TAKE CONTROL

The impact of Control Perception on Stress management and Performance

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1. Executive summary

Problem Statement

The predicament that I identified is the notable increase in stress faced by my peers, as well as the national and global population. The purpose of my science fair project was to see whether increased control perception, would effectively reduce participants' stress levels.

Procedures

In order to deduce whether increased control perception lead to stress reduction, I did the following:

- Gathered participants from two year 10 Food Technology classes from my school (EGGS). Each class underwent Masterchef based lessons and Recipe based lessons as a part of their curriculum (I recorded data for 3 of each lesson for each class).
- Prior to the trials, both classes filled out an initial questionnaire that provided insight on how stress affects their everyday lives.
- Masterchef lessons involved students incorporating mystery ingredients (which they had no control over) into creative dishes. Recipe lessons involved students following their own/the teacher's recipe (i.e. they had more control over the ingredients and dish outcome).
- Students filled out surveys after each lesson. I also observed the participants and asked them relevant questions.
- I received the student participants' marks for that term of work, and made connections between participants' grades, survey results, and my observations, in order to form a conclusion.

Results - The Highlights

- 2.1% of participants felt extreme levels of stress during the Masterchef lesson. 5.6% felt the same way during Recipe lessons. This represented 3.5% increase in the number of those that felt extreme stress levels in the Recipe Lessons assessment.
- For the question, "Were you feeling stressed about this lesson [overall]?" 35.7% answered yes for Masterchef lessons, and 36.9% answered yes for Recipe lessons.
- 74.6% of students felt like the Recipe lessons provided them a sense of control. But only 50.0% of students felt like Masterchef lessons provided them with a sense of control. This represented 24.6% more of participants having a sense of control [perception] for the Recipe Lesson Assessment.
- 11.9% more participants achieved E (Excellence) grade in their Recipe Lesson assessment as compared against their Masterchef assessment.
- 39.1% more participants achieved median grade M (Merit) in their Masterchef assessment as compared against their Recipe Lesson assessment.
- Participants grade distribution was:
    - Masterchef grades: 0%NA (Not Achieved), 4.2% A (Achieved), 62.8% M, 33.0% E.
    - Recipe lesson grades: 11.9% NA, 19.0% A, 23.7% M, 44.9% E.

Conclusion

From the results I concluded that there appeared to be a correlation between stress, control perception and results achieved by participants. The results suggested, despite a 3.5% increase in the number of those who felt extreme levels of stress during Recipe Lessons, 11.9% more of participants achieved at the highest level (E grade) due to increased control perception during their Recipe Lesson and assessment. Data suggests that since the majority of students felt enhanced control perception during Recipe lessons more participants achieved E when compared against the Masterchef assessment.

Further, the data also suggested that a subset (30.9% of participant population) might not have achieved enough of control perception (or perception of control and freedom. Hence, this population might feel in better control when they have absolute freedom with their dishes) to lift their grades. In fact the 30.9% population subset received grades at the lower end of the scale (NA, A). More work is required to further understand the suggested correlation.

1. Introduction

Picture this: it's a foggy Sunday evening; so naturally, you're snuggling up next to your warm Mitsubishi Electric Heat Pump, munching on some Non-GMO apple slices, and watching your favourite action-packed Netflix drama. When suddenly, your evening is disturbed by the protagonist's problematic behaviour! (I mean come on, how hard can disabling a bomb at the top of the Empire State Building, at midnight, with nothing but a wooden spoon and a cryptic message - that you're sure is just the Krispy Kreme menu, really be?). Annoyed by this character's inability to "hurry up and do the right thing", do you (a) sit calmly and quietly as you continue watching; (b) switch off Netflix because it's 2:00am and you're way too invested in fake characters; or (c) despite having no control over the character's unfortunate circumstances, shout at the screen and proceed to stay up till 5:00am to finish the series, because you were simply "too stressed" about the character's wellbeing to go to sleep?.. Despite ludicrosity it may seem on paper, I'm 99% sure that in reality, the vast majority of you relate best with scenario C! Though, I doubt that many have taken the time to rationally analyse how Netflix temper tantrums provide deeper insight to the intriguing oddities of human behaviours. In fact, a plethora of other seemingly mundane daily activities, also suggests interesting facts about control's relationship with our human psyche. Whether this be in regards to school speeches; drivers' odd behaviour of telling other drivers on the road how to drive like the other drivers can hear them; or stressed Masterchef contestants during the final countdown. In this research, I have set out to test the hypothesis that "there is a strong correlation between 'control perception', stress levels and outcomes." That is, I hypothesis that the perception of having control over situations will likely lead to improved outcomes or at least, a reduction in exhibited symptomatic stress indicators.

My science fair research project involved year 10 Food Technology students (participants), who all attended both the "Recipe lessons (where the ingredients were known, and hence participants had control)", and the "Masterchef lessons (which involved mystery ingredients, thus participants lacked control)". In the research, all the participants took both assessment types. They were surveyed at the beginning of term (i.e. prior to taking Food Technologies lessons); surveyed at the end of each term lesson; and finally surveyed at the final term lesson and assessment. Data generated through the survey was correlated to the results (grades) achieved by the participants.

2. Aim

The aim of the research was to see whether participants (a) felt as though they achieved higher levels of control (i.e. control perception) during the Recipe lessons in comparison to Masterchef lessons. (b) If this increase in control perception during one compared to the other lead to a decrease in their stress levels; and (c) if reduced stress levels would lead to better performance in the Food Technology classroom (shown via grade results).

Overall, my aim was to answer the following questions:

a. Is there a strong, inverse relationship between control perception and stress (i.e. as control perception increases, stress decreases)?
b. If so, in what ways can we enhance control perception?
c. Could increasing control perception not only reduce stress, but also improve our performance (e.g. academic performance)?

3. Objectives

The purpose of my science fair research was to show that when people feel like they're in control of their actions and surroundings, they achieve better wellbeing, due to reduced stress. If proven to be correct - this research could help millions improve stress management techniques and initiate profound universal impact on global mental health programmes.

In our current society (one that is fixated on a "quick fix"), the very common forms of treatments for mental illness (which stem from chronic stress), are:

1. Medication (e.g. antidepressants, antipsychotics, mood-stabilisers, etc.)
2. Psychotherapy (e.g. talking to a therapist)
3. Brain stimulation treatments
4. Hospital and residential treatment programs

It's quite sad to think that ¾ of these options require those with mental health disorders to undergo treatments that could potentially cause detriment to their health, and could even lead to major personality changes. Personally, I don't think that the current systems are very fair, or even effective. What I'm hoping for is that through my research results we could begin to identify simple non-invasive techniques to improve universal management of mental health issues, specifically involving control perception, by changing environmental variables around people that will give them a better sense of being in control of their own destiny leading to improved wellbeing outcomes.

Via my science experiment I am hoping to show that if a person is well prepared for a cooking lesson (i.e. during a Recipe Lesson), they will be more in control, and so their stress levels will be reduced, leading to improved performance relative to when they are not or do not have a sense of being in control.

4. Ideation

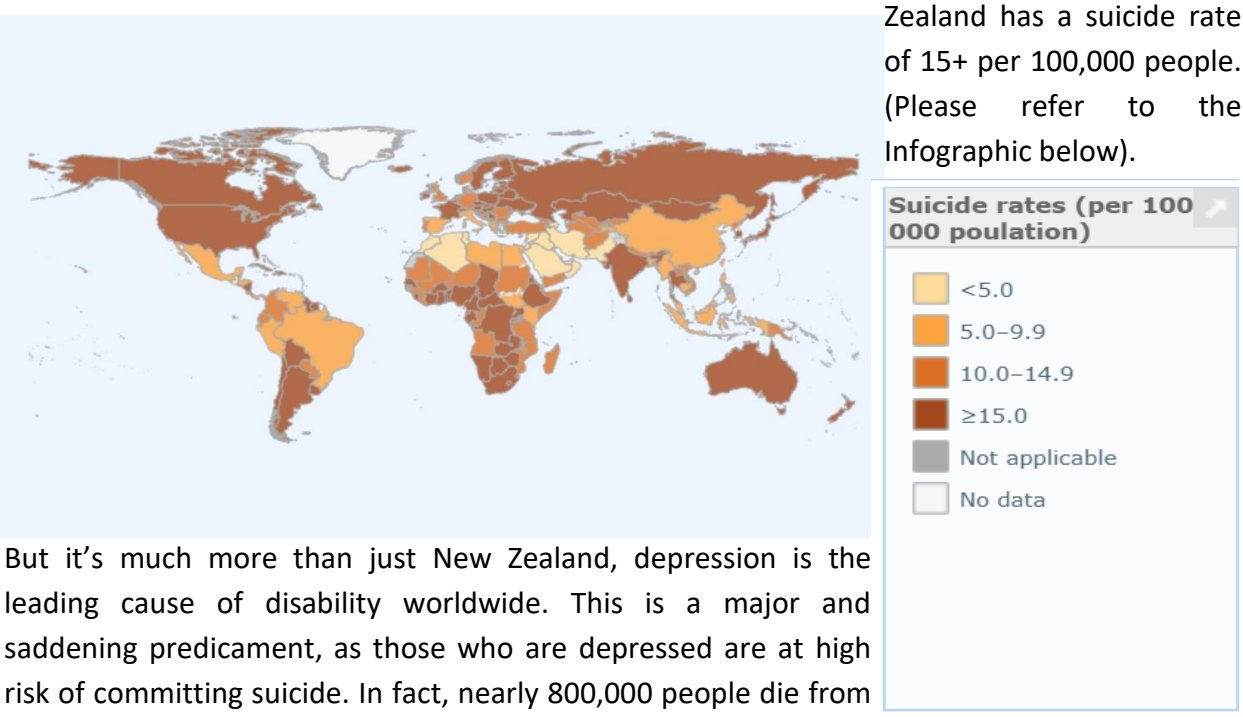
A series of roadblocks arose during my journey towards finalising my final project idea.

1. My very first idea was to emulate stress via digital simulation. I actually came up with my science project when I noticed just how funny - yet fascinating, it was that my dad would give “how to drive properly” tips to other drivers on the road, despite them not being able to hear him! I then realised that this is a very common trend with drivers; that the idea of being able to control other road users (and expressing this verbally), somehow calms people down. Consequently, my first idea was to create a digital car simulation where the focus was on one car which would continuously be on the fringes of getting into an accident. One group would’ve had a fake remote control and hence felt like they were in control of the outcome (that they were the ones who were preventing the car from getting into trouble), and the other group would simply have to watch the car’s crazy journey. After data collection, I would’ve then compare participants’ stress levels. However, this idea was very expensive. I didn’t have the time, skill, or money to create a full on digital 3D car simulation, nor the correct equipment to record accurate data from such an experiment… Hence, this idea sadly had to be put to the side.
2. My second idea was one that my science fair mentor, Professor Glynn Owens, and I discussed and were very excited about. The idea was to make speeches the stressor. Participants would have either been given time to prepare a speech (i.e. obtaining higher levels of control over the outcome), or none at all (i.e. lacking control). Variables such as speech length, audience members, topic type, and speech stakes (e.g. whether the speech going to be graded), could’ve all been variables that I played around with. However, after presenting this idea to the Royal Society for the first time, I was told that this project idea would lead to participants feeling “unduly and publically overly ‘intimidated’”. Therefore, I had to move onto another idea, yet again.
3. My third and final idea then found me when I thought all hope was lost. During the Christmas holidays I watched a lot of Netflix (as you do), and so I eventually came across this show called ‘Nailed It’. This show is focused on culinary novices who compete against each other all in the hopes of winning cooking prizes which would enable them to reach their full culinary potential! Much like every other cooking show, the contestants looked really nervous and panicky as the final countdown began. I soon realised that this nervous panic was a common factor of stress, and that the perception of control can be incorporated in the kitchen environment with ingredients (i.e. knowing what the ingredients would be beforehand vs being presented with mystery ingredients in the moment). My wonderful supervising teacher, Mrs Ghanim, then helped me to get connected to the Food Technology department at my school. And so just like that, I was given the amazing opportunity to work with the Year 10 Food Technology classes for my science fair project!

5. Research

Stress. What exactly comes to mind when you read or hear the word “stress”? To some, the five letter word induces the feeling of anxiety instantaneously, while others are bombarded with memories of the first dates, exams, job interviews, and even Netflix character drama that have caused them stress in the past. Whether it be the stress of deciding a ball dress, or sitting an exam, it is obvious that we have all faced the formidable word at some point in our lives.

In our modern world where there’s pressure for people to achieve more with less means (i.e. time, skill and money), it is evident that stress has become a predominant factor in daily life. Consequently, the prevalence of stress and anxiety based disorders (e.g. anxiety disorder, depression, bipolar disorder, etc.) has increased at an exponential rate over the past few years. This trend has been especially noticeable in New Zealand. In fact, statistics show that one in six New Zealanders have been diagnosed with a mental disorder at some point in their lives. The demographic most affected by mental health illnesses are teenagers and young adults (i.e. 15-24 year olds, also referred to as Generation Z). The percentage of those within the 15-24 year old demographic who struggle with such illnesses has increased from 5% in 2012, to 8.8% in 2015/2016, to 11.8% in 2017, and is continuing to sky rocket. It is also crucial to note that New Zealand is a country with one of the highest suicide rates internationally. Unfortunately, New Zealand has a suicide rate of 15+ per 100,000 people. (Please refer to the Infographic below).



But it’s much more than just New Zealand, depression is the leading cause of disability worldwide. This is a major and saddening predicament, as those who are depressed are at high risk of committing suicide. In fact, nearly 800,000 people die from suicide in the world each year (which is roughly one death every 40 seconds). Consequently, suicide is the second leading cause of death in the world for those aged 15-24 years!

Despite the fact that these statistics are so shocking, the mental health systems that have been implemented in countries across the globe don't seem to be doing an adequate job at promoting human wellbeing (or reducing societal stress). Currently, the mechanisms that health professionals are adopting in order to combat mental illness, fall at both extremes of

the medical treatment scale. Doctors either seem to prescribe large doses of medication and invasive treatments, or mindfulness based therapeutic treatments (i.e. meditation, yoga, etc.). While for some, these treatments work, considering the statistics, it is evident that such treatments aren't very suitable as they haven't resulted in mass benefit. This suggests that scientists have not yet found, or properly addressed the root causes of stress or have not discovered effective treatment regime that will address the majority of sufferers.

After this deduction, I naturally went on to question: what exactly is the root cause of stress? Intriguingly, rather than actively looking for the answer, the answer sort of, well, found me.

Whilst my dad was driving me to school one day (in slow-moving traffic - my time conscious dad's worst nightmare), I realised something: my dad, and many other drivers alike, tend to talk at cars like they can control how other cars on the road will move. Even though this tactic never works (due to the obvious fact that drivers in other vehicles are too far away to hear my dad's rather funny "how to drive properly" tips), it seems to calm him, and other drivers down. I then questioned this: why is it that we feel better when we believe that we're in control of situations (despite the fact that in many cases, we're truly not)? After making the link that both stress, as well as the perception of control, affects one's wellbeing, I decided that the best way to understand control perception's role in wellbeing and mental health, was through its connection to stress. And thus, my science fair project was born!

Maslow's Hierarchy of needs

Abraham Harold Maslow was a 1900's American Psychologist whose most notable work was his creation of "Maslow's Hierarchy of needs". Maslow's Hierarchy of needs is a theory about the vital stages that one must achieve whilst on their journey towards self-actualisation and optimum psychological health. Based on Maslow's triangle, in order to lead a life consisting true happiness (derived from satisfaction and self-fulfilment), one needs to first achieve the lower levels of the triangle in ascending order (from bottom to top). First comes the essentials (i.e. food, water, and shelter), and next comes the ever so important sense of self security. A prime factor that determines one's sense of safety is one's stress level. To fully convey to you how stress affects the body, I'd have to write an entire thesis on neuroendocrinology, however, I'm going to keep it brief! After your brain identifies and computes that you are in the midst of a harmful/stressful situation, the sympathetic nervous system is quickly activated (this activation is called "fight or flight" mode). Nerves situated in the brain's control centre and brainstem activate, subsequently initiating the release of noradrenaline from the adrenal glands. Receptors found in blood vessels pick up on

the activated signals and cause blood vessels to restrict; this leads to an increase to blood pressure, alongside the acceleration of heart rate. Other receptors cause skin hairs to stand up (i.e. goosebumps), and discomfort in the abdominal region. All of these constitute the well-known feeling of stress (i.e. comprised of rapid pulse rate, high blood pressure, goosebumps, sweating, butterflies in the stomach, etc.). The next stage to the stress response involves the HPA (hypothalamus, pituitary gland, adrenal cortex and hippocampus) axis. It is at this stage that the hormone cortisol is produced. If one remains in a constant state of stress, then the level of cortisol in their bloodstream reaches a toxic level, which can potentially shrink the brain's hippocampus; a small hippocampus is common in those with chronic stress disorder and depression. Therefore, Maslow's theory makes a lot of sense. Even on a scientific level, it has been proven that remaining in a state of continuous stress (e.g. when in danger), one cannot move on with their life, fulfil themselves, or obtain true happiness.

Therefore, in order to reduce stress, someone needs to be able to address their stressors, and find viable ways to control it. Although, understanding what determines the degree of stress that someone feels during certain situations, has proven to be a very tricky task. Over centuries, a plethora of social scientists (psychology, etc.) and neuroscientists have dedicated their work towards finding ways to accurately measure stress.

Can Stress be measured?

For years, a myriad of professional scientists, ranging from neuroscientists to psychiatrists, have been debating whether or not stress can truly be measured, and if so, then how? Below is a reflection, and relevant discussion on the various aspects and measures involved in assessing one's level of stress. All of these portions of research were vital when it came to my ideation phase, experimentation phase, and evaluation phase, of my science fair project.

Life Events Theory

In order to identify the connection between one's stressful life experiences, and the likelihood of said person developing mental health illnesses, two scientists: Thomas Holmes and Richard Rahe, undertook a science experiment which they called the "Life Events Theory" (done in 1967). To begin with, Holmes and Rahe formulated a questionnaire known as the 'Social Readjustment Rating Scale', or SRRS for short. This questionnaire consisted of a list of 43 stressful life events, each of which are connected to a corresponding Life Change Unit/LCU (the value of each Life Change Unit was dependent on the degree of trauma that the event caused for a large sample of participants). Then by adding all the LCUs for an individual in regards to their experience over the last 12 months, a person's total value for stressful life events can be produced.

