SEM II 2021/2022 (MARCH 2022)

BSD1323 :

STORYTELLING AND DATA VISUALIZATION

GROUP PROJECT

How Student's Study Skills Affect Their Performances in Math Subjects

(Applied Statistics & Applied Calculus)

MADE FOR:

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MADE BY:

GROUP 5

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1.0 Motivation of the story

We are tasked to create a story of our own daily life database with at least 2 weeks daily data from all members. The title we choose is **How Student's Study Skills Affect Their Performances in Math Subjects (Applied Statistics & Applied Calculus).**

Study skills is defined as a guide for students in which to tackle the process of organizing and taking in new information, retaining information or dealing with assessments to maintain or improve student performance.

Thus, our visualizations will concentrate on reviewing the data collected from four members regarding their study approaches used for about two weeks, which is, starting from 25th May 2022 until 8th June 2022 for two math subjects (Applied Statistics & Applied Calculus). We collected the data by using a Google Form which includes 19 data fields from each member.

We chose this title because we are curious about each other's study skills and how they manage their time everyday. As data analytics students, we take this opportunity to investigate in detail using data that we agree to disclose and collect. The aim of this project is to dig deeper into the different study skills of each student, and how it affected their performances in the two courses.

Other than that, we are also able to know each study skill by tracking their total study time for each math subjects by using start and end study time, methods of learning, total time in classes, total time using phone, total time for exercise, outside sources during study time if applicable, location of study, to-do-list, and also study schedule if the students used one.

At the end of the research we wish to conclude whether the study skills used by the students will affect their carry mark on the two subjects (applied statistics and applied calculus). Hence, in this Tableau story, we will provide an easy storyline and interactive dashboards that makes it easy for viewers to understand and interpret our study skills.

2.0 Detail explanation on storyline

Introduction: At the start of the Tableau story, we will first explain what is the motivation for this story, which is to investigate each member's study skills that help them perform well in 2 courses, Applied Statistics and Applied Calculus.

Story Point 1: We will start off by seeing the students' ranking for each assessment mark using running bar chart animation to make it seem like a fun rivalry and capture audiences' attention.

Story Point 2: We will study whether the number of hours studied affect Quiz 4 marks for both subjects. This can be proven using the trendline in Tableau. If p-value < 0.05, there is a correlation between the 2. Moreover, we will explain why correlation does not mean causation. People who study less but effectively can do better than people who study more.

Story Point 3: We will first explain about the different types of learning styles in the VARK model. Then, we will show the learning styles that each student uses the most by pie chart.

Story Point 4: Next, we will show a map of the study location of each member on each date recorded. We will explain the reasons why some people keep changing places.

Story Point 5: Are you a morning person or a night person? We will show each student's study time such as morning, evening and night. Then we will explain more on chronotypes.

Story Point 6: Average Phone Time Usage (hours) for Each Member. We will compare it with a reference line that shows the average hours of using digital devices among Malaysians.

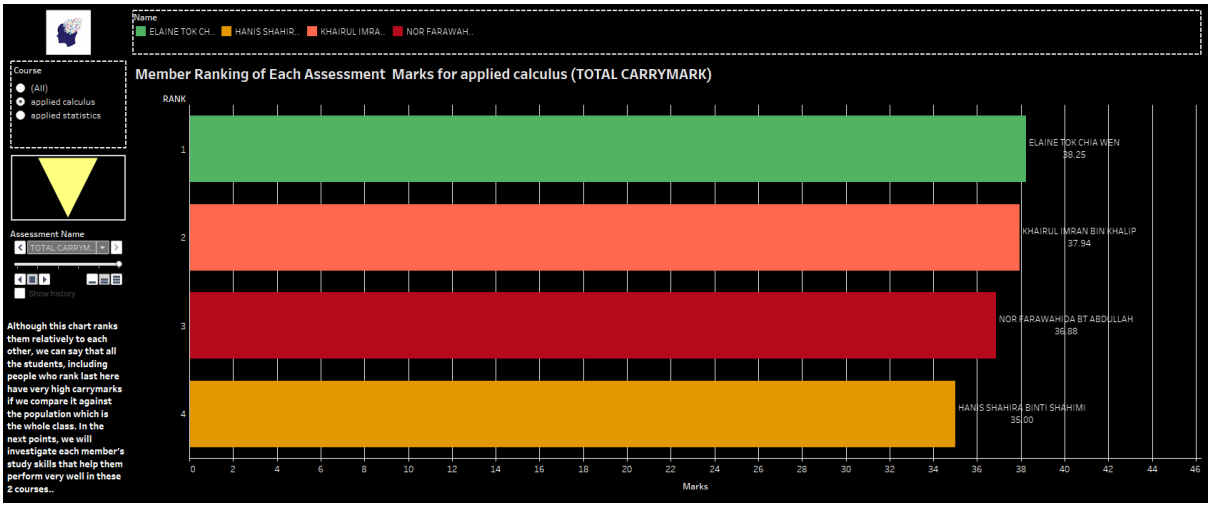
Story Point 7: Then we will explain the benefits of exercise according to research and show students ranking by total exercise time for each day using running bar chart animation. A line chart to show the running sum of total exercise time for each member is shown too.

Story Point 8: Last, but not least we will answer an interesting question; which course is harder? To answer this, we will take a look at each member's time allocation between applied calculus and applied statistics. Allocating more time for harder subjects is crucial.

Conclusion: Finally, we will recap all the factors in study skills that can help students perform in math courses that we studied in this project. We will remind the audiences that whatever the result from this study is, it cannot be generalized to the whole population such that females performed better than males on math courses. This is because our data consists of 4 members only. Therefore, this project is only a study about ourselves.

C. Detail analysation of each story point

Story Point 1: Member Ranking of Each Assessment Marks



NAME	COURSE	QUIZ 1	QUIZ 2	QUIZ 3	QUIZ 4	TEST
NOR FARAWAHIDA BT ABDULLAH	applied statistics	4.75	3.50	5.00	4.50	22.50
	applied calculus	2.63	3.00	3.00	2.25	26.00
HANIS SHAHIRA BINTI SHAHIMI	applied statistics	4.75	3.50	5.00	4.50	23.00
	applied calculus	2.50	2.50	3.00	2.00	25.00
ELAINE TOK CHIA WEN	applied statistics	5.00	5.00	5.00	5.00	24.00
	applied calculus	3.00	3.00	3.00	1.75	27.50
KHAIRUL IMRAN BIN KHALIP	applied statistics	5.00	2.50	5.00	5.00	23.00
	applied calculus	3.00	2.50	1.94	1.50	29.00

TABLE 1

Table 1 shows the assessment marks for applied statistics and applied calculus of each member. In this story point, we use a running bar chart animation to make it seem like a fun rivalry and capture audiences' attention.

