

# Improving Student Participation in Group Project Work: An Action Research

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## Abstract

Group project work is a tool to share knowledge and skills among students and it is one way to assess students in a semester. However, a large number of students are not participating in group project work. This paper aims to improve students' participation in group project work and identify challenges that hinder students' participation in group project work. The primary data were collected by questionnaire and observation data gathering tools. Qualitative and quantitative research approaches and purposive sampling were used. Advanced Database Systems course was selected from the Information Systems Department and 13 groups were formed and each group has 5 members. The questionnaires distributed to all 65 students, and of which 61, were properly filled for analysis. Descriptive statistical analyses of percentage were calculated. The major factors that hinder students' participation were a shortage of time, lack of interest and awareness, lack of monitoring, group members not given individual responsibility, and assessment method. The taken actions to improve students' participation were creating awareness, distribute project guidelines, assigning roles, monitoring group members' participation, and prepare assessment criteria. After the implementation of the actions and there is a great change in the participation of students in the group project work.

**Keywords:** action research, group project work, implemented actions, students' participation

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## 1. Introduction

Education is the pillar of one's country development. Higher education is a critical factor in human capital development and innovation. The Ethiopian government is now working on the expansion of Ethiopian Higher Education Institutions (EHEIs) for the country's development (O'Neill, 2015). In the 2013 academic year, a national harmonized curriculum was implemented in all EHEIs of Ethiopia. Hence, the harmonized curriculum plays a great role to enhance the quality of education in Ethiopia. According to this, today most programs in EHEIs have their own harmonized curriculum.

Wolkite University is one of EHEI in Gurage Zone. In Wolkite University under the College of Computing and Informatics, there are four departments such as Information Systems(IS), Computer Science, Information Technology, and Software Engineering. The IS department harmonized curriculum has different student assessment methodologies such as quiz, test, group project work, final exam, individual assignment, group assignment, and presentation. The IS harmonized curriculum most courses have group project work with a total load of 20%-30% (Sisay Adugna, 2013).

According to (Luios, 2018) case study group work is defined as a cooperative process that allows ordinary students to achieve extraordinary results. Also, explain that group work has a common goal where group members can develop effective, mutual relationships to achieve group member goals. Group work is individuals working together in a cooperative environment to achieve common group member goals by sharing knowledge and skills. Group project work is a tool to share knowledge and skill among students. Group projects often involve a large task that is undertaken over an extended period (Leister University, 2009). In the IS department, group projects involve students working together to complete a piece of assessed work. The most common tasks in a group project are study manual or automated systems, identify problems, analyzing a system, design a new system, and implement the system by writing up programming codes. Also, in a group project work the student design and implement network, design and implement a database, and develop mobile, desktop, and web-based applications.

In the case of the IS, department to maximize the sharing of knowledge and skill the student-organized into groups and top students are selected as the leader of the groups. In a group project work, working in small groups, a group of five students formed to discuss a particular issue or perform a particular task. The group arrangement is based on a 1 to 5 (one to five) principle which means in each group there are four group members and one group leader and the group leader have higher academic performance than other group members. Most of the time each group has five group members. Group project work is one of the student's assessment methods that covers one semester (Sisay Adugna, 2013).

Group project work helps to develop group work skills, develop leadership skills, and encourage learning from one another, and improve knowledge and skill sharing. Also, it manages an assessment in large classes with limited resources, students gain a better understanding of themselves and increase productivity and academic

performance (Harris, 2008). Moreover, group work provides the opportunity to develop many interpersonal skills such as collaboration, communication, cooperation, delegation, diplomacy, leadership, negotiation, organization, responsibility, time management, and tolerance (Adelaide, 2014). However, group work has problems such as pressure from the group to conform to the majority opinion, an individual may dominate the discussion, some group members may absent, and some members may rely too heavily on others to do the work (Burke, 2011).