Life Event	Mean Value
1. Death of spouse	100
2. Divorce	73
3. Marital Separation from mate	65
4. Detention in jail or other institution	63
5. Death of a close family member	63
6. Major personal injury or illness	53
7. Marriage	50
8. Being fired at work	47
9. Marital reconciliation with mate	45
10. Retirement from work	45
11. Major change in the health or behavior of a family member	44
12. Pregnancy	40
13. Sexual Difficulties	39
14. Gaining a new family member (i.e.. birth, adoption, older adult moving in, etc)	39
15. Major business readjustment	39
16. Major change in financial state (i.e.. a lot worse or better off than usual)	38
17. Death of a close friend	37
18. Changing to a different line of work	36
19. Major change in the number of arguments w/spouse (i.e.. either a lot more or a lot less than usual regarding child rearing, personal habits, etc.)	35
20. Taking on a mortgage (for home, business, etc..)	31
21. Foreclosure on a mortgage or loan	30
22. Major change in responsibilities at work (i.e. promotion, demotion, etc.)	29
23. Son or daughter leaving home (marriage, attending college, joined mil.)	29
24. In-law troubles	29
25. Outstanding personal achievement	28
26. Spouse beginning or ceasing work outside the home	26
27. Beginning or ceasing formal schooling	26
28. Major change in living condition (new home, remodeling, deterioration of neighborhood or home etc.)	25
29. Revision of personal habits (dress manners, associations, quitting smoking)	24
30. Troubles with the boss	23
31. Major changes in working hours or conditions	20
32. Changes in residence	20
33. Changing to a new school	20
34. Major change in usual type and/or amount of recreation	19
35. Major change in church activity (i.e.. a lot more or less than usual)	19
36. Major change in social activities (clubs, movies,visiting, etc.)	18
37. Taking on a loan (car, tv,freezer,etc)	17
38. Major change in sleeping habits (a lot more or a lot less than usual)	16
39. Major change in number of family get-togethers ("")	15
40. Major change in eating habits (a lot more or less food intake, or very different meal hours or surroundings)	15
41. Vacation	13
42. Major holidays	12
43. Minor violations of the law (traffic tickets, jaywalking, disturbing the peace, etc)	11

Holmes and Rahe's experiment had the following procedure:

- The scientists gave the SRRS to 2,500 male American sailors who then recorded the number of life events that they had experienced during the prior 6 months.
- Each participant had their total score on the SRRS recorded individually.
- Over the following six-month period (whilst the sailors continued their duties on deck), each sailor's health status was routinely checked upon and record.
- The detailed records of the sailors' health statuses contributed towards their illness scores; this was then correlated to their individually recorded number of Life Change Units from the prior assessed SRRS.

Holmes and Rahe's results:

From the experiment, a small - but significant - positive correlation of +0.0118 between Life Change scores and illness scores had been identified. It indicated that there was a statistically significant correlation between Life Change Units and health, particularly mental health. To put it simply, as Life Change Units increased, so did the frequency of illness. Hence, Holmes and Rahe concluded that the experience of life events increases

one's chances of facing stress-related health breakdown. However, since the correlation was not perfect, the scientists realised that Life Events cannot be the only factor in contributing to illness.

From the results, the following was gathered:
If a person has…

- Less than 150 LCUs then they have a 30% chance of suffering from stress.
- 150 - 299 LCUs then they have a 50% chance of suffering from stress.
- Over 300 LCUs then they have an 80% chance of developing a stress related illness.

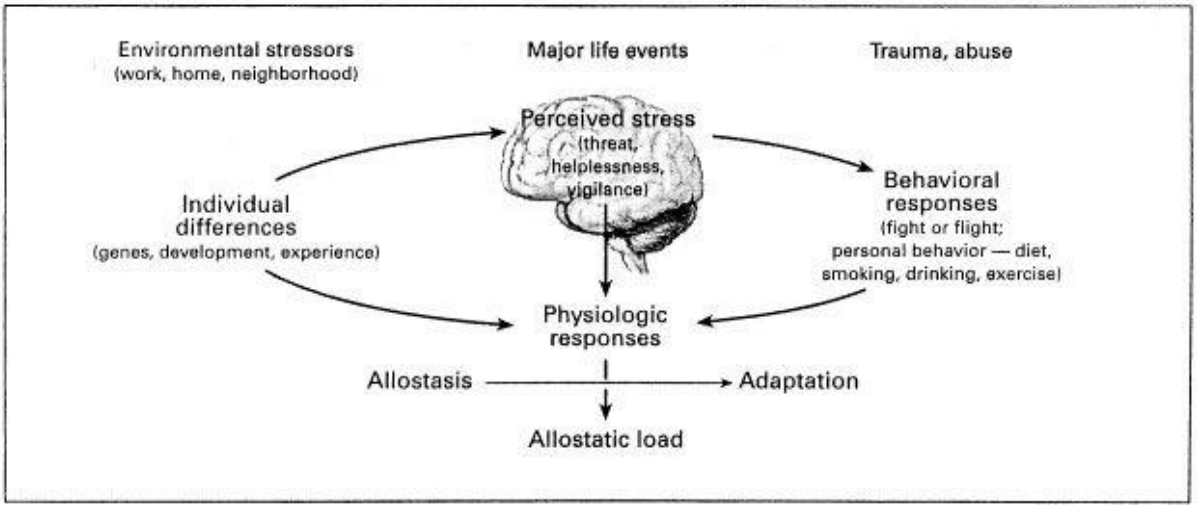
Holmes and Rahe's Critical Evaluation:
Like all great scientists, Holmes and Rahe critically evaluated their experiment. Throughout this evaluation they made some thoughtful considerations:

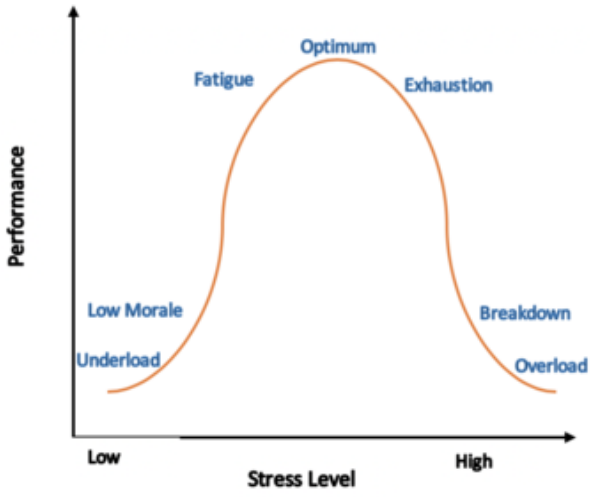
- *(paraphrased) Due to the structure of the SSRS scale, there is an assumption that the stressors identified on the list, affect all people in the same way, and to the same degree. However, this is obviously incorrect. For example, some people view divorce as an immensely stressful event, whereas others find divorce to be somewhat relieving.*
- *(paraphrased) In truth, the vast majority of people experience major life events on an infrequent basis, which means that the impact of such events may not be the best measure of stress. Potentially, a better measure of stress would asses "daily hassles".* So, I believe that daily hassles such as losing your keys, or being late to work (i.e. stresses and strains that affect life on a daily basis).

I used this information to enhance my data. Prior to the beginning of the trials, I asked participants to fill out a questionnaire where one of the sections involved a list that was similar to the one used in Holmes and Rahe's experiment. This way, I was able to gain insight on the type of stressors that most affect the age range of my participants (i.e. Year 10s - 14 to 15 year olds), which I hope will benefit educators. Hopefully this could enable them to better teach students, as they'd have the inside knowledge of what students of today they're dealing with.

Allostatic Load
Allostatic load, most commonly referred to as "wear and tear", is a term that was invented by the psychiatrists Bruce S. McEwen and Elliot Stellar in 1993. This term depicts the relationship between long-term chronic stress, and the effect on the body, and one's general wellbeing. McEwen and Stellar's theory, was that after frequent and immense exposure to stress, the body's stress responses become increasingly more maladaptive (maladaptation refers to the inability to adapt to changing environments). What this means is that the body's initial responses to acute stress (e.g. increased coagulation, blood pressure, heart rate, and quantity of cortisol release in the bloodstream), eventually become permanent after prolonged experiences of chronic stress. In order to sustain homeostasis (the maintenance of steady physical, chemical and internal bodily conditions) during periods of acute stress, the body

adapts by regulating hormones, temperature etc.; the process of this regulation is known as ***allostasis***. Thus, prolonged chronic stress causes allostatic load, which in turn negatively affects one's stress level, and can potentially lead to the development of irreversible damage, and stress based mental health disorders (e.g. anxiety, depression, bipolar disorder, etc.).





Allostatic load can be measured using specialised scientific equipment that can analyse a human's neuroendocrine activity, neurophysiological state, anti-inflammatory system, metabolic pathways, and more. Allostatic load can also be graphed visually via diagrams such as the one to the left.

The prevalence of this research is the relationship between allostatic load and coping mechanisms. It is said that "Allostatic load can be increased due to dysfunctional coping mechanisms such as a repeated failure to habituate to common stressors, and an inadequate response from one or more bodily responses that leads to hyperactivity in other bodily responses to stress". To summarise, this clearly shows that an individual's inability to identify their stress stimuli, which results in their inability to exert control in situations, leads to an increase in allostatic load, and hence one's stress level.

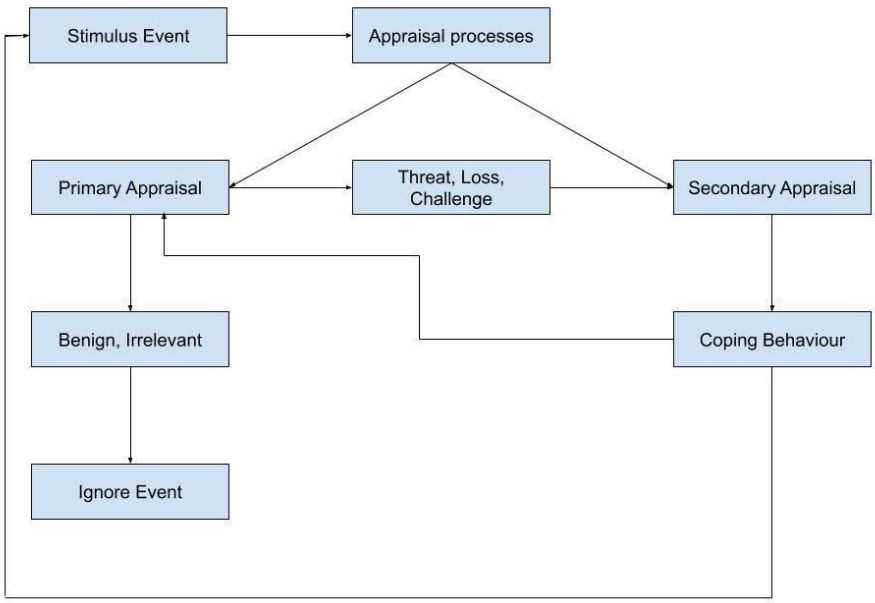
This research and knowledge made me very confident that my results would be very beneficial towards finding remedy for the mental illness epidemic. Especially since the vast majority of people seem to lack beneficial coping mechanisms.

Appraisals

Evidently, each and every one of us reacts to stress stimuli in a multitude of different ways. To some, the prospect of being chased down the road by a Grizzly bear (an activity which results

in the prompt activation of one's "flight or fight" mode), provokes intense internal alarm bells, whereas for others (who may be e.g. very fast sprinters), the anxiety response may be minimal. Because of this vast dichotomy between how each individual's responses to stress, the relationship between stress stimuli and corresponding allostatic load for each individual depicts an even greater contrast. Therefore, understanding the dynamics involved in people's assessment of stress (i.e. stress appraisal), is fundamental to understanding why stress can affect people so much (i.e. via allostatic load). This will provide insight towards how best to minimise stress levels.

According to Richard Dr Lazarus - a famous Psychologist, "stress is a result of an interaction between an individual's characteristics and appraisals, the external or internal event (stressor) environment, and the internal or external resources a person has available". Lazarus developed the idea of stress being a transaction into a model known as the "Cognitive transactional model of stress".



← *My drawn diagram based off of Lazarus's early transactional model (originally adapted from Lovallo [1977:77])*

Primary Appraisal Processes

In order to generate a stress response, a person must first consider the nature of the stress stimulus (this consideration is called primary appraisal). Lazarus categorised stressors into three different groups: stressors that pose harm (i.e. damage - e.g. failure or loss that has already occurred), those that pose a threat (i.e. provoke the anticipation of harm), and those that are viewed merely as a challenge (i.e. opportunities for personal growth). Occurrences that cannot be categorised into either of these distinct groups, were considered by Lazarus as benign (i.e. non-stressful events, hence events that require no further action). During this process, individuals probe themselves with a series of questions such as: "Is this event something I have to deal with?" "If so what is at stake?", "Is it relevant to me?" "Is it a positive,

negative, or neutral event? If potentially or actually negative, then is it posing me harm, threat or challenge?"

Secondary Appraisal Processes

In Lazarus's model, the secondary appraisal process occurs in correspondence to the primary appraisal process, as it is the interaction between the two that develop one's final stress response. At this stage, individuals consider their "coping potential"; this is where people analyse their resources and abilities to cope with the stressor at hand. People my take account of either internal resources (e.g. their tenacity, will, strength, personal goals, etc.), external resources (e.g. family, friends, school support, money, etc.), or both; it all depends on the type of person and how said individual copes during stressful events. Individuals will be wondering, "How am I going to deal with this?" "What can I use or call upon to help me?"

Final Appraisal

The overall stress appraisal is then an amalgamation of both the individual's primary appraisal, and secondary appraisal. It is somewhat "gap" between an individual's perception of stress on a primary basis, and the level of capability said individuality feels they have to deal with the stressor, that denoted whether stress would be extreme or minimal. To conclude, stress arises "from a mismatch between perceived demands and resources, both of which would change over time". Therefore it is crucial that stress is viewed as a dynamic process".

An excellent example of stress appraisal can be made in relation to exams. Consider students experiencing the following during exam season:

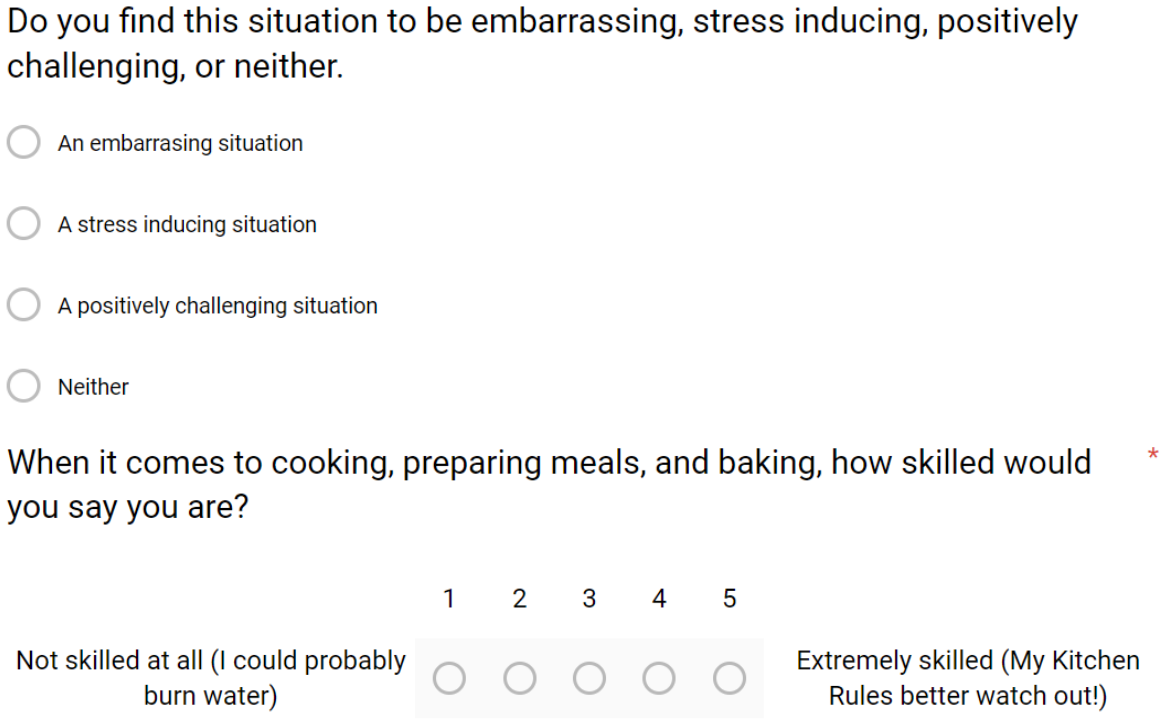
- "There is no way I can possibly deal with this. I simply know I will fail" (threat + no resources = extreme stress level)
- "This will be really hard. I am just not as clever as the other students". (Threat + limited internal resources = high stress level)
- "Maybe I can manage this if I revise really hard". (Challenge + possible internal resources = lower stress level)
- "I could perhaps do it if I get some help from my friends"". (Challenge + external resources = even lower stress levels)
- "This isn't a problem, I know the material well". (Benign)
- *"I managed to pass last time; I'll be okay this time" (Benign. However, note that despite this person feeling no stress towards exams, they have confided in false comfort and have taken the approach of avoidance, of e.g. studying, rather than actively taking action. This concept will be discussed further on in this Research booklet)*

The example above has been adapted from the example given in the book 'An Introduction to Health Psychology' outlined in the Bibliography.

The knowledge I gained from this research was very applicable to my actual experiment. Through this, I was able to create some questions that revealed my participants' primary and

secondary appraisal processes. Some examples of such questions are shown below (note that you can see the statistical results from such questions, in the "Results" portion of the booklet).

Both examples are from the questionnaire titled, 'Questionnaire to do before the experiments start'



The Locus of Control

At this stage, you may still be wondering what the link between talking to yourself whilst driving, and the sense of control is. Well, the important relationship has a lot to do with one's "locus of control". As the name suggests, locus of control (a principle developed by Julian Rotter in 1954) refers to where one's sense of control resides; this can either be internal or external control. Some people tend to feel like their own actions are what's influencing their outcomes (internal control); whilst others believe that they have very minimal ability to shape their own lives (external control). One's locus of control has a direct effect on how a person appraises their stress.

