبي

( اختيار بجدي )

الاسم: ناصر ضلعان المصنوع

الصف: ١ / ١٢

التاريخ: ٢٠١٩ / ٤ / ٢٢

السؤال الأول: اختر الإجابة الصحيحة:

1) الكائن الحي الذي يحول الحليب إلى روب يسمى :

أ- الفطريات      ب- الابقار      ج- البكتيريا      د- الأوليات

2) يوضح المخطط المقابل خطوات تحضير الروب (الزبادي).  
ماذا يمثل كل من الرمزين (A) ، (B) ؟

	(B)	(A)	
أ	إضافة البكتيريا.	التكثيف.	
ب	إضافة البكتيريا.	البسترة.	
ج	البسترة.	إضافة البكتيريا.	
د	التعقيم.	البسترة.	

3) دائما ما تلاحظ أن ربة المنزل تحفظ علبة الحليب بعد فتحها في الثلاجة وذلك :

أ- لإزالة الرطوبة.      ب- لأن البكتيريا في هذه الحالة تتنفس لا هوائيا.

ج- لتعديل القيمة الغذائية      د- لتبطئة معدل نمو البكتيريا

4) درجة الحرارة المناسبة لنمو معظم البكتيريا :

أ- 20 °C      ب- 40 °C      ج- 60 °C      د- 80 °C

السؤال الثاني : أجب عما يلي

1- ما هو شكل بكتيريا الزبادي ، وما هي الاشكال الأخرى للبكتيريا ؟

عصوية (كروية ، مربعة ، لولبية)

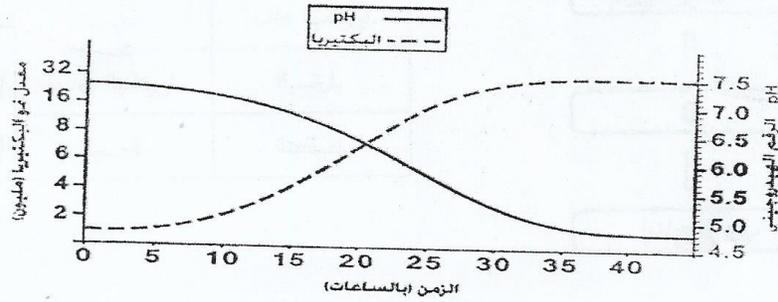
2- هل البكتيريا ضارة أم نافعة، وضح إجابتك؟

نافعة تحويل الحليب إلى الزبادي

3- ما هي عملية البسترة ، وما فائدتها؟

تستعمل لتدمير جراثيم البسترة لسرعة 40 لثانية  
البكتيريا

4- ادرس الشكل أدناه، ثم أجب عما يلي:



أ. ما الرقم الهيدروجيني (pH) المثالي لنمو هذا النوع من البكتيريا؟

4.7

ب. حدد نوع العلاقة بين معدل نمو هذا النوع من البكتيريا والرقم الهيدروجيني (pH).

علاقة عكسية

ج. اذكر طرفين يتحكمان في نمو البكتيريا.

درجعة الحرارة ، التغذية ، pH

Appendix H: Marked Post-test Sample (From Control Group)

(اختيار بدي) الضالطة اختبار تحريري

التاريخ: ٢٢/٤/٢٠١٩

الصف: ١/١٢

الاسم: منصور، العيساء

السؤال الأول: اختر الإجابة الصحيحة:

1) الكائن الحي الذي يحول الحليب إلى روب يسمى:

د-الأوليات

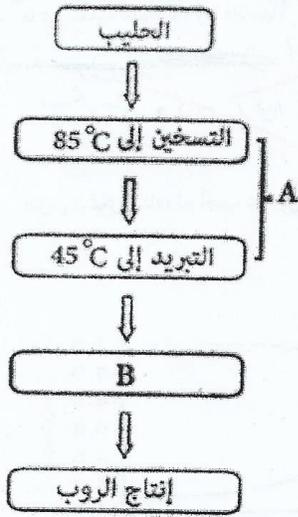
ج-البكتيريا

ب-الابقار

أ-الفطريات

2) يوضح المخطط المقابل خطوات تحضير الروب (الزبادي).

ماذا يمثل كل من الرمزين (A) ، (B)؟



(B)	(A)
إضافة البكتيريا.	التكثيف.
إضافة البكتيريا.	البسترة.
البسترة.	إضافة البكتيريا.
التعقيم.	البسترة.