In the IS Department curriculum, most of the courses have group project work assessment methods. Since group project work enables the students to work together, to communicate with each other, to understand and implement the course objective, and to share knowledge and skills. However, a large number of students are not participating in group project work. This leads to a lack of knowledge in each course, increases dependency, reduces the quality of education, demoralizes group leaders and teachers, difficult to implement active learning methods, and overloaded the group leaders. So, to improve students' participation in a group project work have chosen this topic to do this research. This action research aims to improve students' participation in group project work in the case of the Information Systems Department second-year students at Wolkite University. The authors answered the following questions:

1. What are the challenges that hinder students' participation in group project work?
2. What are the possible actions to solve the challenges?
3. How can we implement solutions to enhance student's participation in group project work?

## 2. Related Works

The authors in (Davis, 1999) stated the advantage of group work and methods to form effective group work. The advantages are increased students' participation in all components of the course, a better understanding of each course, improved skills in the course, and increased interest in self-directed learning projects. The paper suggested different methods that make the group work more success such as assigning group tasks, teaching students to work in groups, forming and guiding groups, evaluating group work, and experimenting to learn.

In (Sewnet Tesfaye, 2015) studied to improve second-year Tourism Management Students' participation in active learning methods like group discussions, demonstrations, and presentations and determine factors that hinder students to participate actively in the class and out the of class. These authors used descriptive research method and observation and questionnaires were used to collect the primary data. Their findings of the study exposed that 75% of the students assured that group discussion gives them more chance to participate freely in the class than presentations and demonstrations. The study indicated the challenges that hinder student's active participation was a poor academic background, shortage of time, shyness, requirements for presentations, poor communication skills, and lack of preparation. Finally, to improve the student's involvement in their learning, the first motivate them by calling their name, and teachers had better be friendly, sociable, and approachable to students.

This paper (Burke, 2011) presented four-stage methods that can improve group member's participation mechanisms to use group members effectively. In the first step, the group task should be designed based on the curriculum. The second step, focuses on teaching the students to work in a group. The teacher must be able to teach the students how to work proactively in groups, structure time, and delegate tasks. This leads to the third stage, which involves monitoring the groups and group members. The last stage and the most important to the students is the assessment of the groups and the group members. The teacher must develop concrete rules for grouping the students.

According to (Weimer, 2014) departments now have students do some graded work in groups. The task may be, preparation of proposal or report, collection, and analysis of data, a presentation supported with visuals, analyze and design a system, develop a system, and creation of a website. The groups produce quality work better than what the students could do individually and the students to learn how to work productively with others (Burke, 2011).

The authors in (Hansen, 2006) recommended ten methods that can improve students' involvement or participation in group discussion. Some of the recommended methods are: emphasize the importance of group work, teach group work skills, use team-building exercises to build cohesive groups, make the workload reasonable and the goals clear, consider roles for group members, provide some class time for meetings, and require individual members to keep track of their contributions.

This paper (Lynda Kriflik, 2007) is aimed to improve student's reactions, facilitate student ability to resolve group issues, highlight group work as an important attribute, and to improve perceptions of the benefits of group work. These authors prepared three strategies that guide teachers and students through group work such as the introductory activity, assessment process, and process evaluation. These strategies comprised a handout guiding teachers and students through group work considerations as an introductory activity, a template for peer assessment, and a template for student evaluation of the group work. Also (Ashley V. Whillans, 2018) this works to improve students' engagement in research focus universities.

The authors in (Kasa, 2016) studied experimental action research to improve first-year chemistry department

student's participation in the classroom. To collect data, both interview and observation methods are used as a data-gathering tool. To improve student's participation in a classroom different action strategies were taken such as give advice, changing the seating arrangement, positive reinforcement, and using active teaching methods. The author has been used both quantitative and qualitative research approach and the data was analyzed by using Microsoft Excel. The findings of their study put into three categories such as level of participation, the teaching method of the instructor, and problems of students. Regarding this, the author increases the behavior of students actively participates in the classroom.