Internal Control

Individuals with a strong internal locus of control believe that they are in control of the outcomes of events in their own lives. Such people feel a strong sense of control throughout their day to day lives as they take responsibility for their life triumphs and downfalls. With limited lack of control, such individuals tend to feel less stressed, although when things go wrong, such people take on the blame and can do to a high degree of damage.

External Control

Individuals who believe that control over their own lives resides in external forces (e.g. nature), tend to be more fatalistic (i.e. they believe that there's nothing much that they can do about the things that happen in their lives). People either react to this by feeling stressed about

things in their lives constantly changing without their control, or merely become complacent, and accept it.

Link to Mental Health

One's locus of control has very strong connections to their mental health, and potential development of mental health disorders. For example, extreme perfectionists tend to have a very high degree internal locus of control. Whereas, those who tend to give up easily, often have an external locus of control. However, it is very important to note that one's locus of control can vary in different situations, and hence the way that people react and respond to different stimuli, varies by situation also. Interestingly, people often only apply e.g. perfectionism, laziness, etc., to certain areas of their life. For instance, some people find school exams to be extremely stressful, and so they feel the need to arrange their exam resources (e.g. pens, rubbers, rulers) perfectly on their desk before the exam starts. Doing such rituals gives them the sense that they have an internal locus of control, and are in complete control of their exam performance. However, this same person may have the messiest room as they don't feel stress whilst the comfort of their room.

From this, I was able to identify that how people address life events, can be directly related to their locus - and hence perception - of control in their lives. This information was very important in the observations section of my science fair project as it allowed me to translate seemingly mundane behaviours of students during the cooking lessons, to meaningful insights regarding one's perceived level of control, and the relationship to their stress level.

From this initial idea, I quickly came to the conclusion that a better pathway for mitigating the feeling of stress, is certainly via strengthening one's perception of control.

Coping Mechanisms

I'm sure that all of us have come across the term "coping mechanism" time and time again. Albeit, I doubt that many of you have ever sat down and pondered about what it really means to "cope with stress". Well, based off the prior established definition of stress being a transaction ("a mismatch between demands and resources as perceived by an individual in a specific situation"), the action of actively trying to alter the stressor, or one's interpretation of the stressor to create the perception that said stressor is more favourable, is called coping. The art of coping is marvellously detailed interaction between a myriads of factors, each of which is derived from a multitude of emotion based behaviours and cognitions developed by individuals during primary and secondary appraisals.

It is important to know that the act of coping doesn't automatically generate a better outcome when dealing with stressors, rather, coping enables people to manage stressors by various means (e.g. employing new skills in order to increase capability, tolerating the stressor,

reappraising it, or minimise it). Thus, it is concluded that the goal of coping is trying to adapt to stressful environments. It is said that coping is a "dynamic, learned... and purposeful process". To convey this concept in an easily understood way, in 1979 Lawrence J. Cohen and Dr Richard Lazarus described 5 fundamental coping functions which enable individuals to successfully adapt to a stressor.

1. Reducing harmful external conditions;
2. Tolerating or adjusting to negative events;
3. Maintaining a positive self-image;
4. Maintaining emotional equilibrium and decreasing emotional stress;
5. Maintaining a satisfactory relationship with the environment or with others.

At this point, it is evident that we have come full circle. The list depicted above coincides with Maslow's hierarchy of needs as it is only possible to have a positive self-image (correlating to the 4th step on Maslow's hierarchy: "esteem needs") and a satisfactory relationship with the environment or with others (corresponding with the 3rd step on Maslow's hierarchy: 'belonging and love needs), when one has achieved the second step on the pyramid, i.e. safety. The sense of safety is aided by minimising stress, which can be achieved via the use of coping mechanisms. Therefore, lack of adequate coping mechanisms, negatively affects both one's health (i.e. allostatic load), and general wellbeing/livelihood. Considering how fundamental coping mechanisms really are for how people function on a daily basis, I knew that the incorporation of these findings into my experiment was going to be extremely important.

In addition, in 1980 Dr Susan Folkman and Dr Richard Lazarus discussed the two main coping taxonomies. The two described the differences between problem-focused coping, and emotion-focused coping; as well as the differences between approach-oriented coping and avoidance-oriented coping.

1. **Problem-focused coping (problem-solving function)**
   This is when you strategize and plan how to change the stressful situation, control the stressful situation, focus on dealing with and overcome the stressful situation first and foremost, actively look for practical information which will help you reduce stress in the stressful situation, handle the stressful situation head on, and remain level-headed.

2. **Emotion-focused coping (emotional-regulating function)**
   This is when you focus on how you're feeling in a stressful situation and work on reducing stress to minimise negative emotions. This can be done by assessing the stress with a more optimistic attitude, accepting that the stressful situation at hand isn't going to be fun but encouraging yourself to handle it, seeking for emotional support, venting anger, and praying.

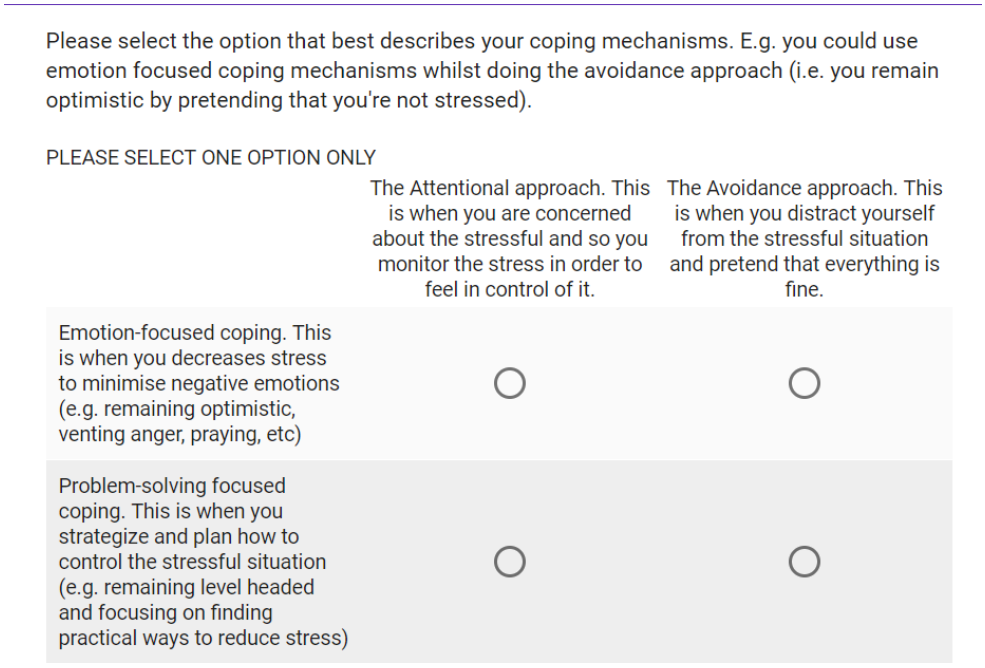
3. **Attentional/approach, monitoring, vigilant, active**

This is when you are concerned about the stressful situation and so your approach is to intentionally seek information about how to reduce the stress in the situation, or continue to monitor the stress in order to feel in control of it. (However note that hyper-vigilance - extreme vigilance, is the exact opposite of a coping mechanism, and actually leads to the development of paranoia and anxiety disorder).

4. **Avoidant, blunting, passive**

   This is when you distract yourself from the stressful situation happening by thinking pleasant thoughts, doing lots of random activities to fill up time, etc.

I decided to implement the latter in my experiment to get a deeper understanding of how my participants' coped with stress, prior to the experiments. I compared their answers to my observations as well as their Food Technology grade.



Please select the option that best describes your coping mechanisms. E.g. you could use emotion focused coping mechanisms whilst doing the avoidance approach (i.e. you remain optimistic by pretending that you're not stressed).

PLEASE SELECT ONE OPTION ONLY

	The Attentional approach. This is when you are concerned about the stressful and so you monitor the stress in order to feel in control of it.	The Avoidance approach. This is when you distract yourself from the stressful situation and pretend that everything is fine.
Emotion-focused coping. This is when you decreases stress to minimise negative emotions (e.g. remaining optimistic, venting anger, praying, etc)	○	○
Problem-solving focused coping. This is when you strategize and plan how to control the stressful situation (e.g. remaining level headed and focusing on finding practical ways to reduce stress)	○	○

Resilience

As a side note, despite coping mechanisms and their important role in stress reduction, in truth, each person's resilience towards stressful situations varies massively. People who grow up in hardship and experience consistent doses of stress (each being a small knock back to their life journey), tend to build better resilience to stress in comparison to those who live a predominantly stress free life. Hence, as they experience extreme stress, they are less likely to crumble. The notion of resilience hence plays an active role in stress reduction. However, measuring one's level of resilience is a complex matter, especially considering that the degree

of one's resilience would differ based on which aspect of their life was being recorded (e.g. some people can handle heaps when it comes to sport performance pressure and stress, but less so when it comes to academic induced stress). I have tried to incorporate this concept into my experience with the 'Life Theory Events' based questions in my questionnaire, as to an extent, the responses to these questions will depict how many knock backs each student has encountered during the past 12 months, which will thus correspond to their estimated level resilience.

Rumination

Despite there being a number of very beneficial coping mechanisms, not all coping mechanisms are actually helpful. In fact, some are so negative that they can cause people to develop anxiety, depression, bipolar disorder, etc. Rumination is one of these detrimental "coping mechanisms". As defined by Susan Nolen-Hoeksema (1991), rumination is "where an individual engages in passive, repetitive, and self-focused thinking about their negative emotional states and the implications and consequences of these states". So to say that overthinking one's prior actions, and dwelling on potentially negative anticipated events, can cause excessive stress and anxiety, rather than the gift of positive reflection and lesson learning. From this research I deduced that an important link to make from my statistical findings is whether or not groups who were much organised and had pre-planned their self/teacher chosen recipes, actually ended up more stressed than those who didn't. If so, Nolen-Hoeksema's reasoning would explain why.

Relevant Past Experiments

Despite minimal spotlight on such research, there have actually been a number of researching endeavours that have tried to approximate the degree of the link between one's perception of control, and stress level. Below are a few examples and the corresponding results:

<u>Dissociation of Learned Helplessness and Fear Conditioning in Mice: A Mouse Model of Depression</u>

During the 1900s and early 2000s, a series of tests, carried out by a number of scientists (including: Capelari, Hunziker, Castelli, Glazer, Weiss, Gouveia, and more) that depicted the relationship between sense of control, coping mechanisms, and responses, occurred.

Abstract:

A key aspect in the development of major anxiety disorders such as depression is the sense of helplessness (or in other words, the lack of control). To investigate this, a group of scientists focused on the learned helplessness paradigm in rodents; the results now serve as a well-established model to depict the relationship between animals, and depression. Learned helplessness is defined as: the lack of escaping adverse situations, despite escaping being a viable option. Such tendencies arise due to exposure to similar prior experiences of uncontrollable stress. In order to test this, the scientists set up three experiments, with each trial there were a group of rats that faced an uncontrollable stressor (known as the

experimental group), and a control/comparison group that had been exposed to an equivalent amount of controllable stress.

Procedure:

Five days prior to the beginning of the experiments, a group of rats were separated into individual cages. Each mouse was then assigned to be part of either the group that faced the uncontrollable stressor, or the group that faced the controllable stressor (this was done randomly). Within the two different groups, each rat (residing in its own cage; note that each mouse remained in its initial cage throughout the entire experiment), was kept within close proximity of other rats in the same group. After the five day "acclimatisation period", the experimental rat groups undertook a three day learned helplessness procedure.

During the learned helplessness procedure, experimental groups were exposed to one session of inescapable electric shocks. Specifically, this session involved sixty 10 second, 1.0mA electric shocks within a square electric shock chamber. These electric shocks were delivered to the mice every 10-110 seconds. The structure of the electric shock chambers were such that mice were unable to use their usual nose-poking response to escape danger, hence the mice had no control over any aspect of the shocks.

1. *Experiment One:* After 1, 14, or 28 days, mice that were previously exposed to inescapable shocks undertook an escapable electric shock session. This time, the mice received 30, 1.0 mA shocks, each with a maximum duration period of 10s; these were delivered every 10-110s through the grid floor.
2. *Experiment 2:* This was the same experiment as experiment 1 except results were observed in male and female rats from a different laboratory.
3. *Experiment 3:* This was the same experiment as experiment 2 except results were observed after providing mice with an increased opportunities/ability to escape.

Results:

The results from the specific set of experiments described above, and a range of other rat/mice related experiments with relation to learned helplessness, showed that rodents that had suffered uncontrollable stress stimuli (e.g. inescapable shock sessions), showed that even when they had the opportunity to escape (i.e. had control over the situation), they continued to act helpless. Such rodents had developed stress based disorders such as anxiety and depression. Despite some results alluding to the notion that there are other factors that could also affect the results, the majority of findings and research suggested that this rather profound conclusion is very valid.

What this means?

The results from these rodent experiments depict a momentous, but not surprising, phenomenon. The idea that consistent lack of control arises in an individual developing a completely external locus of control (leading to the constant feeling of stress, resulting in allostatic load, rumination, and other vicissitudes), is important as it proves that the link

between control and stress is crucial. Without the sense of control, people, much like these rodents, will inevitably result in depression, anxiety, and worse. This is just another reason why being able to accurately understand the link between control and stress is essential!

A comprehensive test of the job demands-control interaction: Comparing two measures of job characteristics

Job stress is a form of stress faced by a large portion of the population, and once again, the sense of helplessness plays a pivotal role in job stress. In regards to work, one's perception of control relates to their level of leadership in the workplace (i.e. bosses and CEO's have high levels of control, whereas lower level employees experience minimal levels of control). To see whether increased control lead to decreased job stress, Angela Mansell and Paula Brough, undertook an experiment in 2005. The experiment's purpose was to derive a relationship between prior works: Karasek's (1979) operationalisations of job characteristics, alongside Jackson, Wall, Martin Davids (1993) measures of job demands and control.

Below is a snippet from the published findings:

The job demands-control (JDC) model (Karasek, 1979) asserts that the primary source of work stress lies not within the individual, but in the characteristics of the work environment. The JDC model identifies the psychosocial job characteristics most important in determining employee health as psychological demands and decision latitude (Karasek & Theorell, 1990). The strain hypothesis of the JDC model posits that individuals working in jobs characterised by high job demands and low control will experience high levels of strain. In contrast, low strain jobs are those characterised by low levels of job demands and high levels of control. Empirical support for the strain hypothesis has been considerable: working in a high strain job is associated with a variety of adverse outcomes, including lower levels of both job satisfaction and psychological well-being (see reviews by de Jonge & Kompier, 1997; van der Doef & Maes, 1999).

Results and conclusion:

Results showed that there was in fact some relationship between job strain, and job demand and control, and that in fact, high job demand when coupled with low job control lead to increased job strain. However, since this relationship was graphed and proven to be non-linear, some view the results as sceptics. In reality though, this idea has been proven to be accurate time and time again.

Hence, to conclude, the idea of control perception is viable for everyday activities (e.g. going to work), and so I strongly believe that deducing the link between stress and control perception will not only benefit people like my participants (i.e. 14-15 year olds school girls), but will be beneficial for the global population.

Pattern Perception

Arguably, one of the most quintessential pieces of research discovery that effectively portrays the relationship between the perception of control, and stress, is Jennifer Whitson and Adam Galinsky's 'Pattern Perception' experiment that in 2008.

Evidently, the lack of control places people in an uncomfortable, unsettling state of mind - one where stress is prevalent. Whitson and Galinsky deduced that because of this, people will try to manufacture the sense of control. That is, "when individuals are unable to gain a sense of control objectively, they will try to gain it perceptually". When people encounter situations where they lack control, they confide in pattern perception (a sort of pseudo sense of

structure). From as little two years old, everything we learn is delivered in some sort of structure or pattern (e.g. the alphabet - A is first then B, then C, or the number sequence). Consequently, humans prefer to decipher their world via the recognition of patterns; this process of linking information from stimuli, to information already stored in the brain, is known as pattern recognition. Pattern perception is the application of this, i.e. "the identification of a coherent and meaningful interrelationship among a set of random or unrelated stimuli". Through pattern perception, individuals are able to formulate predictions and make sense of future instances, subsequently providing them with an artificial sense of control.

Hypothesis:

Before diving right into the experiment, Whitson and Galinsky hypothesised that participants who experience a lack of control will be prone to seeing and seeking patterns (e.g. by creating conspiracy beliefs). This prediction was supported by the following pre-established facts:

- Tribes of the Trobriand island, who have minimal control over fish abundance as they fish in unmapped waters prone to storms, have far more rituals associated with fishing in comparison to fishermen/women who fish in shallow, mapped seas.
- Parachute jumpers are more likely to see a non-existent figure in an image of visual noise (i.e. the black and white flickering that can be seen on TV screens when channels are out of reception) right before a jump, in comparison to an earlier time *(prior the jump)*.
- The tendency for a Baseball player to create pre, during, or post-game rituals is directly linked to their position's level of capriciousness (i.e. unpredictability/uncertainty of outcome). For example, many baseball pitchers see a link between their specific baseball shirt, and the game's success.
- First-year MBA (Master of Business Administration) students are more likely to develop conspiratorial perceptions, than second-year students.

Procedure:

Whitson and Galinsky undertook six experiments that tested whether lacking control increases illusory pattern perception. They did this by initially splitting participants into two groups (one group that lacked control, and the other was the baseline group) for the first few experiments.

1. *Experiment One:* in this experiment the scientists' aim was to establish whether lack of control creates a need to see patterns. They did this by creating a concept identification paradigm purposefully designed to reduce one's sense of control. The group who lacked control were given feedback based off their ability to identify concepts; this feedback didn't correlate with their performance at all. Conversely, the baseline group identified concepts without feedback. Whitson and Galinsky then measured each group's need for pattern perception with the 'Personal Need for Structure' scale.
2. *Experiment Two:* both groups were asked to decipher a hidden image contained inside a large grainy image. There were 24 grainy images, and only 12 of them had a hidden

image embedded within it. Each group of participants were asked to identify what the images within each of the 24 the grainy images were.

3. *Experiment Three:* participants were asked to recall instances where they remembered having had full control, or complete lack of control, over a situation. They were then asked to identify any superstitious behaviours or beliefs that they had adopted during this instance (e.g. knocking on wood before an extremely important meeting). All participants were asked to state whether they believe that these superstitions and rituals affected that instance's outcome.
4. *Experiment Four:* to disprove the notion that threat was the driving force for pattern perception, Whitson and Galinsky conducted yet another experiment. They did this by creating 10 pictures snowy pictures, each consisting of a random scattering of black and white dots. With the images, they measured participant's illusory pattern perception. Next, the participants were asked a series of conspiracy scenarios to test their conspiracy perception; via these scenarios, individuals were asked to make connections between behaviour and outcome.