Applied Calculus:

Ranking for Quiz 1: Elaine & Imran (tie), Farawahida, Hanis.

Ranking for Quiz 2: Elaine & Farawahida (tie), Hanis & Imran (tie).

Ranking for Quiz 3: Elaine , Hanis & Farawahida (tie), Imran.

Ranking for Quiz 4: Farawahida, Hanis, Elaine, Imran.

Ranking for Test: Imran, Elaine, Farawahida, Hanis.

Ranking for total carrymark: Elaine, Imran, Farawahida, Hanis.

Applied Statistics:

Ranking for Quiz 1: Elaine & Imran (tie), Farawahida & Hanis (tie).

Ranking for Quiz 2: Elaine, Farawahida & Hanis (tie), Imran.

Ranking for Quiz 3: Everyone tie

Ranking for Quiz 4: Elaine & Imran (tie), Farawahida & Hanis (tie).

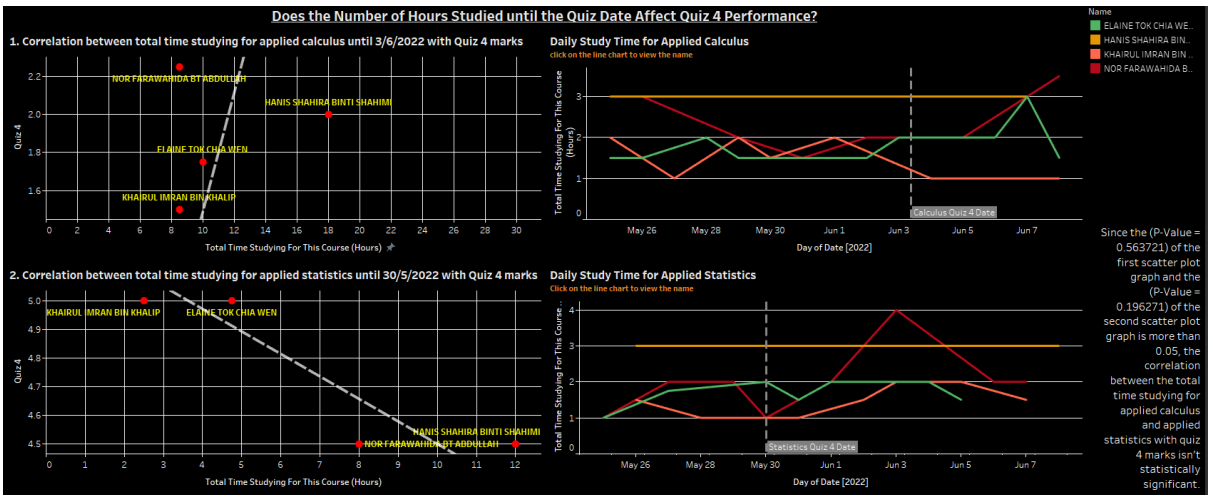
Ranking for Test: Elaine, Hanis & Imran (tie), Farawahida.

Ranking for total carrymark: Elaine, Hanis, Imran, Farawahida.

We can see that the ranking keeps changing between each assessment from this running bar chart. Besides, there is a big performance difference between the 2 courses too. For example, Hanis ranks last for Calculus total carrymark but is the runner up for Statistics total carrymark.

Although this chart ranks them relatively to each other, we can say that all the students, including people who rank last here have very high carrymarks if we compare it against the population which is the whole class. In the next points, we will investigate each member's study skills that help them perform very well in these 2 courses.

Story Point 2: Does the Number of Hours Studied Effect Quiz 4 Performance?



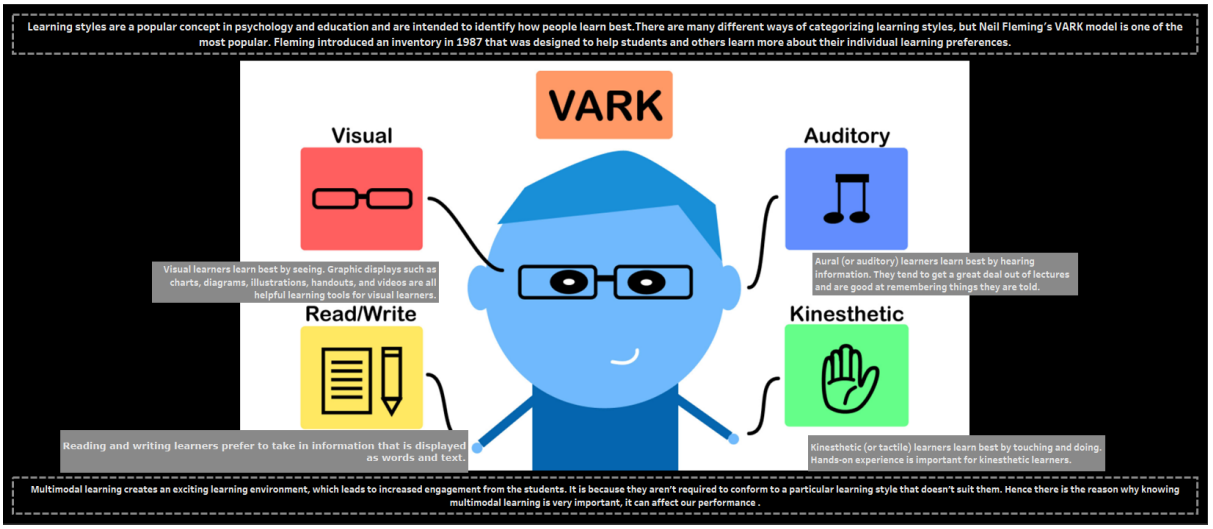
Second story point is about whether the number of hours studied affects quiz 4 performance? We separate the course subject into applied statistics and applied calculus. From the first scatter plot we can see that the correlation between total time studying for applied calculus with Quiz 4 marks . From the trend line we can see that the correlation between total time studying with Quiz 4 marks in applied calculus shows a positive linear trend. If we just look at the trend line, we can conclude that when our group members spend more time studying applied calculus , we will get higher marks in applied calculus . However , when looking at the p- value of the first graph, the P-Value = 0.7733. Since the p-value is more than 0.05, the correlation between the total time studying for applied calculus with quiz 4 marks isn't statistically significant. Therefore there is no linear relationship between the total study time and the quiz 4 mark in applied calculus courses. From the other sides, if we just look at the R-Square value(coefficient of determination value) of the first scatter plot graph , we can see that the R- Squared value is only 0.0514056 , which mean that only 5% of the variation in y (quiz 4 mark) can be explained (is predictable)by x(total study studying) and from the R-Square value we can know that the R value(strength of correlation coefficient) of the first graph is 0.2267 which mean that the there is a weak positive linear relationship between quiz 4 mark and the total time studying for applied calculus course.