This case study (Fesiha M. Guangul, 2018) has present improvements in student's participation in classroom group tasks. These authors have introduced different techniques to improve student's participation in classroom group tasks. Carpentry and Joinery II (WT-392) course was selected from Wood Technology Department. The selected course was taken by 27 students and five groups were formed. The authors have prepared ten group tasks. The five tasks were distributed on the first day to the group members without introducing the techniques. On the other day, the remaining five group tasks were distributed to the same group and eight techniques were introduced to enhance student's participation in classroom group tasks. Before implementing the techniques only 10(37%) of students were able to summarize the class group task satisfactory from the groups. However, after implementing the techniques 24(89%) students have summarized their group tasks satisfactory.

### 3. Methodology

**Data Collection Tools:** The authors used questionnaires and observation data gathering tools. The questionnaires contain both open-ended and Likert rating scale closed-ended questions which were developed based on the objectives of the study.

**Sampling Techniques and Sample Size:** This study used, purposive sampling technique to select all second-year IS department students from first-year to fourth-year students. Advanced Database Systems course was selected from the Information Systems Department at Wolkite University. The total number of Section A and Section B second-year students that take the selected course was 65 and the authors were selected, 65 students. The number of Section A and Section B students is 35 and 30 respectively. There are 13 groups and each group has five members. In total, 65 questionnaires were distributed to all second-year Information Systems students, and 61 were appropriately filled.

**Research Method:** In this study, the authors used a descriptive research method such as a percentage. Also, both qualitative and quantitative research approach has been used to provide more comprehensive answers to the research questions.

**Data Analysis:** After the data is collected from the respondents, the authors used descriptive statistics method to analyze the data by using SPSS 20.0.

### 4. Data Analysis and Finding

In this section, the authors presented the results from the key close-ended questions in the survey form. The findings of the study answered that 49.2% of students strongly agreed and 26.2% of students agreed that preferred group project work because which gave them more chance to share knowledge and skills. Also, 4.6% of students strongly disagreed and 9.2% of students disagreed with group project work because a large number of students were not participating in group project work. The remaining 4.6% of students were neutral with group project work.

The study answered that 9.2% of students strongly agreed and 46.2% of students agreed on group project work as the best student assessment method. About 4.6% of respondents are neither agreed nor disagreed and the remaining 7.7% of respondents strongly disagreed and 26.2% disagreed with the group project work assessment method.

About 38.5% of students stated five group projects were done by group leaders only. The remaining four group members will come to learn from the group leaders after the project was completed without any involvement. Also, about 46.2% of students stated that six group projects were done with only two students participation and the remaining three students did not participate until the project was completed. Moreover, about 9.2% of students stated that one group project has six group members, this project worked with only three students' participation. The remaining two students did not participate until the group project was completed. The remaining 6.2% of respondents not appropriately filled the questionnaires.

Here below, the authors presented the results from the key open-ended questions in the survey form. The respondents frequently answered the problems that occurred interacting as a group member are an absence of group members, lack of interest, shortage of time, late during discussion time, and disagreement. Sometimes the group leaders are careless and not motivate their group members. Also, some group members are not easily understanding the project.

As the respondent mentioned most of the time a large number of students consider group project works is the responsibility of group leaders. Most of the time group projects are done by the group leaders and other group

members are ready for only what the teacher could ask them during project presentation. A large number of student needs only mark but not knowledge and skill from the given group project.

In another open-ended questionnaire, the group members don't understand the benefit of working together. Since the lack of monitoring, the task is not divided, individual responsibility not given to each group member, the assessment method, and the project are given to the students around at the end of the semester. In many cases, the group leaders don't give an assignment and role to the group members. A large number of respondents frequently stated that these factors as the main factor that hinders student's participation in group project work.

The authors investigated the preference of current group member's arrangements in group project work. The current group arrangement is based on a 1 to 5 (one to five) principle i.e. each group has four group members and one group leader. To implement a 1 to 5 group arrangement principle, first, the student with high academic performance and high CGPA is selected as a group leader. Then, select the student with medium academic performance and medium CGPA and then select the student with low academic performance and low CGPA. This group arrangement helps the student to share knowledge and skill. According to this, most respondents have preferred the existing group arrangement.