   Snowy pictures:

5. *Experiment Five:* the scientists manipulated control by describing the economic climate of a made up stock market as either volatile or stable. In the volatile stock market condition, participants read 24 statements about the financial performance of two companies (company A and company B). There was an even ratio of positive statements (e.g. "Smooth sailing ahead for investors") and negative statements (e.g. "Rough seas ahead for investors") for each company, however company A had 16 positive statements, and 8 negative statements, but company B only had 8 positive statements, and 4 negative statements. Participants then had to choose which company they'd invest in based on the number of positive or negative statements that they'd remembered for each company.
6. *Experiment Six:* lastly, Whitson and Galinsky tested if there was a correlation between self-affirmations and a reduction in illusory pattern perception. This experiment had three conditions: lack of control without self-affirmation, lack of control with self-affirmation, and baseline. Participants then completed a scale focused on a value they had given at the start of the experiment, and decide whether it was most important (self-affirmation), or least important (no self-affirmation), to them.

Results:

1. *Experiment One:* the lack-of-control group had increased needs for personal structure in comparison to the baseline group. The group lacking control had a Personal Need for Structure Scale mean (M) = 44.9, SD=6.3. The baseline group had a Personal Need for Structure Scale mean (M) = 38.2, SD=10.7.
2. *Experiment Two:* for the 12 grainy images consisting of hidden images, almost all people identified the presence of a hidden image (overall M = 11.4, SD = 1.1). For the 12 grainy images without embedded images, the lack-of-control group displayed the marginal tendency to see more images than participants in the baseline group. The group lacking control had a mean (M) = 5.16, SD=3.5. The baseline group had a mean (M) = 3.57, SD=2.0.
3. *Experiment Three:* participants with recollections of experiences in which they lacked control, had a stronger link between the two events (i.e. the instance outcome and the superstitious ritual), than those who remembered instances of complete control. This was a comparison of M = 4.92, SD = 2.5, compared to M = 3.5, SD = 1.8. Additionally, those who performed pre-event rituals were more worried about performing similar behaviours in the future. (M=5.95, SD = 2.6, compared to M = 4.12m SD = 2.3).
4. *Experiment Four:* those who lacked control had an increased likelihood to see images in the snowy pictures (M = 2.92, SD = 2.5), and perceived a greater likelihood of conspiracy (M = 4.42, SD = 1.1), than those in comparison to those in the baseline group (M = 0.92, SD = 2.0 and M = 3.50, SD = 1.0, respectively).
5. *Experiment Five:* As predicted by Whitson and Galinsky, volatile market conditions resulted in a stronger connection between the negative statements and company B, with participants overestimating the frequency of negative information provided on company B (M = 5.0, SD = 1.5). Though, participants accurately estimated the number of negative statements relating to company B in a stable market (M = 3.9, SD = 1.7). Also, only 25% of participants agreed to invest in company B during a volatile market, and 58% during a stable market.
6. *Experiment Six:* the group who lacked control and didn't have the chance for self-affirmation (M = 3.24, SD = 2.6), perceived more non-existent patterns than those in the baseline condition (M = 3.47, SD = 3.3). Also, those who lacked both control and self-affirmation (M = 4.76, SD = 0.87), had an increased likelihood of perceived conspiracy than those in the self-affirmation group (M = 4.18, SD = 0.83), and baseline group (M=4.20, SD = 1.10).

Conclusion:

This experiment demonstrated that when people lack control, the tendency to develop pattern perception (e.g. a variety of illusory patterns, including seeing images in noise, forming illusory correlations in stock market information, perceiving conspiracies, and developing superstitions), increases. Also, there is a "causal link" between the reduction of illusory perception produced from lack of control, and self-affirmation.

These findings support my science fair experiment greatly, as it provides ostensible evidence relating to the fact that developing a sense of control in order to mitigate stress, is something well sought out for (i.e. is a genuine need).

Experiments by 'The Big Think'

Tali Sharot, from 'The Big Think' was involved in various small scale studies prior to 2017.

- In one study, Tali Sharot associated various shapes with varying levels of financial reward. The participants' aim was to receive the highest level of rewards. Participants were given the opportunity to either make choices about which shapes to pick, or to give this choice to an expert who had some degree of inside knowledge of which shapes to pick. The vast majority of participants chose to make their own choices, despite the knowledge that the expert had a better likelihood of guessing shapes with higher rewards.
- In another study, Tali Sharot showed that when people create their own things, they value it more. The study gave participants the opportunity to design their own converse shoes; exact replicas of these designs were then created. It was found that participants liked their own converse shoe creation more than the converse shoes that they didn't create, despite both shoes being identical.

Sharot also did some general research around how one's locus of control changes in different circumstances. A finding that was notable was the fact that although people with an internal locus of control tend to feel more in control of their lives, when stress is too immense, people often like to leave big decisions up to other people. People do this so that they don't have to bear the pressure and weight of the stress on themselves.

Conclusion:

Participants felt better when they felt as though they had control over outcomes, hence generally, people feel happier when they have choices which denote outcomes. This fact is true even if the option to make your own decision, rather than leaving choices up to other people (i.e. an external locus of control), is the less intelligent choice. It is simply the opportunity to have agency in a situation that makes people feel more settled, even if this means obtaining credence in oneself despite common sense. This links strongly to my science fair experiment as it proves that even though people may feel a strong sense of control, and hence reduced stress level, their performance/outcome (i.e. of the food dishes), may not necessarily be top notch. This is because the perception of control can lead to people overestimating their capabilities.

It is also important to note that, when pressure mounts beyond certain thresholds, people begin to feel less stressed when they're not the ones controlling the outcome.

Cooking and stress

I'm sure that all of us have watched MasterChef, My Kitchen Rules, or even The Great British Bake off, at some point in our lives. Therefore, I'm certain that we've all witnessed one of those iconic scenes where the countdown for when teams' dishes need to be ready starts, and all of a sudden all team members scramble around the kitchen, whilst dripping with sweat, and sometimes even cursing under their breaths! To most people, such a scene is merely entertainment, however, I capitalised on my kitchen show viewings, for my science fair. I soon realised that cooking seems to be something that causes people a lot of stress, especially under time pressure. This realisation is what prompted my new - and final - idea for my science fair investigation! However, like always, to ensure that my reasoning was substantiated by actual facts, I decided to embark on a mini research journey and find out about what aspects of cooking actually cause stress; stressful aspects of cooking include:

1. Deciding what to cook and how to cook it.
2. Testing out and trying new recipes or ingredients. This is because testing new things out is extremely risky, as the outcome is unknown.
3. Cleanliness while cooking. (In an ideal world, we'd all keep our kitchen units nice and tidy, but in reality we tend to rush-clean at the very end).
4. Time pressure!
5. Worry that those who eat your food will be judging you and your skills harshly.
6. Wasting ingredients. As it's human nature to try and minimise wastage, we feel bad when we throw away food, and hence some people feel as though they shouldn't cook at all due to the fear of having to throw away disgusting food at the end of the day.

Questionnaires

As it was unethical and costly to use invasive investigation methods (e.g. the salivary cortisol testing, blood pressure, HRV, etc.), I decided to go along the questionnaire route instead. However, as receiving statistical datasets via participant filled forms meant that I would be

relying on my participants heavily (i.e. to fill the forms accurately and truthfully), I had to employ some risk mitigation tactics, in order to validate my project.

Some risks of this methodology included:

Risks:

1. Participants could get tired and bored of filling forms, and hence give "sloppy" responses.
2. Participants could overestimate their cooking abilities and score their outcomes highly. Likewise, some students could rudely underestimate their cooking abilities, and score their dishes poorly.
3. Participants could skim read over the questions, and hence misread/misinterpret certain questions and hence fill them out wrong.

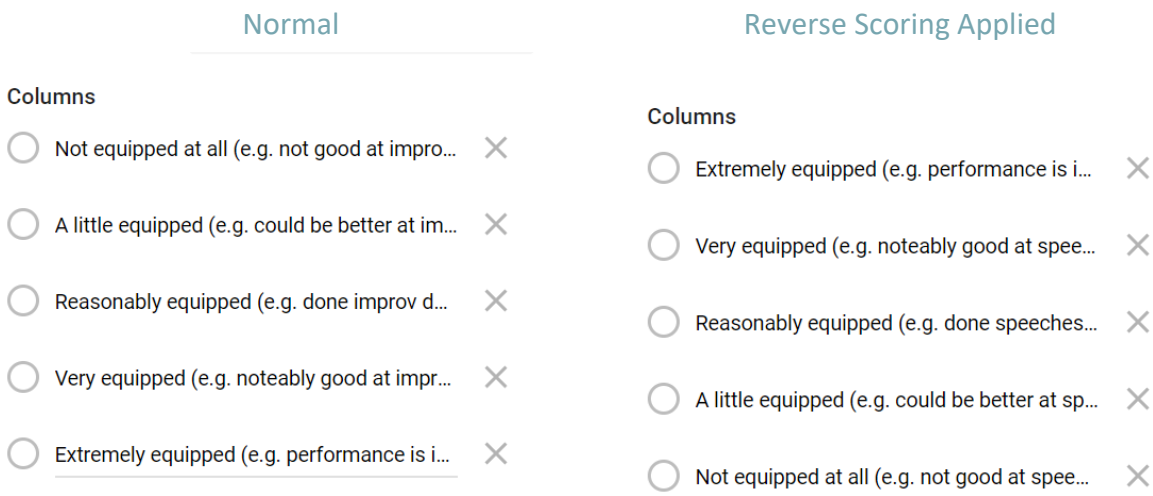
To reduce these pre-empted risks, I came up with some viable solutions.

Solutions:

1. To maintain participants' interests as they fill out the forms, my science fair mentor (professor Glynn Owens), alongside my supervising teacher (Mrs Ghanim), reminded me that good forms/questionnaires are:
   a. Short, sweet, and to the point.
   b. Relevant to the user (i.e. incorporate questions that users can actually answer).
   c. Engaging. For example, one could engage their target audience by asking them questions relating to them in certain scenarios. This is both intriguing for the user, and helpful for data as this gives insight into participant's real life reactions to certain situations (i.e. such data allows you to understand the participant further).
2. To ensure that the student participants don't present themselves and their cooking abilities in an overly positive, or negative, I will be comparing their grades with how they responded to the forms. This way, not only will I be validating my project by presenting forms of non-biased data, but I will be sharing insight on how one's own idea of their performance of a task, corresponds to their actual performance. The importance of this implementation is that it reveals each participants' personal views of "expectations vs reality" (i.e. the concept where the reality of an outcome differs to how one expected an outcome to occur). This way I can gain insight into if stress, and perceived control, affect how people view their own outcomes (e.g. cooking outcomes - dishes).
3. In order to prevent student participants from skim reading over the questions, and giving poor answers, I was encouraged to implement reverse scoring. Reverse scoring refers to Likert Scales such as the typical scale: strongly disagree, disagree, neutral, agree, strongly agree, which commonly gets used as the format for people to answer certain questions. To reverse score such scales, all I needed to do was swap which option was displayed first (i.e. in this instance, "strongly agree" would then be first, and "strongly disagree" would then be last). This wakes users up as they soon realise that they can't assume what the question is asking and continuously click the same column of answers each time (i.e. as, for example,

the location of “strongly agree” isn’t the same throughout all questions, simply clicking the column which it belongs to, wouldn’t be suitable).

An example of reverse scoring in my questionnaire:
This is in the questionnaire titled “Questionnaire to do before the experiments start”
Question: “How equipped are you to handle this situation?”

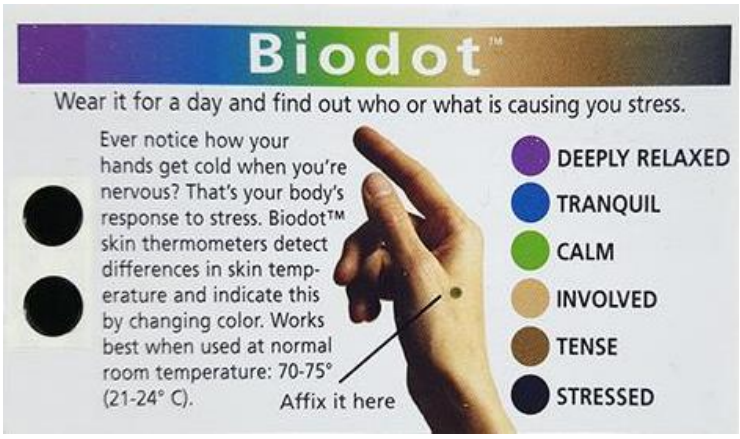


Possible Measures

Before jumping straight into the creation of my science fair method, I needed to assess a multitude of viable different ways to measure stress during my science fair experiment.

Biodots

Biodots are small pieces of plastic (often in the shape of a circle or square) that when attached to the skin (preferable positions are on the hand, specifically between the thumb and index finger), act as a rudimentary (i.e. basic) biofeedback device. In particular, biodots change colour based on the temperature of one's skin, which has a direct relationship with one's stress level. As stress decreases, capillary blood vessels open up, enabling for better blood flow, and subsequent skin temperature increase. Therefore, via a change in the colour of the biodots on my participants' hands, I would be able to deduce their stress levels.



Why I didn't end up using this

First and foremost, there wasn't enough legitimate, and certainly I did not come across enough credible research done on biodots prior to my science fair investigation. Hence, to prevent the risk of my results being invalid, I decided not to use them. Also, I quickly realised that when cooking, hands are exposed to high temperatures constantly (e.g. when opening ovens, washing hands with hot water, cooling down warm foods, etc.). Therefore, the colour change of the biodots wouldn't accurately depict participants' stress levels. Alongside this, it would be hard to track the colour change for every single participant considering how small the biodots are, and it is also very likely that participants would misplace the biodots and that they could even end up in the food that they'd make (this is a major health and safety hazard!)

Blood Pressure

As mentioned prior, during moments of stress, blood vessels constrict, heart beat increases, and the amount of hormones in circulation increases also; these all contribute to an increase in one's blood pressure. Therefore, a very obvious way to measure stress is via one's blood pressure.

Why I didn't end up using this

However, there are a number of factors that make blood pressure testing very impractical for a school setting. Firstly, the cost of getting blood pressure monitors for all … of my participants was far too high, and hence wasn't feasible. Secondly, the prospect of having to lug the blood pressure monitors to the technology department, and wait for each participant to use the monitors before and after each lesson, was very onerous and very impractical (not to mention, unfair on my science fair participants). Also, if I were to get valid results during the cooking lesson, it would just be far too unreasonable to have participants wear these monitors whilst cooking! Thirdly, the results still may not depict accurate findings, especially since blood pressure is something that varies between individuals. Hence, not only would I have to measure the participants' blood pressure throughout each trial, but for accuracy I would also have to gather preliminary results to measure each individual against. With my time constraint, this wasn't a likely outcome. And lastly, it would have been a lot harder to get students to have their parents sign permission slips to partake in the experiment, if it involved intense measuring procedures such as this one.

<u>HRV</u>

Heart Rate Variability (HRV) describes the variance in the period of time between heart beats. HRV is measured via the analysis of the beat-to-beat interval, and the corresponding alterations in time taken for each interval. Intriguingly, one's HRV is an exact reflection of their control of their autonomic nervous system (comprised of the sympathetic, and parasympathetic nervous system), and ability to balance the two autonomic divisions. An individual's HRV increases when stress is low.

Why I didn't end up using this

My idea was to use the HRV monitors in the same way that I would've measured the participants with the blood pressure monitors. Albeit, HRV monitors are much more expensive than blood pressure monitors, and hence, even less feasible to use. As well as this, for the same exact reasons as with the blood pressure monitor (i.e. inaccuracies, high cost, arduous job, ethical challenges), I decided that using HRV equipment was going to be too difficult. However, I do hope that the use of this equipment is more than a pipe dream, and that one day, when I can repeat this experiment on a much larger scale, HRV companies will be asking me to test their products!

Salivary cortisol

As mentioned in previous sections, a major chemical involved in increase and decrease to one's stress level is cortisol. Cortisol is a glucocorticoid/steroid hormone which is released when signalled by ACTH during the fight or flight response. As much as enough cortisol can be beneficial to enable general cell homeostasis, too much can cause allostatic load (as explained prior). Long story short, the measure of cortisol in one's blood pressure, or even saliva, can give insight on that person's level of stress. Therefore, my initial and most favoured idea was to do salivary cortisol testing on my participants before and after each trial.

Why I didn't end up using this

However, this testing method is quite invasive and involves intense health and safety measures, as well as background checks in regards to ensuring ethical practices. Therefore, not only would salivary cortisol testing have been too costly, and time consuming, but this method would have been the most ethically challenging. This is as it would be very unlikely for that parents of participants would have willingly allowed their daughters to do this without doing some background checks (which many parents are skeptical into buying into anyway). Alongside this, getting the school nurses on board, as well as external nurses who are trained with the required practices, would have been a bit of a nightmare. And so, despite this method giving the most accurate results, due to major constraints, using such methods at this stage in life is rather impractical.

Physical attributes

Taking it real old school, there are also a number of non-technological ways to measure stress. For example, there are some obvious physical features that people obtain during stressful situations. For example, sweating, reddened face, and dilated pupils (all of these are a result of the hormonal imbalance created in the body during the fight or flight response). When people are stressed they also tend to pace back and forth, and tend to get quite loud (e.g. due to shouting to others, or even at themselves).

Because of the constraints that the other experimental methods brought about, I relied heavily on observations of participants' physical features, in addition to the questionnaires, to deduce each individual's stress levels. As I walked around the room and asked participants questions, I checked to see if the participant was sweating, had blushed cheeks, had dilated pupils, was moving and pacing around a lot/being fidgety, or was being loud. Unsurprisingly, my observations reflected the findings from my research quite accurately!