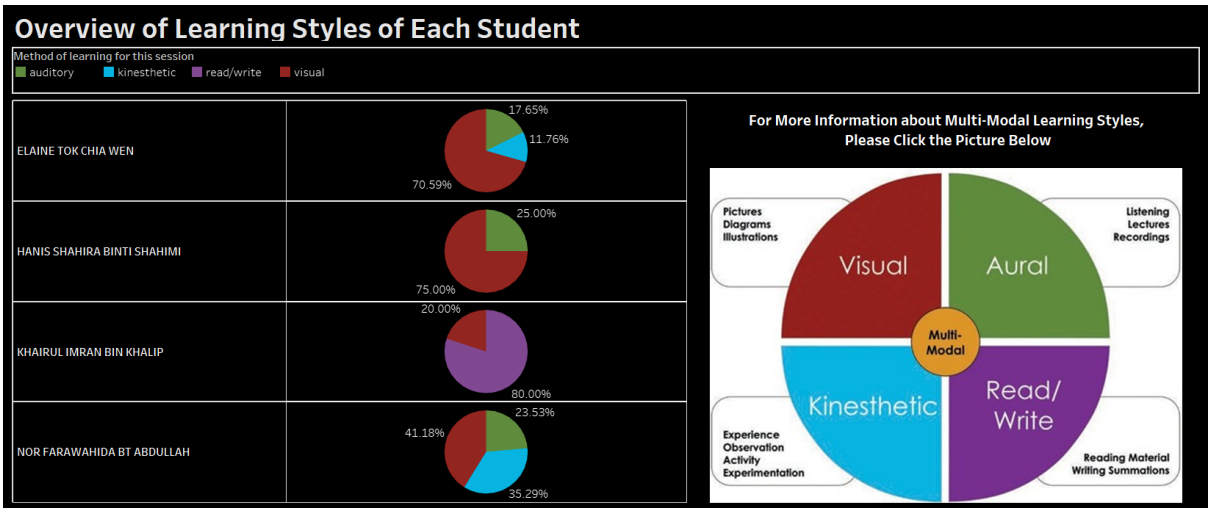
From the second scatter plot which is the correlation between total time studying for applied statistics with Quiz 4 marks , we can see that the trend line of the graph shows a negative linear trend. When we look at the p-value of the graph, we can see that the P-Value =

0.108822. Since the p-value is more than 0.05, the correlation between the total time studying for applied statistics with quiz 4 marks is not statistically significant. Therefore there is no linear relationship between the total study time and the quiz 4 mark in applied statistics courses. From the other sides, if we just look at the R-Square value(coefficient of determination value) of the second scatter plot graph , we can see that the R- Squared value is 0.794198, which mean that 79% of the variation in y (quiz 4 mark for applied statistics) can be explained (is predictable)by x(total study studying for applied statistics) and from the R-Square value we can know that the R value(strength of correlation coefficient) of the second graph is -0.8912 which mean that there is a strong negative linear relationship between quiz 4 mark and the total time studying for applied statistics.

For this strange phenomenon, our group had conclude 3 reason, first is because of small sample size, as we know the smaller the sample size the higher is the margin of error, since our group only take 4 people for the dataset , the result obtain might have huge error occur because of the very small sample size . Second is because of the focusing in study style, there is different study style between our group members, some of us prefer listening to lecturer explanation and focus in class, hence they spend less time in self- studying for that subject because already catch up the knowledge during class, while some of us prefer self-studying, hence they will spend more time in studying. Third reason is because the mark is only for quiz 4 only, there is a probability that the group members spend their time studying for the previous chapter and not for the chapter exam in quiz 4. Besides that, some members of the group are short-term memory people and some are long-term memory people, so for long-term memory people, they don't need to study as often to remember the knowledge, while short-term memory people need to take a lot of time to remember all knowledge.