The authors have identified the factors that hinder IS second-year student's participation in a group project work. As per the response of the majority of the respondents, the following factors have been stated frequently as factors that hinder students to participate in group project works: Shortage of time, lack of awareness, lack of interest, lack of monitoring, group project tasks are not divided, group members not given individual responsibility and group evaluation have a higher mark than individual evaluation.

## 5. Implemented Actions

In this study, the authors have implemented five actions to improve IS second-year student's participation in group project work. The implemented actions are creating awareness, prepare project guidelines, assigning roles, monitoring student's participation and contribution, and assess the student both individually and in the group.

**Creating Awareness:** the first implemented action was creating awareness about the benefit of participating actively in group project work. So that the authors prepared notes about group project work purpose, benefit, and the outcome of working effectively in a group project.

**Preparing and Distribute Group Project Guideline:** The second implemented action was preparing and distributing project guidelines that cover all chapters of the course. This makes it easier to do the project step by step, to give an assignment to the group members, to monitor the group project progress, and to evaluate group member's contribution to the project.

**Assigning Roles:** The third action was identifying and assigned roles to each group member such as group leader, facilitator, reporter, recorder, and checker. The roles of the students have been assigned depending on the goals of the group project work and the size of the group members.

**Monitoring Students' Participation and Contribution:** the fourth implemented action was monitoring group member's participation and contribution to the group project work. Also, monitor student's discussion points to record what they did during their meeting and record the assignment given to each group member for the next group work meeting.

**Assess the Students' Individually and in the Group:** the fifth implemented action was evaluating the students both individually and in the group. The advanced database project work total load was 20 points (mark), from this individual evaluation has 15 points and group evaluation has 5 points. This implemented action planned to evaluate the students both individually and in a group.

## 6. Implementation of the Actions

After identified the five most appropriate actions, the authors have implemented the actions in the middle of the semester. One semester has sixteen weeks or four months' length. The authors have randomly observed the number of participant students in each group project work before implementing the actions for two months.

First, the authors taught the student what group project means and the purpose, benefit, and mechanisms of group project work to create awareness and motivate them. Also, I taught each student to understand the group project, the purpose of the project, the learning objective, the knowledge, and the skills that need to be developed through group project work. Give training and advice to create awareness and motivate the student on the group project work.

In the second action, the authors selected an advanced database systems course and this course has six chapters. Then authors have prepared questions starting from chapter one to chapter six. Then write each question sequentially, this helps the student to understand the project questions easily. After this, the researchers distributed the project guideline to the student and taught what they will do in each step of the given project manual within their project. Also, prepared sample project based on the prepared advanced database project manual. Moreover, when the instructor taught in the class have indicated that what the student include in their project. Additionally, in each session, the course instructor randomly asked one group project title and give direction to what they include

in their project.

In the third action, the authors have assigned a role to each group member. The assigned roles are the group leader, facilitator, recorder, timekeeper, and checker. The top scorer student assigned as a group leader that leads all group members, activities and gives an assignment to the group members. The facilitator role this role can be assigned to any group members that keeps the group on task tries to create a positive group atmosphere and do the given assignment to the next meeting. The timekeeper that keeps deadlines of the project, makes sure meetings start on time, prepare a schedule, make sure the tasks completed within a given time, and do the given assignment. The recorder takes notes summarizing group member's discussions, keeps all necessary records, serves as a group spokesperson, and does the assignment for the next meeting. The checker that checks to make sure all group members understand the project and the group's conclusions and do the assignment for the next meeting.

In the fourth action, the authors prepared a monitoring form to monitor the group member's participation and contribution to the group project. The monitoring form has an attendance sheet to take the active participant group members' attendance, 10 questions to evaluate the group member's contribution to the project, and group member's discussion points.

In their first meeting, the group leaders give an assignment for each group member to submit in the next meeting from the project guideline. The timekeeper prepared a schedule and set deadline, the recorder records each group member assignment and role. In their next meeting, each group member submits their assignment to the group leader and discussed it together. The checker checks whether the group member did their assignment or not. After this, monitor and evaluate the group member's contribution to the group project from a very low contribution to a very large contribution.