Side Note: Experimenter Expectancy

After discussing the fact that my observations seemed to align perfectly with my research and my hypothesis with my science fair mentor, he told me about Experimenter

Expectancy. This phenomenon (deduced by Robert Rosenthal) is where the experimenter carrying out the scientific trial, inadvertently sways the results, by e.g. unconsciously phrasing questions in such a way that will give the experimenter their desired responses, or making a testing environment overly favourable for the experimenter's desired outcome. *Below is more information about Rosenthal's work:*

Robert Rosenthal (pictured) is most known for his research and studies conducted on experimenter expectancy effects, which is the influence that a researcher can have on the outcome of an experiment ("Rosenthal's Work", n.d.). The first notable study that he worked on was with Fode in 1963. Rosenthal and Fode had two groups of students test rats; these rats were categorized as being bred "maze bright" or "maze dull," even though, in reality, they were all standard lab rats and not specially bred one way or the other. The results of the study illustrated that the students unconsciously influenced the performance of the rats in order to fit the expected results between the "maze bright" and "maze dull" rats ("Rosenthal's Work", n.d.). Thus, Rosenthal would rationalize that the same effect would occur with teachers and students.

What this means is that in the future I have to be wary about how I phrase questions, and how I observe participants. Some suggestions made by Professor Glynn Owens was that, if the experiment was done on a larger scale, I could get someone else (who knows very little about the experiment that I'm conducting) to observe and ask the participants questions. This way, the likelihood of the experimenter expectancy effect, affecting the results, is very minimal.

6. Variables

Independent Variable

The variable that I changed throughout the experiment was the type of lesson that the students participated in. The two different lessons were the Masterchef lesson and the Recipe lesson.

Dependent Variables

The variables that were dependent on the lesson type were: the levels of stress, and control perception of the participants, and the corresponding grades achieved by the participants.

Controlled Variables

- Lesson time: Masterchef lessons were 55 minutes; Recipe lessons were 45 minutes. (See the 'Constraints' section to read about my constraints on time).
- Classroom: this variable was controlled as the same kitchen classroom was used each time.

<u>The following is a variable that I tried to control but couldn't</u>

Having the same teacher teach participants' respective classes. I believed that this factor could alter the students' results; this is as students may feel more stressed when taught by teacher A in comparison to teacher B, and vice versa. However, I couldn't realistically control this variable as it's only natural for teachers to get sick once in a while, or require work leave for e.g. school teaching courses.

7. Constraints

Even just to get my project going, I had to email and connect with a lot of people! I had to do so as one of my initial major constraints was not having a mentor in my chosen field (i.e. psychology). Fortunately, I was blessed that Professor Glynn Owens decided to guide me along my experiment journey. Albeit, prior to that, I messaged many email addresses:

1. Professor Sally Merry (s.merry@auckland.ac.nz) - Head of Department of Psychological Medicine at Auckland University
2. Professor Suzanne Purdy (sc.purdy@auckland.ac.nz) - Head of School of Psychology at Auckland University
3. Professor Glynn Owens (g.owens@auckland.ac.nz) - Prior professor at the School of Psychology at Auckland University
4. Jean Richards (jean.richards@onehealthgp.co.nz) - Employed by OneHealth
5. Saad Mansour (saad.mansour@labtests.co.nz) - Employed by Labtests
6. Vanessa Buchan (Vanessa.Buchan@cdhb.health.nz) - Employed by Canterbury Health Laboratories
7. Linda O'Neill (loneill@aut.ac.nz but jkelly@aut.ac.nz while Linda was on holiday) - Head at AUT culinary arts school
8. enrol@nsia.ac.nz - NSIA (The Professional Hospitality Academy in Auckland)
9. John Sollers (jjsollers@nccu.edu) - American HRV specialist

Some other major constraints were:

- *Testing equipment:* (See a more in depth explanation in section Possible Measures). After extensive research, I found out that Blood Pressure monitors, Heart Rate monitors, HRV equipment, and Salivary Cortisol testing were the best measures for stress. Although, due to:
  - *I.* the impracticality of using such equipment in a cooking environment (I wouldn't expect students to willingly wear a heart rate monitor while cooking, or spit into sample bottles after each lesson);
  - *II.* the expensive cost of such equipment; and
  - *III.* the ethical dilemma that I would've fallen into to (especially since year 10 students are 14-15 and hence below the legal age of consent), I couldn't use the fanciest, most accurate testing measures. Being restricted to surveys and questionnaires for my data, meant that I had to rely heavily on my participants' honesty (this could've resulted in a decrease in data accuracy).
- *Sample size:* Despite having two full classes (about 40+ students) over the course of a full school term, I was not able to maintain a constant sample size throughout the entire experiment as participants took leave when they were sick or otherwise unable to make it to class for other reasons. Whilst this sample size constraint might have pronounced impact on individual participant's statistical outcomes, the overall (combined) insights/outcomes for the entire group would remain valid and approximate representation of the group of participants. In any case, it would have been cost prohibitive for me to provide financial incentives to participants!

- *Cost:* As explained in the equipment constraints section, cost was a major constraint with my project. In a perfect world, I'd be a million dollar air scientist with ample resources. However, I'm not. And so I was unable to pay for the professional, accurate, and scientific data gathering equipment that would have made my results the most credible. Although, as stated within the equipment constraints section, using said equipment would've been unreasonable anyway.
- *Time:* As it was unreasonable to ask my participants to partake in my project outside of school (i.e. use up their free time) I was limited by the school timetabling system. As a result, I was not able to set out my experiment so that Recipe lessons (45 minutes) and Masterchef lessons (55 minutes) were the same length. Hence, my results could have been impacted by the difference in time allocation to the two lessons. Yet, it is very important to note that the reason why recipe lessons are set up for shorter 45 minute periods is also mostly just due to the fact that recipe lesson set up is less time consuming. During Masterchef lessons it takes about 5-10 minutes for the mystery ingredients to be revealed anyway, thus in the end the time allocated to actual cooking, is about the same in both lesson types. Although, in an ideal world, making the time more controlled would've been better.
- *The availability of ingredients:* In a perfect world, the participants would've had access to an abundance of ingredients so the scarcity or finite amount of available ingredients wouldn't have affected their stress levels (i.e. as having limited resources can make coming up with dishes a lot harder, and hence more stressful). However, considering that ingredients are costly, and were provided by a school, having unlimited access to all the ingredients in the world, was very unrealistic!

8. Hypothesis

Before jumping straight into the project, I thought about the results that I would expect.

Hypothesis for the results from the initial questionnaire

My predictions are as follows:

- I predicted that at least 60% of participants would say that the last time that they felt stressed was within the past week. I thought this as stress is a part of students' everyday lives. I believed that the majority of people would feel this way due to school related stressors (i.e. I assumed that most people will tick the boxes "Having a test/exam/assessment", "Dealing with friend drama", "Regretting a choice of a subject", and "Being busy with extra-curriculars", on my miniaturised SSRS chart). This is because school is usually the biggest, and most time consuming, part of a students' life, and hence would probably cause my student participants the most stress.
- I thought that 30% of people would say that their past 12 months weren't stressful at all, 20% of people would select "A little bit stressful", 10% would select "Reasonably stressful", 10% would select "Very stressful", and 40% would select "Extremely stressful". I believed this as I have noticed whilst asking my peers about how stressed they feel, the answer is usually split. Often, the two answers that I receive are something along the lines of, "wow my year was so stressful", or "nah, everything was very chill". I rarely get anything in between. Hence, I felt as though my results would reflect this real life observation.
- Incorporating Appraisals concept by Dr Lazarus I hypothesised that asking participants (in a pre-lesson survey) how they felt about delivering public speech could be a stressor, especially as the stakes of the speech increased (i.e. as aspects like the speech being graded, or being the determinant of whether or not one gets an end of year prize), there would be a notable increase in the response "a stress inducing situation". I predicted this as students tend to value academic accomplishment as a big deal, and hence feel more pressure (and stress) to do very well when their results are on the line. By "notable percentage increase", I predicted about a 10-15% increase between the 1st and 2nd scenario, and 2nd and 3rd scenario. I also felt like as the stakes of the speeches increased, the percentage of student participants that viewed the scenario as being positively challenging would decrease (by about 10-15% each time). This is as, with higher stakes, people usually feel less relaxed and free to challenge their abilities.
- I also believed that there would be an almost consistent percentage (about 30%) of students who viewed speeches as being an embarrassing situation. I thought this as, some people just find speeches to be embarrassing, with or without the factor of stress (i.e. this is more of a personality type).
- I thought that only 5-10% of students would view the speech scenarios as being benign, considering that in reality I'm very aware that my peers feel very stressed and nervous when talking in front of a class-sized audience.

- I predicted that most people would believe that they perform at their best when they have a medium level of stress; this is as most people know that too much or too little stress isn't good.
- I hypothesised that students would either view their cooking abilities as being amazing, or very poor, as people have the tendency to overestimate or underestimate their abilities, and often fail to properly assess themselves.
- When it came to coping mechanisms, I believed that most students would pick the avoidance technique, and emotional focused technique.

Hypothesis for general questionnaires, observations, and results

- I predicted that a higher percentage (about 20%) of people would feel stressed before their Recipe lessons rather than their Masterchef lessons, due to the effect of Rumination.I believed that participants will be anticipating and dwelling on the potential outcome of their food, as they would have everything prepared prior. Although, I also thought that there'd be a notable percentage of people who felt stress prior to Masterchef lessons, due to the options "I was worried that the mystery ingredient was going to be a food that I had never heard of/hadn't cooked with", "I'm not generally someone who's good at thinking of/making up recipes on the spot", and "I was worried about having to cook a good, original dish in time".
- I felt like at least 70% of students would stick to the recipes during recipe lessons. This is as people like to follow instructions when they feel as though they're stressed and out of control.
- I believed that the majority of students would either 1: experiment and make up recipes on the spot with Masterchef lessons, or 2: simply modify pre-established recipes and somehow incorporate their mystery ingredients. I thought that there'd be a group of students who liked to just "go with the flow", and would hence do option one, and that there would also be a group of students that would go with option 2. Participants choosing the latter option would prove that with the lack of control, trying to find alternatives to gain control occurs in the attempts of reducing stress.
- I hypothesised that at least 60-70% of students would say that they felt in control and not stressed during recipe lessons. Whereas, I predicted that 60-70% of participants would way that they felt out of control, and stressed during Masterchef lessons.
- Overall I believed that students would feel medium levels of stress during recipe lessons, but high levels of stress during Masterchef lessons. Either way, for both (as revealed by my research), I felt as though time pressure would cause the most stress for students.
- I believed that students would either view their dishes as being amazing or absolutely terrible (again due to human's ability to severely over or underestimate their creations).
- I believed that at least 70% of people would state that they felt control during recipe lessons, and only 40% of participants would say that they felt in control in Masterchef lessons.

- I believed that when it came to actual performance (grades), those who noticed that they felt in control of the situation (regardless of whether this was with the Recipe lessons or Masterchef lessons), would get better Food Technology grades.
- In regards to observations, I believe that I would be able to notice people's faces getting ready, sweating, and the participants increasing in noise, quite well.

9. Methods

The way my experiment worked was that students within Mrs Riley's and Miss Brook's Food Technology year 10 class (aged 14-15), went to class as normal, and I came to observe, ask questions, and prompt my participants to fill out the surveys in order to collect data. Below was the full breakdown of my science investigation process:

Before the trials began, all students (from both classes), were asked to fill out a questionnaire (see appendix 2). This questionnaire incorporated knowledge from my research (see Research section) regarding stress. In particular, I applied my knowledge of Holme and Rahe's 'Life Events Theory' with my miniaturised and teenage specific SSRS table, Lazerous's theory of primary and secondary stress appraisal with my speech scenario questions, various scientists' work on coping mechanisms with my coping mechanism questions , and more. Students then participated in both Masterchef and Recipe lessons on different days, depending on their pre-established school timetables.

Recipe lessons were held on Fridays and were 45 minutes long, whereas Masterchef lessons were held on Tuesdays (class 1) and Thursdays (class 2) and they were 55 minutes long (this time difference occurred due to EGGS' timetabling system).

Masterchef Lessons	Recipe Lessons
● Once students had arrived to class, the teacher would reveal the mystery ingredient(s) for that lesson. ● As students began to think about what dish they'd make, I walked around the room and ask random students about their specific tactics/strategy for overcoming the lesson. ● I observed students as they cooked (i.e. looked out for physical attributes such as sweating, reddening faces, increased noise level, etc) that would identify their stress levels. ● Students worked in groups (of their choice) to create their dishes. During this time, I'd continue to wander around and ask participants questions.	● Once students had arrived to class, the teacher told them a few instructions, before the students whizzed off into their groups, and began cooking from their recipes. ● As students cooked, I observed and asked them questions.

- I recorded data for observations at the beginning, at about 15-20 minutes left, 10 minutes left, 5 minutes left and 1 minute left, for both lesson types.
- I waited until students plated their dishes up to visually observe how well they did; sometimes I even had taste tests! (please see appendix 1 for some examples of student dishes).
- Once the lesson had finished, I'd remind the students to fill out the google form that applied to the lesson that they had just completed.

10.Results

Observations

I carried out the trials for my science fair investigation throughout Term 2 of the 2019 school year. For both Miss Brooks and Mrs Riley's class, I came in to observe three Masterchef lessons, and three Recipe lessons. The trials took place on the following dates:

Miss Brooks' class:

- 17/05/19: Recipe lesson (teacher recipe, with student initiative. This was the pizza making lesson)
- 31/05/19: Recipe lesson (student recipe).
- 14/05/19: Masterchef lesson (oats, cardamom, almond)
- 21/05/19: Masterchef lesson (cauliflower, zaatar, pumpkin seeds)
- 28/05/19: Masterchef lesson (dark chocolate, chilli, orange)
- 02/07/19: Recipe lesson (student recipe). In this lesson, students were able to use any of the ingredients from the prior Masterchef lessons, and design their own recipe accordingly. This lesson acted as their final assessment.

Mrs Riley's class:

- 10/05/19: Recipe lesson (teacher recipe)
- 24/05/19: Recipe lesson (student recipe)
- 16/05/19: Masterchef lesson (cauliflower, zaatar, pumpkin seeds)
- 23/05/19: Masterchef lesson (dark chocolate, chilli, orange).
- 30/05/19: Masterchef lesson (halloumi, beetroot)
- 04/07/19: Recipe lesson (student recipe). In this lesson, students were able to use any of the ingredients from the prior Masterchef lessons, and design their own recipe accordingly. This lesson acted as their final assessment.

Below is a summary of the observations that I recorded from each lesson.

<u>Masterchef Lessons</u>

The way that the Masterchef lessons worked was that the teacher chose a few mystery ingredients for the students to work with. These ingredients were not shown to the students until the beginning of each lesson, and so they had to come up with dish ideas on the spot. However note that students were allowed to use their devices for on the spot dish research.

The criteria for the Masterchef lessons was for students to focus on how they could show their level of culinary skill with their dishes, their incorporation of the different mystery ingredients and elements (i.e. how well the mystery ingredients' flavours came through), as well as focus on creativity, cleanliness, and effective plating presentation.

During Masterchef lessons, some noticeable things were:

- *Noise level:* students tended to be very noisy at the beginning of lessons, and at the end of lessons. At the beginning of lessons, the noise level was relatively high as students discussed the dishes that they would create. Some students even fought with members of their group, whilst trying to decide on a dish. During the middle of lessons, the majority of students were too busy working hard, to make a lot of noise. At the end of lessons, as tensions rose high, students got noisier again, specifically due to across-the-room communication (i.e. students communicating with members from across the room so they could continue their work from where they were), and intense cooking (e.g. sizzling pans due to students trying to cook their food fast to finish in time).
  - *Power dynamics:* without prior planning and job assignment, the power dynamic within groups during Masterchef lessons was very interesting. As no one knew what they were doing to begin with, students didn't simply begin to do their work; rather they required guidance. I noticed that for most groups, a natural leader was "born" at the start of each lesson. This person was the one who assigned the cooking roles, which inevitably helped groups to progress with their dish fast. However, it was interesting that the "born leaders" didn't tend to do as much work themselves, as the others did.
- *Time management:* it was extremely noticeable that generally, students lacked proper time management skills during Masterchef lessons. Most groups spent a very long time deciding on their dish (e.g. due to lack of ideas, not knowing how to use the ingredients, group disagreement, etc.). Even when groups decided, they began cooking at a noticeably slower pace than they should have, which lead to scrambling to finish closer towards the end of the lesson. Intriguingly, quite a few groups chose to go with dishes that required more time than they were allowed. I questioned this, and students responded by saying that the expected outcome of the dish would be too good not to follow through with. Others justified that the time taken would reduce as they'd make modifications to their researched recipes along the way.
- *Duty neglect:* a by-product of students' subpar time management during Masterchef lessons, was their neglect towards certain non-cooking duties that they were expected to complete, the major one being tidying up their workspace. Dishes began to build up as time went on; however, stress levels did also. As students became more and more wary of the time, they became more than willing to forget about the dishes that they had to clean up. This was interesting as keeping a tidy workspace was also part of the criteria, but evidently wasn't deemed to be as important to them. However, for some groups, neglecting the cleaning job allowed them to finish cooking early and have enough time to clean up at the end.

General overview

Beginning

- Prior to knowing the mystery ingredients, students stood nervously and guessed possible ingredients with friends.
- Student spent time researching dish ideas and discussing with team members.

- Students asked a lot of questions to the teachers at this point, mostly questioning if there were x and y ingredients available to use (i.e. this was part of the dish choosing process).
- At this stage, students looked relaxed.
- Some students just sat there tasting their mystery ingredients, and deeply thinking about how they could make the flavours mesh together in a dish.
- Students took about 7-8 minutes to gather all of their ingredients and cooking utensils.

20-15 minutes left

- Students started to make a lot of realisations at this point. Often, groups realised either (a) that they probably weren't going to be able to finish cooking in time, or (b) that their dish wasn't going to turn out as amazingly as they'd hoped. The resolve of 'a' was to take some elements of the dish away to make finishing the dish more doable; however, students then faced issue 'b' downstream time later. Students' solution to 'b' was to add random, on-the-spot elements to their dish to "spice" it up; this lead to students facing issue 'a' downstream time later. And hence, at this stage, many groups were already trapped in a vicious stress cycle.
- Students became curious about what other teams were making. It seemed as though they were trying to deduce where their dish would rank in the class.
- Students looked more stressed. Some were moving around a lot and were quite fidgety (e.g. pacing from one cooking job to another, and fidgeting with the plating presentation); others had red cheeks and were sweating a little (however this could've been due to heat from warm food).

10 minutes left

- Stress levels noticeably ramped up (there was a lot of across-the-room shouting, and general noise). However, teams who had clean workspaces, tended to be a lot less stressed than those who had neglected cleaning duty.
- From an outside view, the classroom just looked very hectic. Students were walking back and forth, and the noise levels rose.
- Students who still weren't happy with their group's dish, did some random trial and errors with leftover ingredients. They were trying everything they could with their limited time, experience, and ingredients. Even then, some groups spent their limited time, arguing about how they should use their time (this was rather ironic).