Story Point 3: Overview of Learning Styles of Each Student

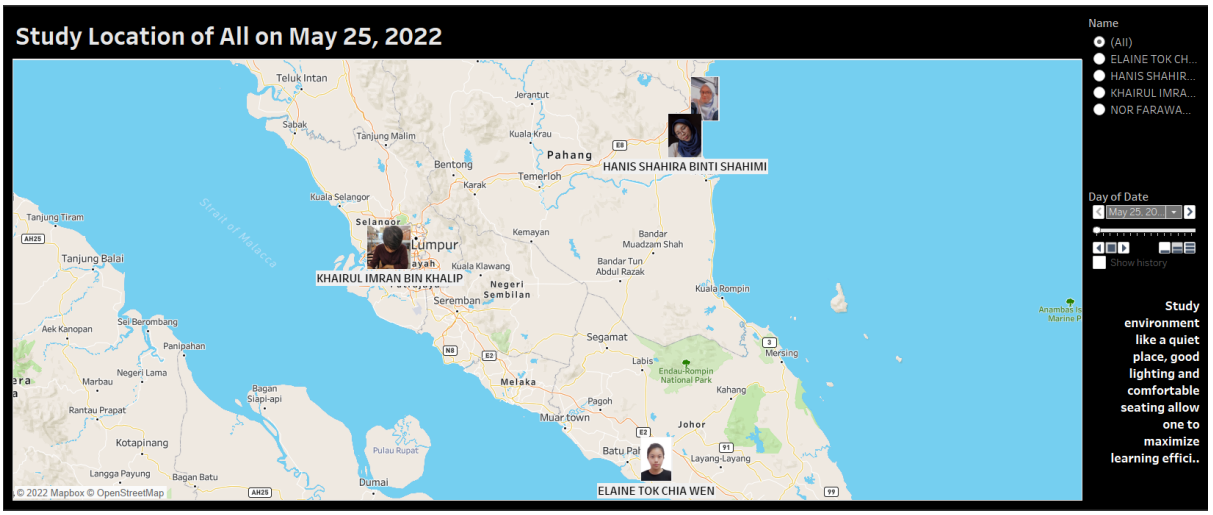




Third story point is about the learning style. Learning styles group together different ways individuals prefer to learn or the way they learn best. There are a few different models to explain learning styles. One of the most popular is the VARK model. There are four main methods of multimodal learning in the VARK model which are visual, auditory, reading and writing and kinesthetic. Multimodal learning suggests that when a number of our senses – visual, auditory, kinaesthetic – are being engaged during learning, we understand and remember more. Now let us see the first style of learning in the Vark model which is Visual learning. Visual learning involves the use of graphs, infographics, pictures and illustrations, videos, artwork, flowcharts, and diagrams – anything that primarily stimulates learners' eyes.

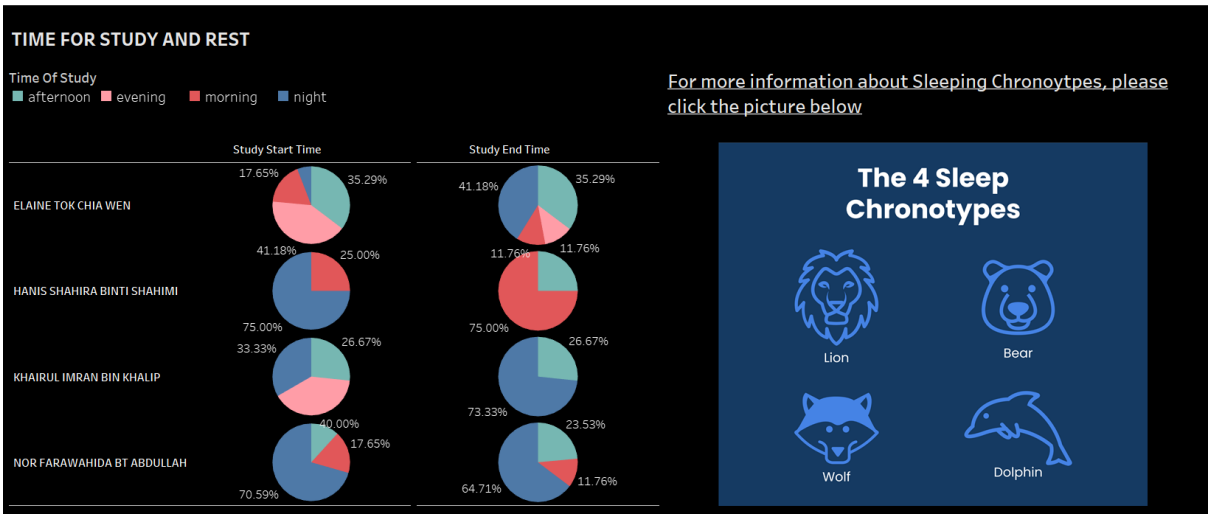
Aural learners are these people who learn best by hearing, responding to auditory cues like listening to lecture recordings, discussions or songs. Third learning style in the VARK Model is Reading/Writing. Usually, this approach is focused on reading the material and writing down the most essential points. Writing down the information helps the learners better remember and learn. Last is about Kinesthetic -- these people learn best by doing, a practical, hands-on approach is more effective. They are responding to tactile cues like movement, actions and real-life examples. Multimodal learning creates an exciting learning environment, which leads to increased engagement from the students. It is because they aren't required to conform to a particular learning style that doesn't suit them. Hence there is the reason why knowing multimodal learning is very important, it can affect our performance. Some people strongly prefer one of the four learning types. But many others have a shared preference among two or more types, making them multimodal learners. Lets let us look a the pie chart, over the 15 days, we can see that Elaine is a visual learner because she spend more than 50% of her study in visual learning, which is 70.59% in visual, although she have learned by auditory and kinesthetic learning method, but those method contribute a low percent of total in the method learning. Hence we can conclude that she prefers to study by visual learning style. For Hanis Shahira, she is also a visual learner, from her pie chart we can see that she spend 75% of her study on visual learning and 25 % in auditory learning, which for the visual learning style is already contribute more than 50% of her study style, hence Hanis Shahira is more prefer to be a visual learner. For Khairul Imran , over the 15 days, he use 80 % of his time study in read and write learning style, 20% of his time study in visual learning style, hence from her we can know that Khairul is a read and write learner , he is more prefer to read out and write down the short notes when study. For farawahida, she is a multimodal learner, because we can see that from her pie chart she spend 41.18% of her time in visual learning style, 35.29% in kinesthetic learning style and 23.53% in auditory learning style, although she spend most of her time in visual learning, but we can notice that the contribution for the visual and kinesthetic learning style is occupy about the almost the same size in the pie chart, hence we can say that Farawahida is not only a pure visual learner but a multimodal learner, which prefer both visual and kinesthetic learning style when she is learning.