Table 1: Number of actively participating students in group project work.

Groups	In all meeting before introducing the actions	In the 1 <sup>st</sup> meeting after introducing the actions	In the 2 <sup>nd</sup> meeting after introducing the actions	In the 3 <sup>rd</sup> meeting after introducing the actions	In the 4 <sup>th</sup> meeting after introducing the actions	In the 5 <sup>th</sup> meeting after introducing the actions	In the 6 <sup>th</sup> meeting after introducing the actions
Group 1A	2	5	5	5	5	5	5
Group 1B	1	1	1	2	2	2	2
Group 2A	1	5	5	5	5	5	5
Group 2B	2	2	2	2	2	2	3
Group 3A	2	3	4	3	3	3	3
Group 3B	1	5	5	5	5	5	5
Group 4A	3	4	5	5	5	5	5
Group 4B	1	5	5	5	5	5	5
Group 5A	2	3	3	4	3	3	3
Group 5B	1	5	5	5	5	5	5
Group 6A	1	2	5	5	5	5	5
Group 6B	2	3	3	3	3	3	3
Group 7A	2	5	5	5	5	5	5

The authors have implemented the prepared individual and group presentation evaluation methods. The evaluation criteria, the project manual, and sample project work were distributed for each student. The group work evaluation criteria have individual evaluation criteria with 15 marks and group evaluation criteria have 5 marks. The advanced database systems course project manual has 34 steps the student must know each content of their project. Because during presentation time the presentation portion was given randomly to each student by their examiner teacher from their document. And each student has presented the randomly given project portion for a 10 minute.

## 7. Evaluation of the Actions

In this section, the authors evaluated the changes as a result of the actions taken, the practice changed and the students benefit from the actions. After implementing creating awareness and advice actions the students were understood the purpose of the project, the significance of working in a group project and the skills and knowledge's that need to be shared among group members. Regarding this, a large number of students were interested and motivated to do in group project work.

As the authors evaluated, a large number of students have preferred the advanced database systems course project guideline. After implementing the group project guideline, the group leaders can give assignments easily, give responsibility to the group members easily, and minimize the group leader's workload. Furthermore, the course instructor can easily monitor their progress and makes the group members actively participate in group

work.

As the authors observed and evaluated assigning a role certainly improves student's participation in group project work. The assigned roles have created a positive atmosphere among group members, enhanced student's cooperation, and complete the given assignment on time. When students are working in groups without a designated role there are possibilities of spending their time on unrelated issues and may depart from the topics; so the presence of the designated roles is very important. Also, the assigned role improved students' group work skills, make each group member responsible, know their performance, improved student's communication skill, and improved their knowledge and skill sharing.

As the authors observed, before implementing monitoring actions only, the group leaders were asked about the project and related issues in the class and the office. However, after implementing monitoring action, the students participate actively and contribute to the project. Also, large numbers of students were asked questions about the project in the class and the office. The student who has a group leader and recorder role has submitted their project progress, group member's participation, and contribution monitoring from the course teacher based on the schedule.

As the authors observed and evaluated, after applying the individual and group student's assessment method. And the students have presented the randomly given portions by their examiner. Each student has present the given project portion for 10 minutes and the student was given attention to the project because individual evaluation has a higher mark than group evaluation. This action has motivated each student to actively participate and contribute to the group project. The table below shows the evaluation of the number of participants before implementing the actions and after implementing the actions.

Table 2: Evaluation results before and after implementing the actions in a group project work.

Number of participant students	Before implementing the actions	After implementing the actions
Group project done by 1 student	38.5%	0.0%
Group project done by 2 students	46.2%	7.7%
Group project done by 3 students	9.2%	7.7%
Group project done by 4 students	0.0%	23.1%
Group project done by 5 students	0.0%	61.5%

As shown in Table 2 the participation of students in group project work showed significance enhancement after implementing the actions than before implementing the actions. Before implementing the actions 38.5% of students stated five group projects were done by group leaders only. The remaining four group members will come to learn from the group leaders after the project was completed without any involvement. And about 46.2% of students stated that six group projects were done with only two students participation and the remaining three students did not participate until the project was completed. Moreover, about 9.2% of students stated that one group project has six group members, this project worked with only three students' participation. The remaining two students did not participate until the project was completed.