5 minutes left

- Stress levels increased yet again. However, teams who had clean workspaces, tended to be a lot less stressed than those who had neglected cleaning duty.
- As students plated up, some began to make silly mistakes while they were trying to speed finish dishes.

1 minute till plating

- Right before the dish was due; students seemed to quieten down a little bit. At this stage, groups were done and happy with their dishes, or knew that they had no time to fix their dishes and were hence forced to be content.

Notable mentions

Here is a list of very notable occurrences that happened during the lessons.

- Two teams, at about 10 minutes to go, realised that they had burnt food that was an important component of their dish. For one team this was their chocolate sauce, for another team this was their croutons. The chocolate sauce group decided to keep on going and just mask as much of the burnt chocolate sauce with normal melted chocolate, as possible. This lead to the outcome of the dish being hindered. However, the crouton group decided to start the croutons all over again; this lead to them finishing slightly over time. This was very interesting, as under a lot of stress and pressure, people have to make quick decisions which affect outcomes a lot.
- One lesson, a class was given cauliflower, zaatar and pumpkin seeds to cook with. Most students had no idea as to how to cook with cauliflower, and so they spent the start of the lesson, just figuring out ways to actually cook it. Interestingly, the lack of confidence with cooking cauliflower, lead to students choosing simple recipes, and adding their own flare to the dish where they could. And as a result, the outcomes of these dishes were surprisingly spectacular despite the lack of cooking knowledge.
- During the chocolate, chilli and orange lesson, there were a lot of different outcomes.
    - One group had a member that was allergic to oranges, and so they had to think of a fruity alternative. I asked them if they were stressed, and why; their response was “yes, a little. We might be marked down for not using orange” (i.e. as highlighting the mystery ingredients was a part of their criteria).
    - As everyone else was making sweet dishes, a group focused hard on wanting to be different, and so made a savoury dish.
- One lesson, the mystery ingredients weren’t ingredients, but rather a picture of cookies. Students had the opportunity to create any type of cookie that they wished. This lesson had a major focus on dish creativity.
    - This lead to half the class trying to make interesting dishes. One group made a cookie pizza, another group even made edible cookie dough. I asked the cookie dough group if they liked this type of Masterchef lesson, and why. They said, “I like this more. Usually when we’re given specific mystery ingredients and so everyone kind of makes the same thing as there are set ingredients... But with this one, we have more freedom to choose our ingredients”.
    - The other half of the class seemed to play it safe, and made traditional cookies (e.g. Afghan biscuits, chocolate chip cookies, etc), that they’d knew they’d nail.
    - The groups who made traditional cookies, tended to take this lesson quite chill as they thought that their recipes were easy enough for them to cook at a slower pace. One group hadn’t even got their cookies in the oven by 10 minutes to go. I asked them if they were stressed, and they said, “Oh, we’ve got ages to go”, as their

recipe said that their cookies only take 8 minutes to cook. In the end, their cookies weren't cooked at all which was a bit of a disaster.

- During one of the lessons, one student from a group had a hand injury and so couldn't cook much. Instead, she had to help out with the simple jobs only (e.g. cutting the food with one hand, putting equipment away, etc). This student found the lesson quite tricky, but mostly because she couldn't help out as much as she liked with the overall dish, and could only instead, tell her group members how she thought the dish could be improved, rather than incite that change herself. With this, there was an unintended miniature version of my experiment occurring. This student had no control over the dish outcome.
- During one lesson, I asked a girl who was working very hard at her work bench, about her team's progress, and where they were headed. I got the funny response, "I don't know what we're making". This showed that she was definitely one of the group members who took the orders, rather than make the orders. However, this group dynamic worked well; this group didn't express much stress, and their dish was completed on time.
- On the day of the halloumi and beetroot lesson, one group had no idea as to how to incorporate other ingredients in with their mystery ingredients, and so they predominantly used the mystery ingredients for their entire dish. I asked them why they chose to do that, and they said that it was because they didn't really know what else they could've done. However, they ended up making the most creative dish of the day, as they made a recipe up and really just played around with it. Fortunately their dish turned out well.

<u>Recipe Lessons</u>

Recipe lessons were either lessons centred around students recreating teacher chosen recipes, or students creating dishes based on their self-chosen recipes. Teacher recipe lessons involved the teacher creating the dish beforehand and presenting this to the students; this gave students an idea of what their final dish should look like.

The criteria for the recipe levels, highlighted culinary skill, creativity, plating presentation, and time management.

During the recipe lessons, some noticeable things were:

- *The division of labour:* due to groups being prepared for student recipe lessons, and having guidance during teacher recipe lessons, members of each group, quickly split up and undertook their cooking roles. This lead to things being cooked faster, and more efficiently.
- *Time management:* overall, time management certainly improved during recipe lessons. This was because the recipe also showed students how long the cooking would take, and hence students were able to track their progress and assess it against the time they had left. Good time management was especially noticeable during student recipe lessons, as students had already had the discussion before as to what recipe they would be making.

This resulted in less time spent on disagreement; also, students picked less time ambitious meals (i.e. the meal preparation time was deeply thought through so no one picked recipes that were going to take longer than the lesson itself).

- *Planning and Preparation:* most groups seemed fully prepared and ready to go before each recipe lesson. This put them in a good position to complete their dishes. Students felt more "confident" and "on track" as they vaguely knew how their dishes were going to turn out. This was especially true for teacher recipe lessons as students were able to see the teacher's dish, enabling them to assess their own dish against the teacher's.
- *Reduced experimentation: due to groups' planning and preparation, students didn't experiment with their dishes as much. Although this resulted in less time wastage, in some instances, this meant that dish creativity was reduced.*

General overview

Beginning

- *As students had already planned and prepared dishes, they were simply getting ready to start completing their specifically assigned jobs.*
- *Students organised their ingredients and cooking utensils more quickly than they did during the Masterchef lessons (it took about 5 minutes in comparison to about 7-8 minutes during Masterchef lessons).*
- *Students started straight away as they knew exactly what was ahead of them. Despite still being somewhat stressed, they felt "more comfortable" during recipe lessons as they knew " what items [they] needed and what the outcomes were going to look like".*
- *The few groups that made ambitious dishes said things like, "even though we haven't done this dish before... I think we can do it because I believe in us". Such groups had planned their dishes out and were quite confident that the outcome would be spectacular, despite never having cooked the dish before.*

20-15 minutes left

- *Students' stress level increased, as I could tell by the increase in noise and movement, but only by a little bit. For the most part they seemed relaxed, maybe even too relaxed, as they started to make little mistakes (e.g. one group nearly put their food in the oven without baking paper).*
- *I asked the students how they were feeling and one time they said, it's "so much more chill this lesson".*
- *Students didn't have to be reminded to start cleaning up. Students were hence cleaning up all throughout their cooking.*
- *Quite a few groups got their food in the oven really fast, and spent a large proportion of the lessons waiting for their food to be cooked.*
- *I noticed that members within groups were very focused on their own roles as they were quite busy making their recipe into a reality. And so, when members of the group were*

asking other members of the group for help, a common response was "sorry I'm really busy I can't help right now".

10 minutes left

- *Students seemed to be more judgemental of their work as they already knew how their dish was supposed to turn out. A notable comment was "ew that taste gross, we're gonna mess this up".*
- *However, instead of being discouraged by mistakes, despite only having 10 minutes left, students seemed to be more optimistic with the outcome of their dishes, as they had a better clue as to how their dish would turn out (i.e. they weren't as hopeless). E.g. when one group made many mistakes, I asked them how this made them feel, and they said, "You know, you learn from mistakes".*

5 minutes left

- *Students were surprisingly relaxed at this stage. Groups has either finished their recipes, or knew that they weren't going to have the time to add any other elements to their dish and were hence forcibly content.*
- *The speed of dish completing was increasing at this point.*

1 minute

- *Despite being prepared, students' stress levels were very high at the last minute. Whether or not their group was prepared. Something about the final countdown stressed students up!*
- *At the very end, students were good at reflecting on how they did. "This is way better than our last ones", one group said.*

<u>Notable mentions</u>

- *During one lesson, one group decided to make their dish very minimalistic, which meant that they didn't need much time to complete the dish and hence were ahead of their peers. However, this group seemed to be the most stressed during that lesson, as they were worried about whether or not the dish minimalism would affect their grades.*
- *On one lesson, the Food Technology classroom was out of eggs.*
  - Most students were stressed as they had to find quick and easy egg alternatives (e.g. maple syrup and milk - for sweet dishes).
  - However, with this risk predetermined, one group brought their own eggs. Hence, the fact that this was a recipe lesson, allowed them to be very prepared, and unfazed by the low egg count (i.e. preventing stress). .
- On the day of the assessment recipe lesson, the Food Technology classroom was low on cream, and it seemed like almost every group required cream. This time, no one had brought their own cream from home. I asked one group whose dish was reliant on cream, about how they were going. The answer was "Not well… we're very stressed"; t*hey said*

that they were "frustrated", especially because they were unable to predetermine whether the cream would run out.

- *During one lesson, one group was very hectic and their recipe dish was not going so well. However, they continued to say things like "it'll be fine" whilst trying to cope with their undesired outcome.*
- *One time, a group had lost the recipe that they had prepared for. They had put in a lot of time and effort into choosing their recipe, so it was very unfortunate for them to lose their recipe so last minute. It then took them a while to come up with a new recipe. And just like that, the time they would have saved, was gone. This really made me realise that by putting too much pressure on a strict plan, people often forget how to just improvise. This can be a consequence of increased control perception in one's general life (i.e. when one reaches a problem where control is taken away from them, they wouldn't have developed the correct coping mechanisms to deal with this dramatic change, which in the end could cause even more stress).*
- *On the recipe lesson assessment day, one girl was in a group by herself as all the other group members were sick. Surprisingly though, she completed the dish quite quickly and efficiently, She didn't waste time disagreeing with team members, instead she was focused on her dish, and it turned out great.*

<u>Conclusion</u>

My observations align with my research quite well.

- With time management, students didn't seem to feel as stressed about their time when at the beginning of lessons as they felt as though they were in control of the outcome, and hence weren't too worried about time. This observation was intriguing, and aligned with my research findings. You see, students did not feel overly stressed about their poor time management issues, as they felt in control of the situation.
- Many students didn't care much about work space cleanliness. When students were stressed, they must've appraised keeping their benches clean as being a benign stress. Whereas completing their dishes on time, would've been appraised as either being harmful, threatening, or a positive challenge. This was known as they were actively working towards cooking their dishes and not workspace tidiness (for both lesson types but more evidently during Masterchef lessons).
- The power dynamic in groups was dependent on each student's locus of control. When the majority of students had an external locus of control (during Masterchef lessons), the group tended to have a leader (who had an internal locus of control). This was as everyone was looking up to the leader to determine how the outcome of the dish would be. However, when the majority of students had an internal locus of control (during Recipe lessons), they tended to be applying the division of labour, as each student felt responsible for their own dish element, and hence felt complete control over it. In both cases, stress was reduced. Which means that in actuality, one's locus of control is dependent on the situation (in this instance the situations varied from

Masterchef lesson to recipe lesson), and the best locus of control to apply is dependent on situation also.

- As some groups tended to be overconfident with how their dishes were going to turn out (e.g. the group who said "oh, we've got plenty of time", or "it'll be fine"), tended to trust themselves more than they trusted credible resources such as teachers telling them they'd not have enough time, or recipes suggesting that the cooking time would be long (e.g. with groups that chose recipes that would take longer than class time allowed). This links heavily to Sharot's research. This is because, even though people may feel a strong sense of control, and hence reduced stress level, their performance/outcome (i.e. of the food dishes), may not necessarily be top notch. This is because the perception of control can lead to people overestimating their capabilities.

Statistics & Data

<u>From the survey titled "Questionnaire to do before the experiments start"</u>

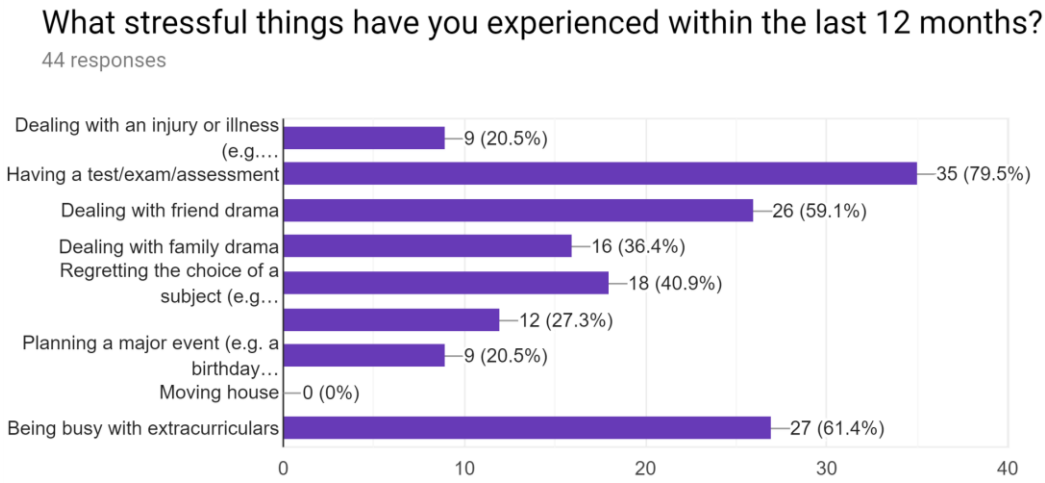
The following is an analysis of the results from the initial questionnaire given to participants before they began the trials. Note that all of the analysis has direct links to my research.

There were 44 responses for each question.

33 people chose "Yesterday", 9 people chose "Last week", 1 (2.3%) person chose "Last month", and 1 (2.3%) chose the option "2-6 months ago".

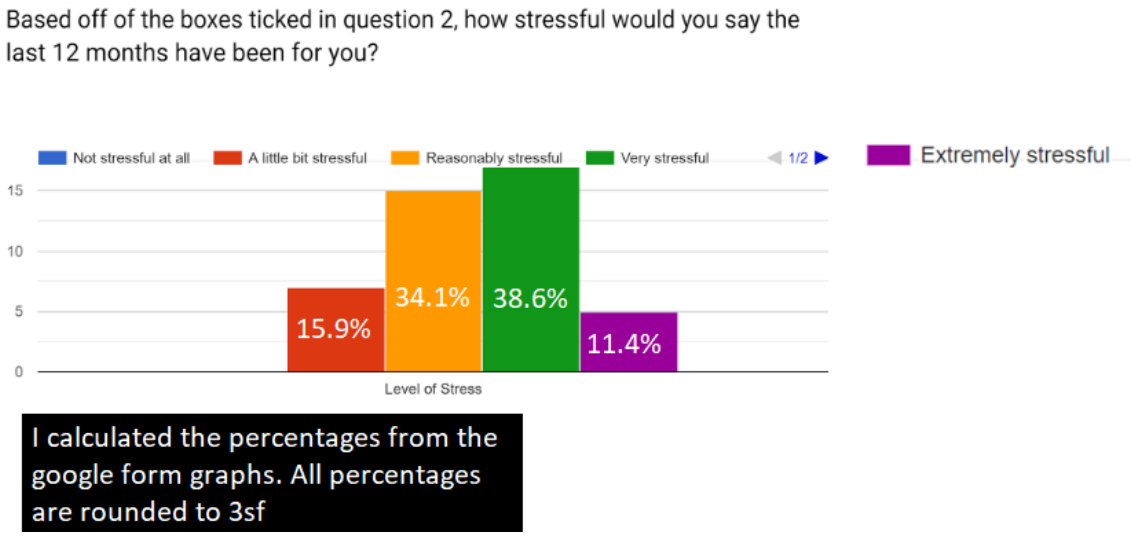
Much like I predicted, the vast majority of participants stated that they had felt stressed in recent times.

However, unlike I predicted, only 20.5% of participants stated that they had felt stressed within the past week, and an enormous 75% of participants stated that their last encounter with stress was yesterday. These results really highlight the prominence of stress in today's modern society. It proves that stress is something that affects all ages (even year 10s, which many older people don't often believe). Hence, the results only strengthen my reason for wanting to find the best way to mitigate chronic stress, and consequently stress and anxiety mental health disorders.



I based this sheet off of Holmes and Rahe's SSRS scale (Social Readjustment Rating Scale). However, I made this scale far more specific to my audience as I predict that most students find school and family to be their biggest sources of stress. (Please note that this prediction is also backed up by research I did for my digital technologies internal; please see appendix 2). I believe that by creating tangible statistics that depict students' main stressors, teachers will be able to gain a lot of insight about what affects their students' general wellbeing. Teachers could apply this knowledge to how they teach at school.

As shown, the biggest reasons for stress were (in descending order) "Having a test/exam/assessment", "Being busy with extra-curriculars", "Dealing with friend drama", and "Regretting the choice of a subject", as hypothesised. These statistics only reinforce the idea that the education system, much like all other universally accepted constructs (e.g. work), has become more mentally and emotionally demanding over the years. What will be interesting is to see whether this increased stress has actually resulted in improved results, or if increasing student stress levels is really just frivolous, and causes more harm than good (as predicted).



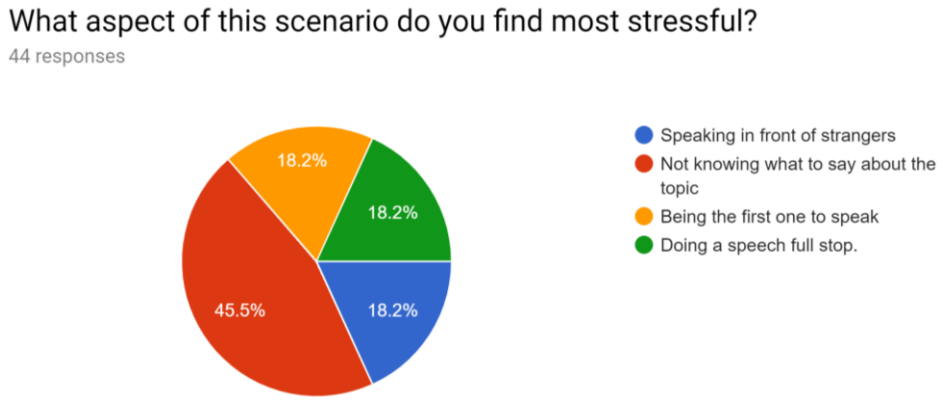
Unlike I predicted, the majority of participants stated that they felt that their last 12 months were either “reasonably stressful” or “very stressful”. What this means is that students are actually good at recognising their stress levels. However, when relating this fact with my observation that students tend to either say that they feel very stressed, or not stressed at all, when in conversation, makes me think that maybe the real issue is the lack of vocalisation of their stress and issues. Therefore, I hope that an outcome of this research is that students start to make their struggles with stress more apparent and open.