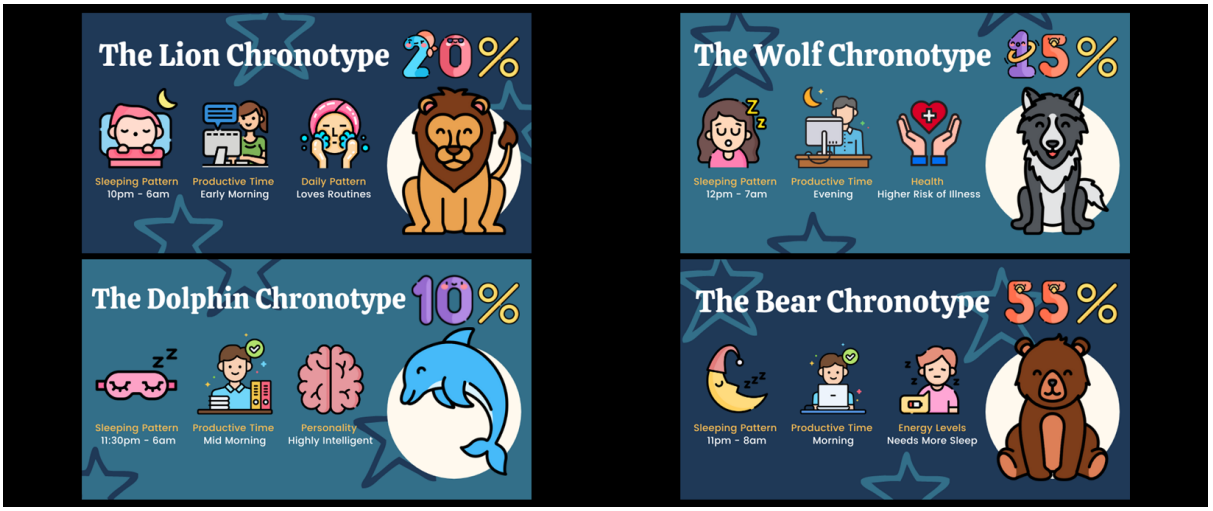
Story Point 4: Study Location of Each Member on a Specific Date



In this story point, we use a symbol map to visualize the data. The variables used are altitude, longitude, date(day), and name. The map shows the overview of the study location of each member. When we play the date button, we can see the movement for each person. For Khairul Imran he is not moving at all but for Hanis Shahira, Elaine, and Farawahida we can see the movement there for a certain date. From the information that the members gave, Khairul Imran prefers to study at home because he is more comfortable as he is living alone. Thus, there is no distraction or noises to distract him from focus on the study. For Hanis Shahira, we can see many movements from her as she loves to go to the library to study with her friends and she wanted to get some fresh air as she said studying at home makes her sleepy. For Elaine, she goes to the library on 3rd and 4th June. She said on those two days, she got visitors at her home, so she decided to go to find another place to study. As for Farawahida, she lives with her three nieces. On the weekend, when they are at home, she could not focus on studying because of the noises and disturbance. She goes to the book cafe to get away from them for study. We can conclude that the environment of the study place (quiet surroundings, ample lighting, comfortable seat and chair, adequate space, good temperature and amenities) is vital to maximize the learning input efficiency.

Story Point 5: Are you a morning person or a night person?

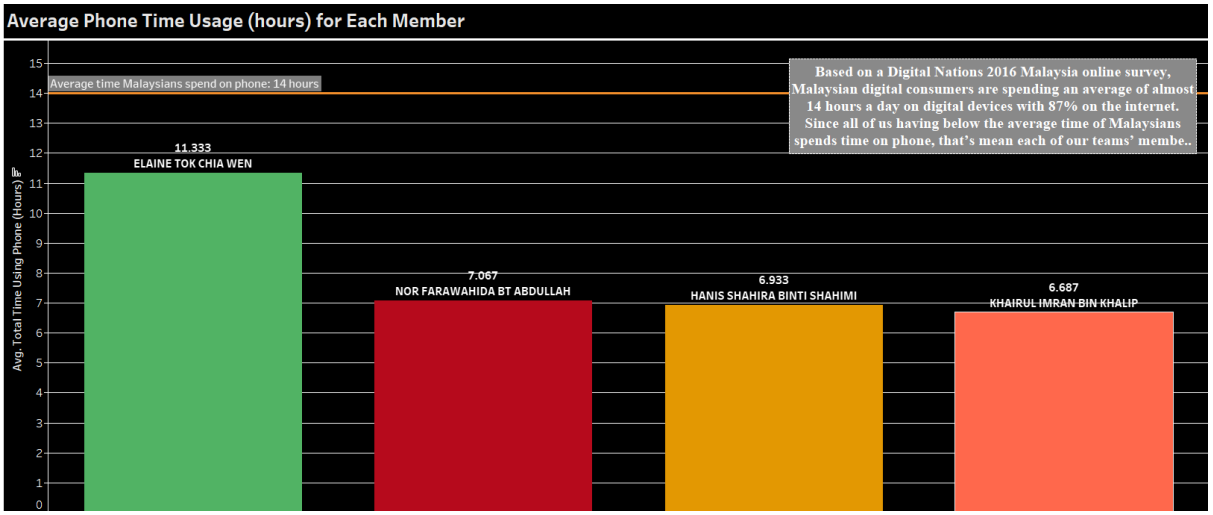




For this story point, we use pie charts to visualize data. The variables used are study start time, study end time, and name. We group the time collected. For morning, the time is from 8am to 11.59am, for afternoon is from 12pm to 4.59pm, for evening it is from 5 pm to 7.59pm and lastly night is from 8pm to 7.59am. So from the type grouped we can see the start time and end time of study the members preferred and compare with the type chronotype. Chronotype is a classification system used to help understand sleep and productivity schedules, including when you're most active and alert throughout the day. There are 4 sleep