However, after implementing the actions 61.5% of eight projects were completed with the participation of all group members. In other words, 40 students working in eight groups, all actively participated in their group projects. The three group projects were done by four students, but one student in each of the three groups did not participate until the project was completed. One group project was undertaken by three group members and the other two members of the group did not actively participate within their group project. The remaining group project was undertaken by two group members only and the other three members of the group did not participate. The result indicates that the implemented actions motivate, interested, and responsible students in group project work. As the evaluation showed, the of five actions have improved the involvement of Information Systems second-year students in group project work.

## 8. Conclusion

Group project work is a tool to share knowledge and skills in higher education. The authors have investigated literature and identified data collection tools, research approaches, and research analysis methods and data analysis tools. Following prepared the questionnaires and distributed to all 65 Information Systems second-year students, and collected properly filled questionnaires for analysis. Next, analyze quantitative data, descriptive statistical analyses of percentage were calculated using SPSS. After this, the study identified that the major factors that hinder student's participation in group project work from the qualitative data. The identified factors that hinder students' participation were a shortage of time, lack of interest, lack of awareness, lack of monitoring, group members not given individual responsibility, and poor assessment methods.

The study obtained about 38.5% of students stated five group projects were done by group leaders only. And about 46.2% of students stated that six group projects were done with only two students' participation. Moreover, about 9.2% of students stated that one group project has six group members, this project worked with only three students' participation. Next, the authors have taken five actions to improve the student's participation such as created awareness, prepared project manual, assigned roles, monitor group member's participation, and

contribution, and prepared group and individual evaluation criteria. After implementing the actions 61.5% in eight group projects all group members have participated and 23.1% in five projects four group members actively participated. After the actions were implemented and there is a great change in the participation of students in the group project work. after implementing the actions 61.5% of eight projects were completed with the participation of all group members. The three group projects were done by four students. One group project was undertaken by three group members and the remaining one group project was undertaken by two group members only. As the evaluation showed that, the actions have increased students' participation in a group project work. Future work will focus on analyzing students' individual and group results in group project work and will analyze with student's participation results.

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## Appendices

### Appendix A: Questionnaires

The following open-ended and close-ended questionnaires were prepared to identify the problems that hinder student's participation in a group project work. Also, to identify techniques that can improve student's participation in a group project work.

1. Do you prefer group project work? Why?
  1. Strongly disagree
  2. Disagree
  3. Neither agree nor disagree
  4. Agree
  5. Strongly agree
2. Is group project work being the best method to share knowledge and skills?
  1. Strongly disagree
  2. Disagree
  3. Neither agree nor disagree
  4. Agree
  5. Strongly agree
3. Do you think that group project work is the best student assessment method?
  1. Strongly disagree
  2. Disagree
  3. Neither agree nor disagree
  4. Agree
  5. Strongly agree
4. What problems have you had interacting as a group member?  
\_\_\_\_\_.
5. Why a large number of students do not participate in group project work?  
\_\_\_\_\_.

6. What are the challenges that hinder group member's participation in group project work?  
\_\_\_\_\_.
7. How many of the group members participated actively most of the time?  
1. One 2. Two 3. Three 4. Four 5. Five
8. How many of you were fully prepared for the group project work most of the time?  
1. One 2. Two 3. Three 4. Four 5. Five
9. Do you think that the current group arrangement is good? Why?  
\_\_\_\_\_.
10. Please suggest at least one method that can improve student's participation in group project work?  
\_\_\_\_\_.