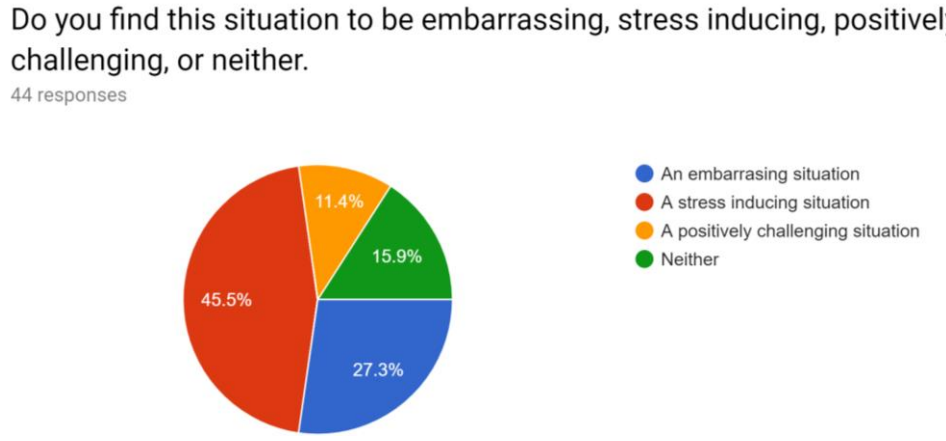
The following sections involve scenarios which students then appraised for stress factor

(Using the concept of Lazarus’s stress appraisal theory)

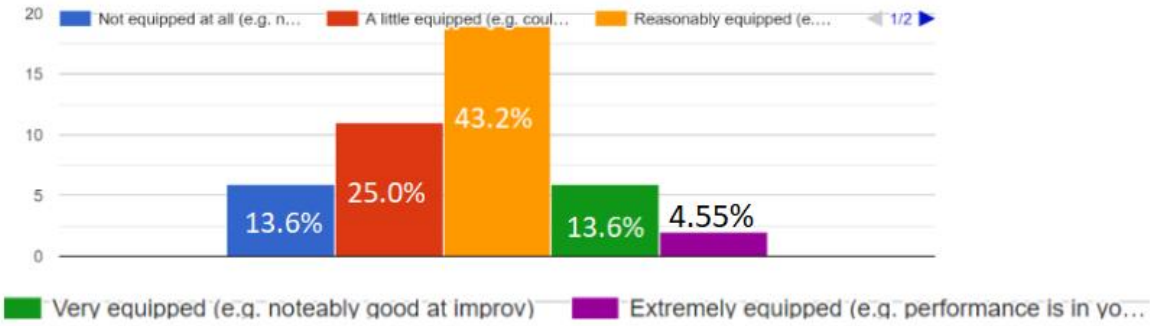
The following scenario will be applicable for this section of questions

It’s your first day as a junior at a new school. Your teacher has asked everyone in the class to give a 3 minute speech about the most exciting part of their holiday, in front of the class. You have been chosen to go first.





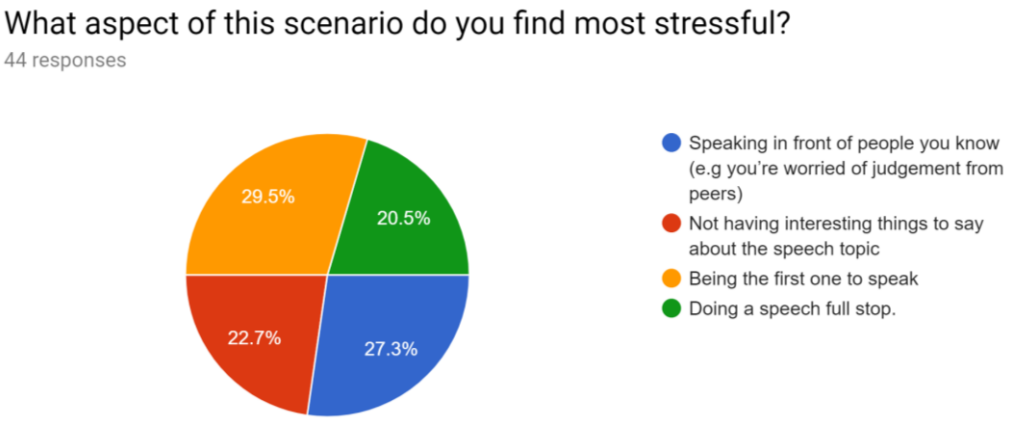
Note that the 2nd option mimics the 2nd stage of Lazarus’s appraisal process. In the same order, the google form options correlate to the options, a “threatening situation”, “harmful situation”, “positively challenging situation” and “benign”.

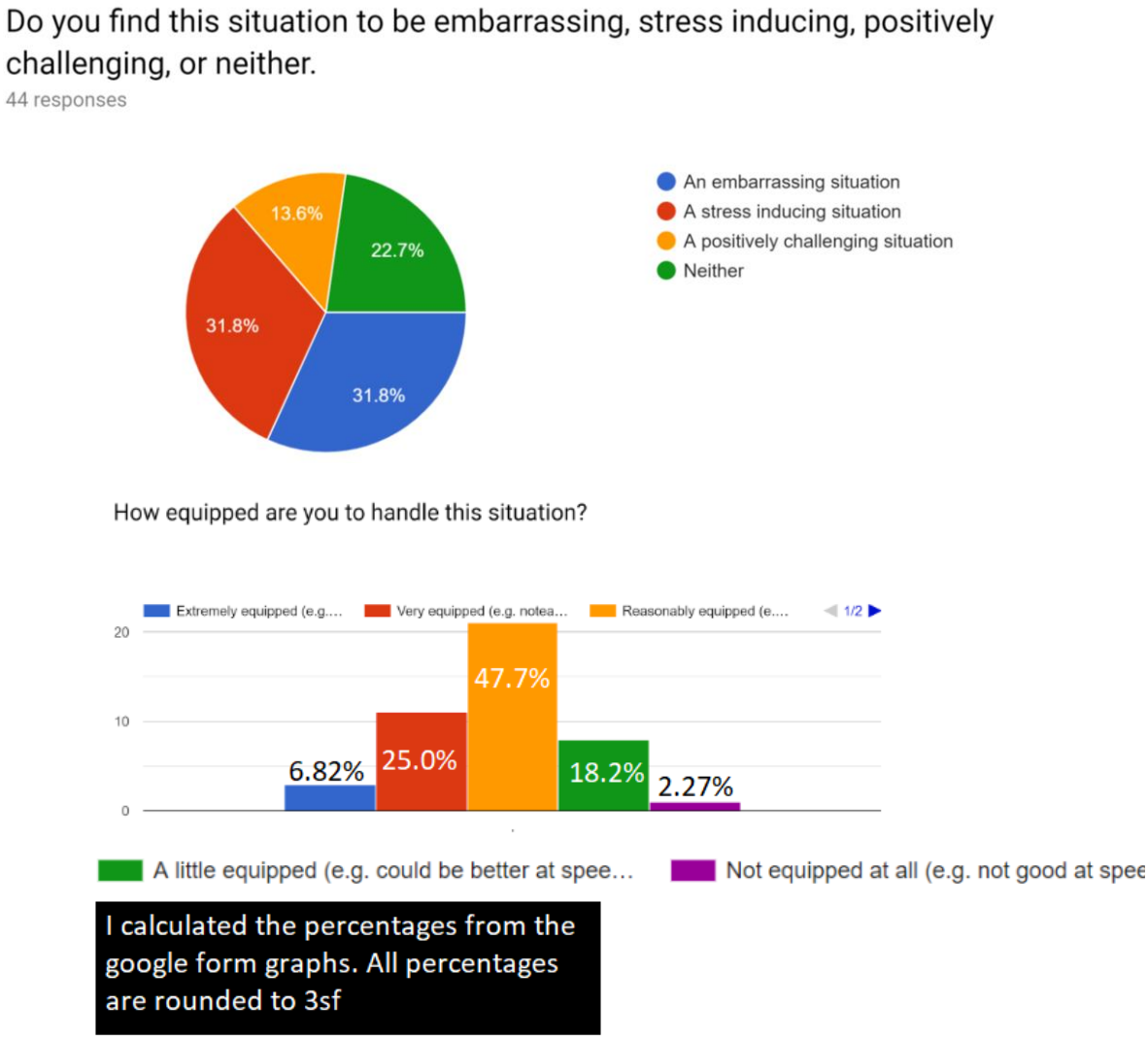


I calculated the percentages from the google form graphs. All percentages are rounded to 3sf

The following scenario will be applicable for this section of questions

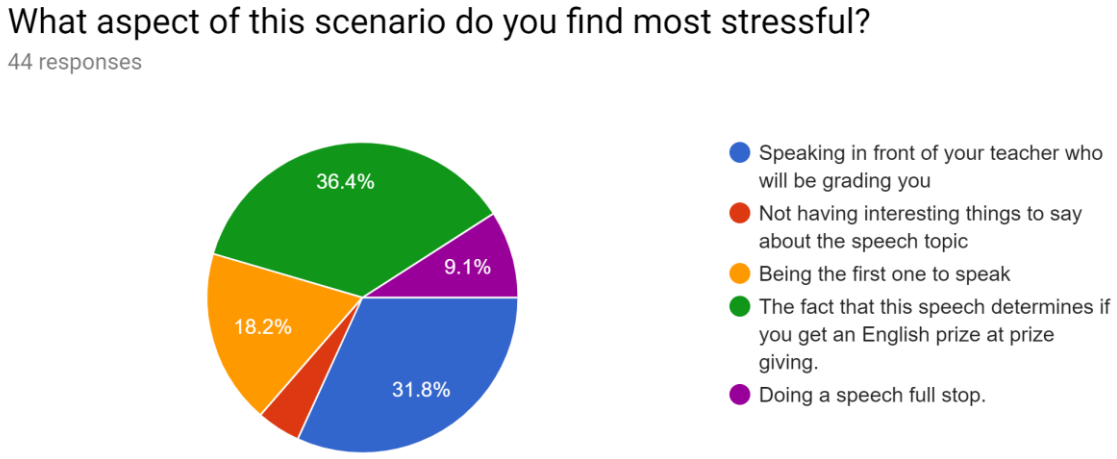
You've been going to the same school for two years and you know everyone in all your classes. As an English assignment (which ISN'T graded), you have been told to give an oral speech in class. The speech has to be 3 minutes long. Your teacher used a random name generator to determine the speech order, and it's been decided that you're speaking first.



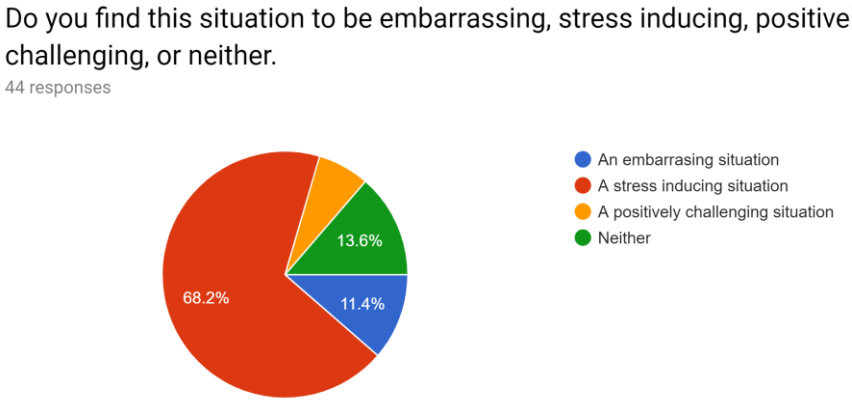


The following scenario will be applicable for this section of questions

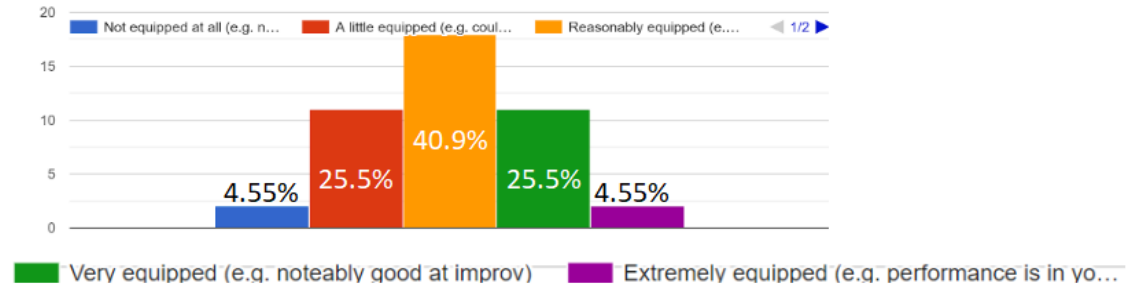
You've been going to the same school for two years and you know everyone in all your classes. As an English assignment (which IS graded), you have been told to give an oral speech in class. The speech has to be 3 minutes long. This speech is what determines whether or not you get a prize in English at the end of year school prize giving. Your teacher used a random name generator to determine the speech order, and it's been decided that you're speaking first.



Note that 4.5% chose the red option.



6.8% chose option orange



I calculated the percentages from the google form graphs. All percentages are rounded to 3sf

Statistical trends shown within the scenario results

Interestingly, as the stakes of the speech scenario increased, the percentage of participants that viewed the scenario as being stress inducing wasn't a linear increase as expected.

Rather, there was a 13.7% decrease in the percentage of those who appraised the scenario as "stress inducing" between scenarios 1 and 2, yet a 36.4% increase in the "stress inducing" category between scenario 2 and 3.

The difference between scenario 1 and 2 was the factor of whether or not the participant knew their classmates. Therefore, the results show that students feel less stress during scenarios where they're comfortable and familiar with those around them. However, in correspondence to this stress reduction, the statistics show an increase in the percentage of those that appraised the scenario as being an embarrassing situation (a 4.5% increase from scenario 1 to 2; a 31.8% decrease from scenario 2 to 3). This is intriguing as it proves that how students choose to express themselves (whether this be with a speech, a cooked dish, or just with general confidence in life), is influenced very strongly by their peers.

The difference between scenarios 2 and 3 is the factor of teacher grading (i.e. the teacher grades the speech that the participant hypothetically presents). The two factors that participants found the most stressful were, "speaking in front of your teacher who will be grading you" (31.8%) and "the fact that this speech determines if you get an English prize in prize giving" (36.4%). These results enhance the fact that as the stakes of the scenarios get higher, the stress increases due to the added factors of worrying about grades, and stress about accomplishment. In correlation to this, with high stakes students feel less worried about peer embarrassment (hence the 20.4% decrease in "an embarrassing situation" between scenario 2 - 31.8% and scenario 3 - 11.4%).

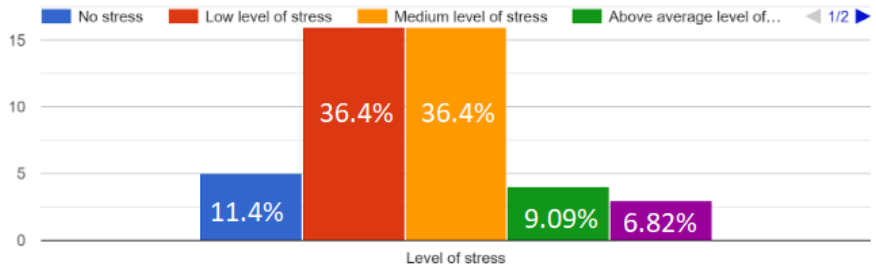
As explained in the prior paragraphs, the percentage of those who appraised each scenario as "an embarrassing situation" didn't remain stagnant at an approximant 30% as I predicted, hence students' peers have a notable impact on one's stress and performance. This is an important piece of data as it provides teachers with insight on how the class environment affects student behaviour (e.g. students who feel threatened by embarrassing themselves when they try hard, could be shyer and not reach their full potential), and grade performance.

Also, unlike I hypothesised, the percentage of those who appraised each scenario as being benign (i.e. the "Neither" option from the "Do you find this situation embarrassing, stress inducing, positively challenging, or neither?" question), varied from scenario to scenario. This hence proves that the appraisal process, much like Lazarus explains, is directly dependent on the scenario at hand.

Another interesting trend was that as the stakes of the scenario increased, the percentage of those who felt like they'd be properly prepared for the speech increased also. This was depicted by a decrease in the percentage of those that were worried "not having anything interesting to say" for the speeches, and an increase in the percentage of those who felt equipped for each scenario. The latter is shown as the histogram graphs depicting

participants' levels of potential readiness, become more and more symmetrical, and less skewed to the right, after each scenario. (However, do note that the equipped scale for scenario two implemented reverse scoring, and so in fact the data being slightly skewed to the right, showed that a greater percentage of participants felt very equipped). Therefore, with each scenario, fewer people chose the lower levels of the equipped chart. This data shows that students are aware that preparation leads to better outcomes. Thus, my expectation is that during the trialling, students will also identify that the recipe lessons enable them to prepare more, control the outcome to a higher degree, and get better grades.

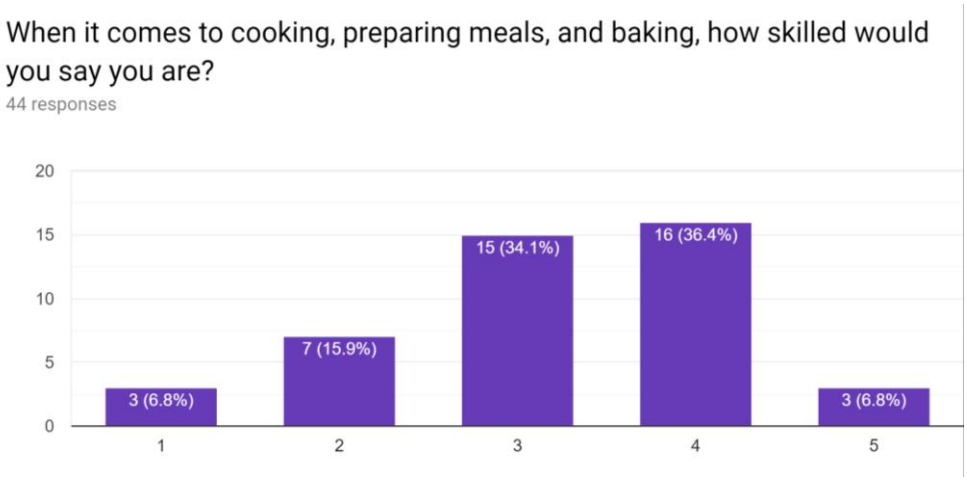
What level of stress allows you to perform daily activities and achieve goals best?