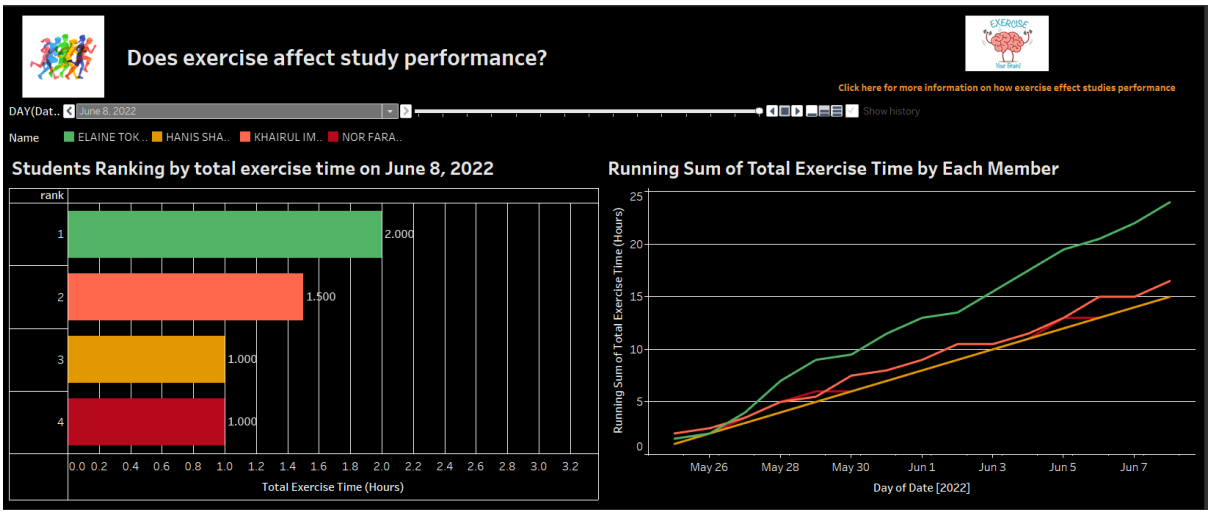
Chronotypes which are lion, bear, dolphin and wolf. Bear chronotype is a person that is a person that goes to bed and gets up early too. The time that they can focus is around 10.00am to 2.00pm. Wolf chronotype is a person that usually goes to bed around 12am and wakes up around 7.30am. For this type of person they will focus more around 5.00pm to 12.00am. For Lion chronotype, the person is the type of person that is active in the morning because they will go to bed early around 10.00pm and wake up around 6.00am. So they are more focused on 8.00am to 12.00pm. Dolphin chronotype is a person that usually sleeps around 11.30pm and wakes up at 6.30am. They will have a hard time waking up in the morning but once they get up they will be more productive throughout the day. They will gain more focus around 3.00pm to 9.00pm, the best study time. For more information we can click on the picture we will direct to the website. From the pie chart, we can see Hanis Shahira and Farawahida study start time more than 50% at night. So we can conclude that they have a wolf sleep chronotype. Wolf chronotype is someone that loves to go to sleep at midnight. As they are active at night so we assume that they will sleep late at night. For Elaine, we see that 5.88% that she starts studying at night. It shows that she is definitely not an active person at night. She preferred to start studying in the evening and afternoon. So we can conclude that Elaine has a bear chronotype as at that time maybe she can focus more, same as bear chronotype characteristics and we can see that she is not very active at night. For Khairul Imran, we can see that he is definitely not a morning person as he has no start time of study in the morning. He has more night and evening study time. We can conclude that he has a dolphin chronotype as we can see that he does not go to bed early as he also starts studying at night about 33.33%. Also the start study time is around the range of focus time for the people from this chronotype. For study end time, it is just to show when the member will usually end the study time and rest. Maybe the end time that has a higher percentage is not preferable for that person to study. We can conclude that every member has different types of sleep chronotypes based on their study time.

Story Point 6: Average Phone Time Usage (hours) for Each Member



First and foremost, we will concentrate and give the interpretation on the **Average phone time usage for each member in hours** by using a bar chart. To illustrate this, let's have a closer look at the green bar chart. We can see that Elaine (11.333 hours) preceded the other members with the highest phone time usage followed by Farawahida (7.067 hours), then Hanis Shahira (6.933 hours) and lastly Khairul Imran (6.687 hours) which had the lowest phone time usage among others. So, Based on a Digital Nations 2016 Malaysia online survey, Malaysian digital consumers are spending an average of almost 14 hours a day on digital devices with 87% on the internet. Since all of us having below the average time of Malaysians spends time on phone, that's mean each of our teams' members have a good discipline on using phone. We can see here if we have exceeded the line reference for the average time on phone usage, for sure our result will be worse.

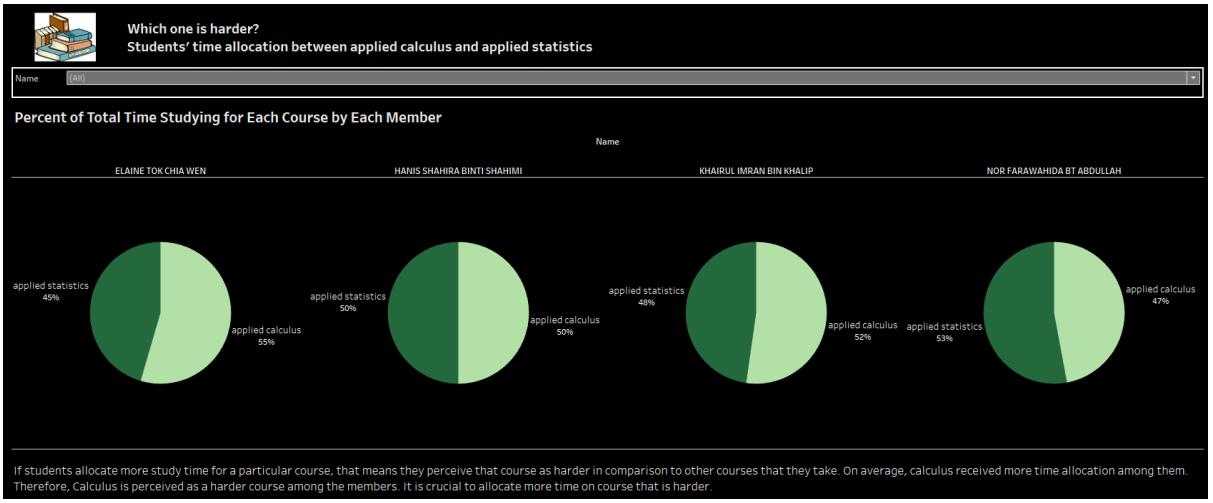
Story Point 7: Does exercise affect study performance?