**Appendix B:** The divided advanced database group project work manual(questions):

1. Identify your project area and project title?
2. What is a database administrator and who is a database administrator?
3. How could you administer a database?
4. What is the role of DBA in your project?
5. What is database security and how could you secure database in Oracle 12c?
6. What is the main difference between Oracle and Microsoft SQL Server?
7. Describe the purpose of SQLPLUS, SQL Developer, and Enterprise Manager(EM)?
8. Write Oracle 12c new features?
9. Explain DDL, DML, TCL, and DCL languages that can execute in Oracle 12c?
10. *By using Oracle 12c answer the question 12-34.*
11. Create and configure container database and pluggable database by using DBCA?
12. Identify users and their roles in your project?
13. Using SQLPLUS connect as SYSDBA and create another DBA user within a pluggable database regarding your project business rule.
14. Connect a new DBA to the database and create other users that access the database based on your use case.
15. Create roles.
16. What is a profile? create profile
17. Grant system privileges to the roles and users.
18. Identify user's responsibility from the organization business rule and grant Roles to the Users and then connect DBA user to the pluggable database.
19. Create 3rd normalized tables and create triggers that enable to update and delete data from both parent and child tables.
20. The table owner grants object privileges to the Roles or Users.
21. Create a synchronized backup copy trigger for each table.
22. Create a database security audit by using DBA\_AUDIT\_TRAIL for each table to audit DML operations.
23. Create a DDL Trigger for each table with Schema Auditing to audit DDL operations (track changes to the database).
24. Create Database level and Schema level triggers (to monitor users' logon, logoff, database shutdown, and startup).
25. Lock and unlock users, revoke system and object privileges, drop users when user turnover from the organization.
26. Backup your database using RMAN.
27. Recover your database and transaction from accidental and intentional failures.
28. Describe the concept of a distributed database.
29. Design a distributed database model(architecture) for your project and identify data allocation strategies and data storage mechanisms to store a single relation in a distributed database architecture.
30. Install Oracle 12c at least on two machines or computers.
31. Create a database link among two or more databases (Implement the designed distributed database model).
32. Access data from these multiple or distributed databases.
33. Documentation
34. Presentation

**Appendix C:** The Possible Roles of Group Members in Group Project Work

**Group leader:** Manage all group members and their roles within the group and manage all activities of the project. Contributes new and alternative perspectives and ideas. Also, divide the task and give an assignment for the next meeting to each group member.

**Facilitator:** Keeps the group members on task, and distributes work. Also, it strives to create a harmonious and positive working environment. Also, do the assignment for the next meeting that is given by the group leader.

**Recorder:** Takes notes summarizing group member’s discussions and decisions, and keeps all necessary records. Also, it serves as a group member spokesperson for the members and instructors, summarizing the group’s activities and conclusions. Also, do the assignment for the next meeting that is given by the group leader.

**Timekeeper:** Keeps the group project work deadlines and makes sure meetings start on time. Also, prepare a schedule, and makes sure the tasks completed within a given time. Also, do the assignment for the next meeting that is given by the group leader.

**Checker:** Make sure all group members understand the group project concept and the group’s conclusions. Also, do the assignment for the next meeting that is given by the group leader.

**Appendix D:** Monitoring form to monitor group members’ contribution to group project work

Group: \_\_\_\_\_

	<u>Group Members’ Names:</u>	<u>Role</u>	<u>Signature</u>
1.	_____	<u>Group leader</u>	_____
2.	_____	<u>Facilitator</u>	_____
3.	_____	<u>Recorder</u>	_____
4.	_____	<u>Timekeeper</u>	_____
5.	_____	<u>Checker</u>	_____

**Assessment Scales:** Very low contribution=1, Low contribution=2, Medium contribution=3, Large contribution=4, Very large contribution=5

No.	Group Members Contribution Assessment Criteria	Group Members				
		1	2	3	4	5
1.	Does he/she always attend a group project meeting?					
2.	Does he/she actively participate in the project work?					
3.	Is he/she interest to do the project.					
4.	Do he/she share ideas and knowledge with other group members?					
5.	Is he/she motivate other group members?					
6.	Does complete the given assignment by the group leader?					
7.	Does he/she listened to and respected the ideas of others?					
8.	Communicated effectively with group members.					
9.	Does he/she complete the roles?					
Discussion Points: • • •		Assignment Given for Next Group Work Meeting: • • •				