أ

ب

ج

د

3) دائما ما تلاحظ أن ربة المنزل تحفظ علبة الحليب بعد فتحها في الثلاجة وذلك:

أ- لإزالة الرطوبة. ب- لأن البكتيريا في هذه الحالة تتنفس لا هوائيا.

ج- لتعديل القيمة الغذائية د- لتبطئة معدل نمو البكتيريا

4) درجة الحرارة المناسبة لنمو معظم البكتيريا:

د- 80 °C

ج- 60 °C

ب- 40 °C

أ- 20 °C

السؤال الثاني : أجب عما يلي

1- ما هو شكل بكتيريا الزبادي ، وما هي الاشكال الأخرى للبكتيريا ؟

~~ليس صلياً~~

2- هل البكتيريا ضارة أم نافعة، وضح إجابتك؟

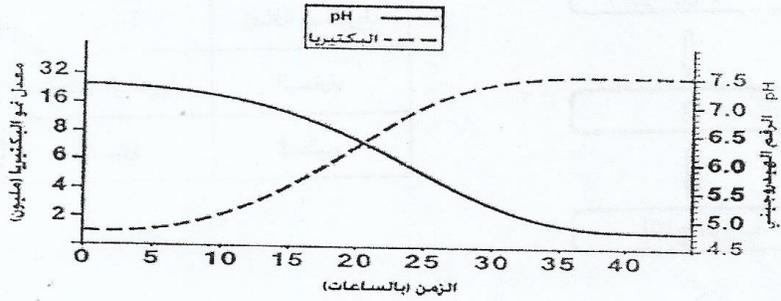
~~بعضها ضار والبعض الآخر نافع كما البكتيريا التي تصنع الفعالة والادوية~~

3- ما هي عملية البسترة ، وما فائدتها؟

~~تجفيف البسترة هو المادة لتعمل الكائنات الدقيقة الطاردة~~

~~تجفيف وكثيراً~~

4- ادرس الشكل أدناه، ثم أجب عما يلي:



أ. ما الرقم الهيدروجيني (pH) الأمثالي لتمو هذا النوع من البكتيريا؟

~~6.5~~

ب. حدد نوع العلاقة بين معدل نمو هذا النوع من البكتيريا والرقم الهيدروجيني (pH).

~~طردية~~

ج. اذكر طرفين بيئيين يتحكمان في نمو البكتيريا.

~~الحرارة والمعدل الهيدروجيني~~

## Appendix I: Independent Sample t-test Analysis of Pre-test

```

DATASET ACTIVATE DataSet3.
T-TEST GROUPS=Group(1 2)
  /MISSING=ANALYSIS
  /VARIABLES=Pretest
  /CRITERIA=CI(.95).
    
```

### T-Test

[DataSet3]

#### Group Statistics

	Group	N	Mean	Std. Deviation	Std. Error Mean
Pretest	control	12	4.7917	1.87639	.54167
	experimental	12	4.9583	1.45318	.41950

#### Independent Samples Test

		Levene's Test for Equality of Variances	t-test for Equality of Means		
		F	Sig.	t	df
Pretest	Equal variances assumed	1.243	.277	-.243	22
	Equal variances not assumed			-.243	20.704

#### Independent Samples Test

		t-test for Equality of Means			
		Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval Lower
Pretest	Equal variances assumed	.810	-.16667	.68511	-1.58751
	Equal variances not assumed	.810	-.16667	.68511	-1.59268

Appendix J: Independent Sample t-test Analysis of Post-test

/CRITERIA=CI (.95) .

**T-Test**

[DataSet1]

**Group Statistics**

	Group	N	Mean	Std. Deviation	Std. Error Mean
posttest	control	12	6.5833	1.36237	.39328
	experimental	12	8.6250	1.13067	.32640

**Independent Samples Test**

		Levene's Test for Equality of Variances		t-test for Equality of Means	
		F	Sig.	t	df
posttest	Equal variances assumed	1.563	.224	-3.995	22
	Equal variances not assumed			-3.995	21.277

**Independent Samples Test**

		t-test for Equality of Means			
		Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower
posttest	Equal variances assumed	.001	-2.04167	.51108	-3.10159
	Equal variances not assumed	.001	-2.04167	.51108	-3.10368

**Independent Samples Test**

		t-test for Equality of Means
		95% Confidence Interval of the Difference Upper
posttest	Equal variances assumed	-.98175
	Equal variances not assumed	-.97965