From this storyboard, we would like to illustrate that we used a line chart to visualize the running sum of the total exercise time by each member, and then a running bar chart which can see the animation of students ranking by total exercise time for each day. From the line chart on the right side, we would like to focus your attention on the underlying trend of this line chart which shows that Elaine also has the highest running sum of total time exercise along the day of date. Meanwhile followed by Imran. And last but not least, here we can see that Hanis Shahira have a linear trend that follows nearly with Farawahida. This is because we can see in detail at the left side of this storyboard, the ranking of total exercise shows in daily life. Here we can see that Elaine almost took the first rank, which is that she took on average 2 or three hours to exercise daily. Meanwhile, Imran took one and a half and last but not least Farawahida and Hanis mostly exercised for one hours. That's why we can see from the line chart, which is red and yellow, both have the almost closed line chart while Hanis have a linear line chart because she only took 1 hours of total exercise time for every day. Let's look at this part in a bit more detail. There is an article that shows that exercise can improve our learning, written by Dr. John, who is an associate clinical professor and provides strong evidence that aerobic exercise physically remodels the brain for peak performance on

all fronts by sweating after exercise. We can say that exercise has immediate effects on your brain. A single workout that you do will immediately increase the levels of neurotransmitters like dopamine, serotonin, and noradrenaline. That will increase your mood and boost your focus right after exercise. Next, he also said that exercise improves learning on three levels: "First, it optimizes your mind-set to improve alertness, attention, and motivation; second, it prepares and encourages nerve cells to bind to one another, which is the cellular basis for logging in new information; and third, it spurs the development of new nerve cells from stem cells in the hippocampus." So, in short, according to Dr John, exercise can be the best defense against a lot of the common mental health issues that students struggle with. As an example can prevent stress, anxiety and panic disorder, depression, attention deficit hyperactivity disorder (ADHD). With the strong evidence we can agree with this statement that exercise affects students' performance. As an example, we can see that Elaine has the top rank of carry mark for both math courses and she also has the highest rank on total exercise time.

Story Point 8: Which course is harder?



We are going to take a look at each member's time allocation between applied calculus and applied statistics to answer this question. The rationale is that, if students allocate more study time for a particular course, that means they perceive that course as harder in comparison to other courses that they take. It is crucial to allocate more time for harder courses.

For Elaine, she spent 55% of study time on applied calculus. Meanwhile, Hanis had a perfectly balanced time allocation for both. Imran spent 52% on applied calculus and finally Fara spent 53% on applied statistics.

On average, calculus received more time allocation among them. Therefore, Calculus is perceived as a harder course among the members.

This is already a known fact among UMP data analytics students. One of the possible reasons is because Calculus requires much more prerequisite knowledge than Statistics. The calculus foundation that students have learned during their SPM, foundation and matriculation studies act as a foundation upon which new knowledge is built and scaffolded.

Mathematics is different from History, where you can miss the previous class about the history of Malaysia 1960-1970 but still be able to understand the next class about the history of Malaysia 1970-1980. This is why having Bridging Classes for first semester students is a good move to help them recap the basics.

D. Concluding remarks

In conclusion, there are many factors in study skills that can help students perform in math courses.

The most important thing is of course how much time you spent studying for that course.If all other variables are constant/equal, then the more time you studied, the better you will perform at it. However, in reality not all hours spent studying among people have the same quality, some people study for hours but they do it inefficiently such as while using a phone, watching TV or doing other tasks simultaneously. Some people study for 2 hours but they are in the zone (flow state) completely.

There are other factors too such as the person's learning style, study location and environment, students' chronotype, average phone time used, total exercise time and time allocation between courses.

Since the sample is only 4 people, we cannot generalize for the whole population such as saying that "Females performed better than males in math courses" or "Males prefer read/write learning style". This is why all of these visualizations are only about ourselves.

اونيۏرسيتي مليسيا ڤهڠ UNIVERSITI MALAYSIA PAHANG PUSAT SAINS MATEMATIK	**SUBJECT: BSD1323 STORYTELLING AND DATA VISUALIZATION**		**MARKS**: 90(30%)
	TOPIC: CHAPTER 3 to CHAPTER 8		
	GROUP PROJECT	**DUE DATE:** 17 May - 17 June 2022	
	GROUP PROJECT MEMBERS (ID, NAMES, SECTION) 1. SD21001, TOK CHIA WEN, 01G 2. SD21002, KHAIRUL IMRAN BIN KHALIP, 01G 3. SD21016, HANIS SHAHIRA BT SHAHIMI, 01G 4. SD21010, NOR FARAWAHIDA BT ABDULLAH, 01G		

GROUP PROJECT: MARKING SCHEME

CLO	Description	PLO mapping	Percentage	Marks
CLO2	Demonstrate the data visualization skill using an effective storytelling.	PLO2: Cognitive Skills and Functional work skills with focus on Numeracy skills C3: Application	10%	30

LEVEL OF ACHIEVEMENT				
1 **Inadequate**	**2** **Emerging**	**3** **Developing**	**4** **Good**	**5** **Excellent**

QUES.	ELEMENTS	MARKS	LEVEL OF ACHIEVEMENT
1&2	a. At least 2 weeks daily data from all members. b. At least 1 Date data type in the dimension shelf. c. At least 2 Categorical/qualitative data types in the dimension shelf. d. At least 1 Geographic data type in the dimension shelf. e. At least 3 Quantitative data types in the measure shelf.	**5**	
3	a. A catchy title and a clear storyline. b. At least 7 story points. c. Combination of text, image, worksheets, and dashboards. d. Combination of several types of visualization from each data field types. e. Interactive visualizations (include filters and animation).	**5**	
TOTAL (10)			

CLO2 RUBRICS OF QUESTION 4								
CRITERIA	**LEVEL OF ACHIEVEMENT**						**WEIGHTAGE**	**SCORE**
	0 Non-existent	**1 Inadequate**	**2 Emerging**	**3 Developing**	**4 Good**	**5 Excellent**		
Motivation of your story	No motivation of the story provided	Very little motivation of the story provided	Motivation of the story provided but missing all major points	Motivation of the story provided but unclear	Clear and good motivation of the story provided	Very clear and excellent motivation of the story provided	0.5	
Details explanation of the storyline	Failed to explain the storyline	Not Efficiently, effectively, and accurately explain the storyline	Partly accurate, but not effectively explain the storyline	Effectively explain the storyline but not accurate	Accurately and effectively but not efficiently explain the storyline	Accurately effectively, and efficiently explain the storyline	1	
Details analysation of each story point	Failed to analyse the story points.	Not Efficiently, effectively, and accurately analyse the story points	Partly accurate, but not effectively analyse the story points	Effectively analyse the story points	Accurately and effectively but not efficiently analyse the story points	Accurately effectively, and efficiently analyse each story point	2	
Concluding remarks	No concluding remarks provided	Very little concluding remarks provided and inaccurate	Concluding remarks provided but unclear and inaccurate	Concluding remarks provided but partly inaccurate	Clear and good concluding remarks provided	Very clear and excellent concluding remarks provided	0.5	
						TOTAL (20)		

CLO	Description	PLO mapping	Percentage	Marks
CLO3	Display a powerful data visualization, report, dashboard or stories in solving various applications using appropriate software.	PLO3: Functional work skills with focus on Practical, and Digital skills P4: Mechanism	10%	30

CRITERIA	LEVEL OF ACHIEVEMENT						WEIGHTAGE	SCORE
	0	1 Inadequate	2 Emerging	3 Developing	4 Good	5 Excellent		
Theory/ Knowledge on data visualization and dashboard	No theoretical knowledge on data visualization and dashboard observed	Very little knowledge on data visualization and dashboard observed or some information is incorrect	Some knowledge or information observed on data visualization and dashboard but missing all major points	Some knowledge or information observed on data visualization and dashboard but still missing some major points	Good knowledge on data visualization and dashboard observed, missing some minor points	Excellent knowledge on data visualization and dashboard observed; provides all necessary background principles	1	
Efficiency/ Assembly/ Tidiness	Failed to demonstrate the given task	Not efficiently, effectively and neatly demonstrated the given task	Partly efficient, but not effectively and neatly demonstrated the given task	Efficiently, but not effectively and neatly demonstrated the given task	Efficiently and effectively but not neatly demonstrated the given task	Efficiently, effectively and neatly demonstrated the given task	1	
Techniques on Story & Data Validation	Failed to create a story	Inappropriate techniques on story are demonstrated	Partly correct techniques on story are demonstrated, with partly valid data	Correct techniques on story are demonstrated, with partly valid data	Good techniques on story are demonstrated, with valid but not completely accurate data	Competent techniques on story are demonstrated, with valid and accurate data	2	
Results (the story points)	Failed to create a story	Lack of story points / zero readability of the result. Poor originality , taking credits of others work	Partly complete story points	Story points are presented but at low readability. Reader has to guess some of the missing information. Less originality, copy paste here and then	Clear and neat presentation of story points. All required results are presented. Readability. Complete with labels, title, axes, etc.	Very Clear and neat presentation of story points. All required results are presented. High readability. Complete with labels, title, axes, etc.	1	

Results (the interactive data visualization and story points)	No interactive data visualization and story points	Lack of interactive data visualization and story points / zero readability of the result. Poor originality, taking credits of others work	Very minimal interactive data visualization and story points are shown	Result presented but at low readability / some result presented. Reader has to guess some of the missing information. Less originality, copy paste here and then	Clear, neat presentation. All required results are presented. Readability. Complete with labels, title, axes, etc	Very Clear, neat presentation. All required results are presented. High readability. Complete with labels, title, axes, etc	1	
						TOTAL		**30**

CLO	Description	PLO mapping	Percentage	Marks
CLO4	Work collaboratively as part of a team to solve given problem through group discussion and presentation.	PLO4: Functional work skills with focus on Interpersonal skills A3: Valuing	5%	15

CRITERIA	LEVEL OF COMPETENCY					WEIGHTAGE	SCORE
	1 Very Weak	2 Weak	3 Fair	4 Good	5 Very Good		
Foster Good Relationship	No clear evidence of ability to foster good relationships and work together effectively with other group members towards goal achievement.	Able to foster relationship and work together with other group members towards goal achievement but with limited effect and require improvements.	Able to foster relationship and work together with other group members towards goal achievement with some effect(s) and require minor improvements.	Able to foster good relationship and work together with other group members towards goal achievement.	High ability to foster good relationship and work together effectively with other group members towards goal achievement.	1	
Alternate Roles	No clear evidence of ability to assume alternate roles as a group leader and group members demonstrated in practice.	Attempt to demonstrate in practice the ability to alternate roles as a group leader and group members but with limited effect and require improvements.	Able to demonstrate in practice the ability to assume alternate roles as a group leader and group members with some effect(s) and require minor improvements.	Able to demonstrate in practice the ability to assume alternate roles as a group leader and a group member to achieve the same goal.	Show clear evidence to assume alternate roles as a group leader and a group member demonstrated in practice.	1	
Respect and accept opinions	Not able to respect and accept opinion of others that leads to conflicts	Limited respect and acceptance of others' opinions in achievement group's objectives	Able to respect and accept opinion of others in achieving group's objectives	Able to well respect and accept opinion of others in achieving group's objectives	Able to very well respect and accept opinion of others in achieving group's objectives	1	
					TOTAL (15)		

***Note:** A self and peer review questions will be given to each of the student to assess their group member and their teamwork and the outcome will assist lecturer to assess the CLO4 rubric.

CLO	Description	PLO mapping	Percentage	Marks
CLO5	Demonstrate an active communication through group discussion and presentation.	PLO5: Functional work skills with focus on communication skills A3: Valuing	5%	15

CRITERIA	LEVEL OF COMPETENCY					WEIGHTAGE	SCORE
	1 Very Weak	2 Weak	3 Fair	4 Good	5 Very Good		
Clear delivery of ideas	Not able to deliver ideas clearly and require major improvements	Able to deliver ideas and require further improvements	Able to deliver ideas fairly clearly and require minor improvements	Able to deliver ideas clearly	Able to deliver ideas with great clarity	3/5	
Confident delivery of ideas	Not able to deliver ideas confidently	Able to deliver ideas with limited confidence and require further improvements.	Able to deliver ideas fairly confidently and require minor improvements	Able to deliver ideas confidently	Able to deliver ideas with great confidence	3/5	
Effective and articulate delivery of ideas	Not able to deliver ideas effectively	Able to deliver ideas with limited effect and require further improvements	Able to deliver ideas fairly effectively and require minor improvements	Able to deliver ideas effectively and articulately	Ability to deliver ideas with great effect and articulate	3/5	
Understand and respond to questions	Not able to understand and respond to a question	Able to understand and answer questions but not able to accurately answer the question	Able to understand and answer questions satisfactorily	Able to respond to questions well	Able to fully understand and respond to questions very well	3/5	
Adapt delivery to audience level	Not able to deliver appropriately to the audience level	Able to deliver ideas with limited appropriateness to the target audience and require further improvements.	Able to deliver ideas appropriately to the target audience satisfactorily	Able to deliver ideas appropriately to the target audience well	Able to fully deliver ideas appropriately very well	3/5	
					TOTAL (15)		