Extreme level of stress

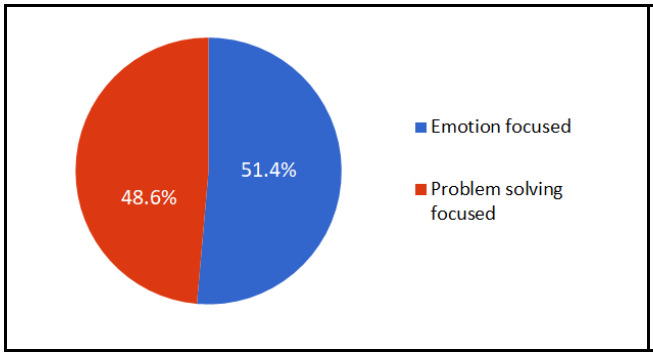
I calculated the percentages from the google form graphs. All percentages are rounded to 3sf

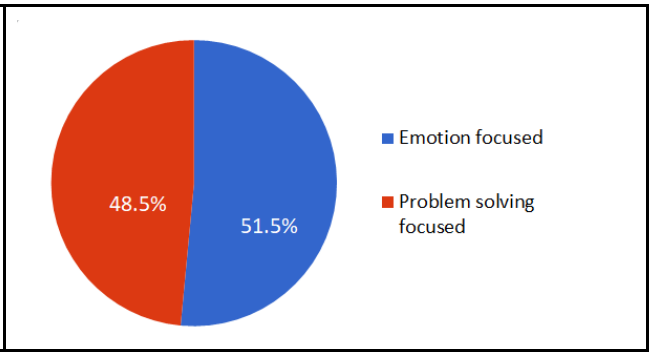
This data coincides with my hypothesis, as the majority of participants (72.7%) have recognised that performance is optimised with medium to low levels of stress.



Unlike I predicted, only a very small percentage of students assessed their cooking abilities as being amazing (a score of 5 - 6.8%) or terrible (a score of 1 - 6.8%). Intriguingly, this could mean that the participants assessed their abilities very honestly as 86.7% of students scored their cooking abilities as being slightly below average to slightly above average (i.e. the middle region of ability, depicting averageness).

The Attentional Approach	The Avoidance Approach
Out of the 51.5% of participants that chose the attentional approach, 48.6% stated that they'd be attentional and emotion focused, and 51.4% stated they'd be attentional and problem solving focused.	Out of the 48.5% of participants that chose the attentional approach, 48.5% stated that they'd avoid and be emotion focused, and 51.5% stated they'd avoid and be problem solving focused.





Therefore, the results that I got for this were unlike I had expected, as there wasn't a significant difference between the percentages of people that stated that they'd use different coping mechanisms under stressful conditions.

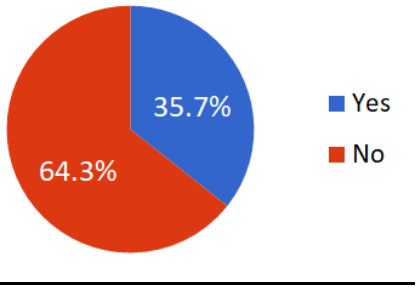
A comparison of the Recipe lesson and Masterchef lesson questionnaires

The following is a comparison of the statistics from the recipe lesson surveys and the Masterchef lesson surveys. Note that the final data for each lesson type is a collation of all of the data from all 6 recipe lessons (3 lessons from each class) and all 6 Masterchef lessons (3 lessons from each class).

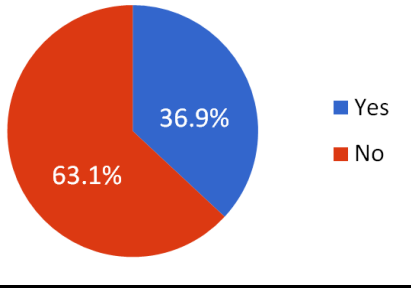
Note that all percentages have been rounded to 1dp; to see the data in detail please see appendix 2. To see the responses for the questions answered as "other" view Appendix 2.

Were you feeling stressed about this lesson?

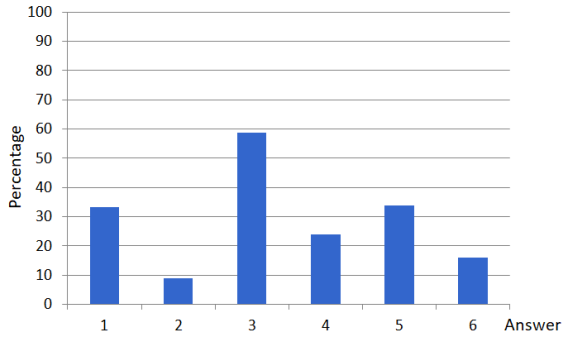
Masterchef lesson



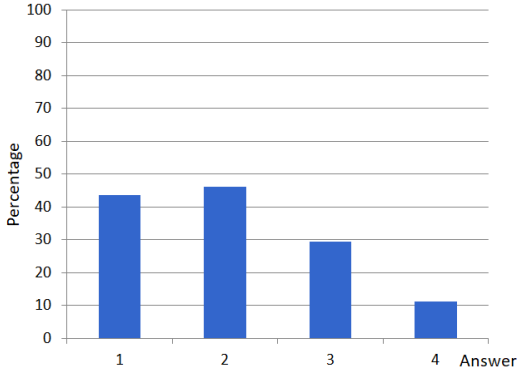
Recipe lesson



If you answered yes, please tick the applicable reasons that lead to you feeling stressed.

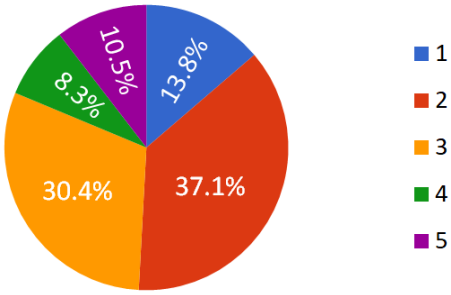


1. I'm not generally someone who's good at thinking of/making up recipes on the spot
2. I've never done a MasterChef challenge before.
3. I was worried that the mystery ingredient was going to be a food that I had never heard of/hadn't cooked with.
4. I was worried about getting a bad grade.
5. I was worried about having to cook a good, original dish in time.
6. Other



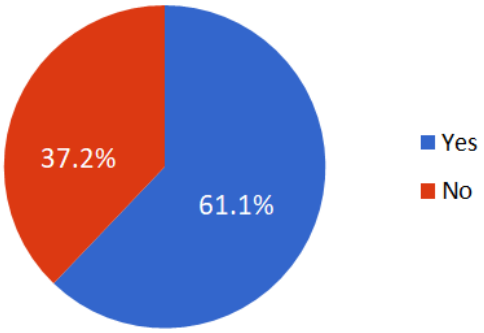
1. I was unprepared for this lesson (e.g. didn't fully plan my recipe).
2. I had never cooked a dish like the one I planned on cooking today before.
3. I was worried about getting a bad grade.
4. Other

How did you go about creating your MasterChef dish?

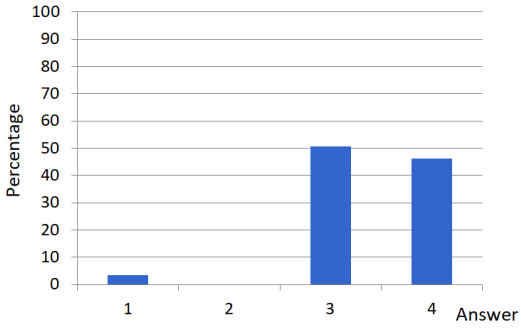


1. I/my group didn't have an exact plan and so we tested out and experimented with ingredients until something seemed to work
2. I/My group thought about yummy, creative dishes that could incorporate the mystery ingredient, before proceeding to cook.
3. I/My group based the dish on a recipe and slightly modified it to incorporate the mystery ingredient.
4. I/My group had no idea what I/we were doing and so I/we panicked…
5. Other

Were you following the recipe?

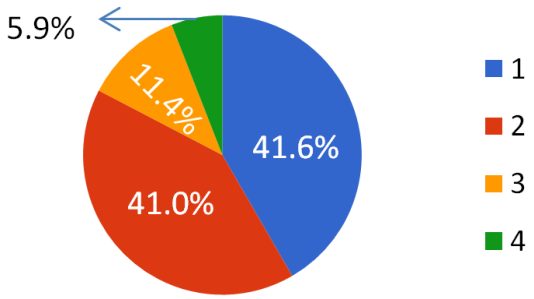


If you answered no, then why didn't you follow the recipe?



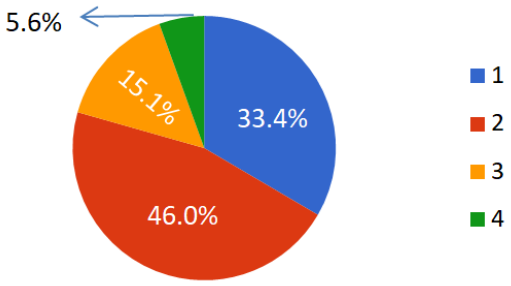
1. Because of time pressure
2. I accidentally read some of the recipe instructions wrong
3. I felt confident enough to modify the recipe in the hopes of making the dish even better
4. Other

How did your approach to the MasterChef task affect you as you were cooking?



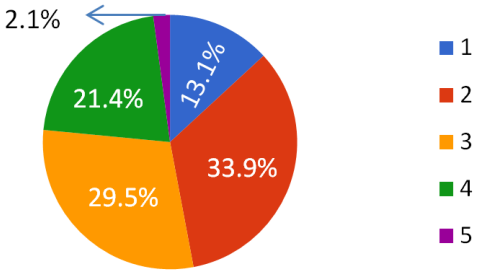
1. I felt in control, yet stressed
2. I felt in control and wasn't stressed
3. I lacked control and was stressed
4. I lacked control and wasn't stressed

How did your approach to following the recipe affect you as you were cooking?

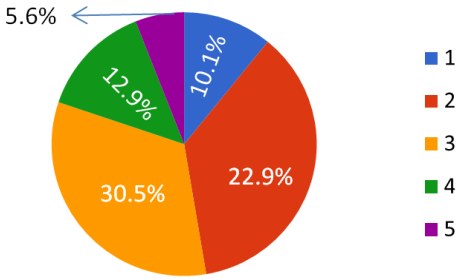


1. I felt in control, yet stressed
2. I felt in control and wasn't stressed
3. I lacked control and was stressed
4. I lacked control and wasn't stressed

Considering the prior question, how much stress did you feel throughout this lesson?

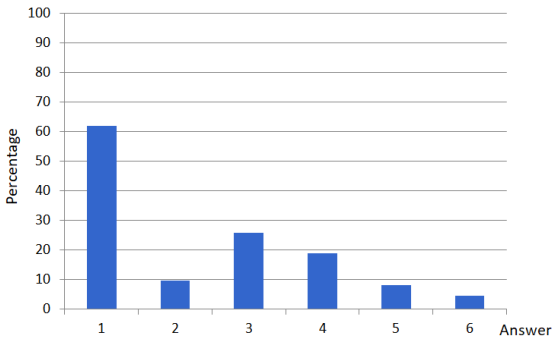


1. No stress
2. A low level of stress
3. A medium degree of stress
4. A slightly above average level of stress
5. An extreme level of stress

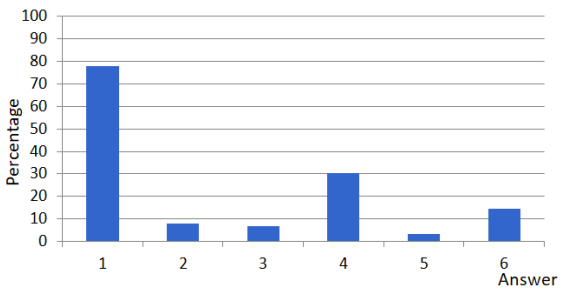


1. No stress
2. A low level of stress
3. A medium degree of stress
4. A slightly above average level of stress
5. An extreme level of stress

What aspects of the lesson made you feel the most stressed?

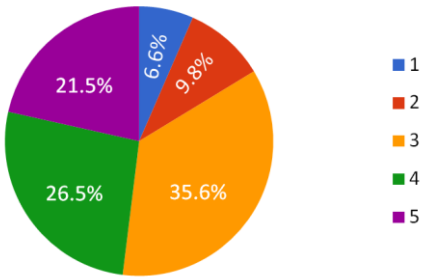


1. Time pressure
2. Lack of skill in the kitchen
3. Not knowing how to use the mystery ingredient
4. Getting a potentially bad grade
5. Having no specific recipe to follow (i.e. having no guideline of whether or not the dish was going to turn out right)
6. Other

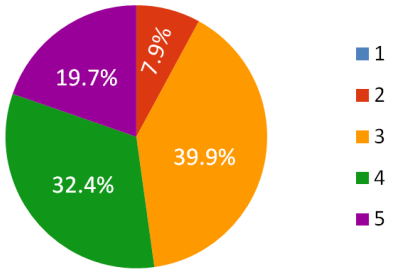


1. Time pressure
2. Lack of skill in the kitchen
3. Uncertainty of if I was following the recipe right
4. Getting a potentially bad grade
5. Having a recipe to follow (i.e. having pressure to make the dish perfect, exactly like the recipe)
6. Other

How well do you think your dish turned out to be?

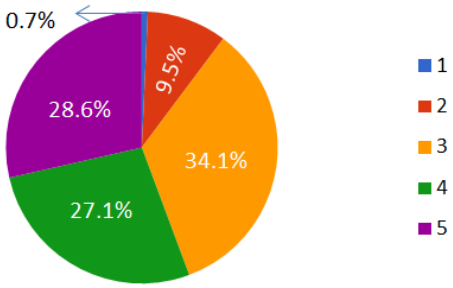


Scale: 1→ 5. 1 = Not good at all. 5 = Extremely good.



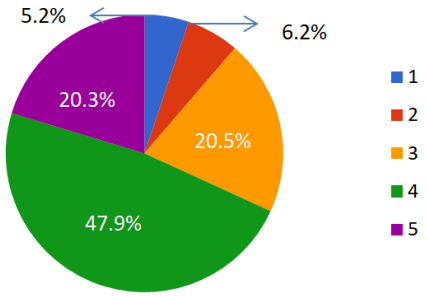
Scale: 1→ 5. 1 = Not good at all. 5 = Extremely good.

How good do you think your approach to the MasterChef challenge was?

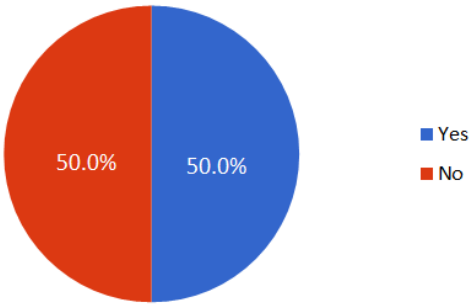
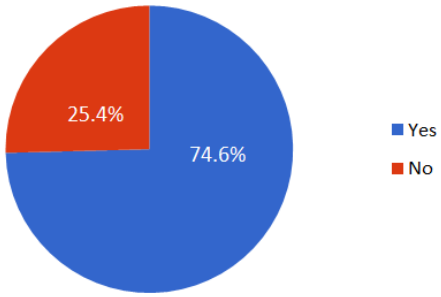


Scale: 1→ 5. 1 = Not good at all. 5 = Extremely good.

How well do you think you stuck to the recipe?



Scale: 1→ 5. 1 = Not well at all. 5 = Very well.

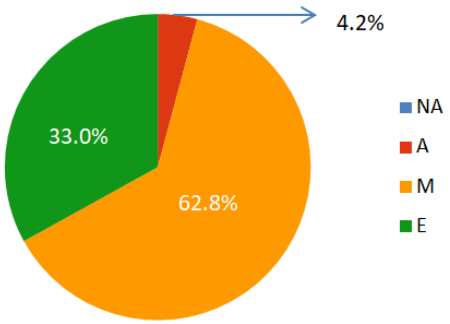
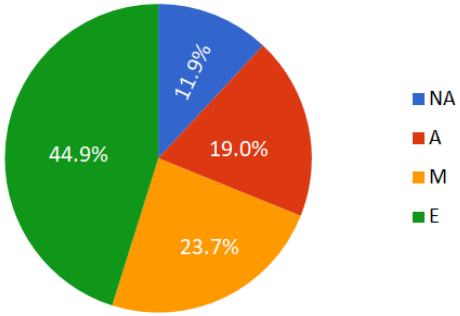
Did not having a recipe to follow make you feel like the outcome of your dish was easy to control?	Did having a recipe to follow make you feel like the outcome of your dish was easy to control?
	

Grades and comparisons

The results below present the percentage of the participants that achieved the final Masterchef assessment with NA (Not Achieved), A (Achieved), M (Merit), and E (Excellence), as well as the percentage of participants that achieved the Recipe lesson Scrapbook assessment with NA (Not Achieved), A (Achieved), M (Merit), and E (Excellence). (The Scrapbook assessment involved students collating all of their recipe ideas, alongside the inspiration, and research that was used to come up with said recipes. Teachers then assessed how good students were at coming up with creative recipe ideas, their ability to prepare for it, as well as student's real life recipe dish outcomes).

Please note the following:

- Students who were absent on the days of the final assessments did not get marks, and hence received a "Not assessed" grade (different from "Not Achieved"). I did not include these people in the dataset as they did not obtain an actual grade.
- Students who joined the class late in the year did not get fully graded as they hadn't been part of the class for long enough for "final" grades to be applicable. Likewise, I did not include these people in the data set as they did not obtain an actual grade.

Masterchef	Recipe
	

Comparison

Below, I compare the final Masterchef assessment outcomes to the baseline results, the Recipe scrapbook assessment.

- Whilst no participant achieved NA grade for Masterchef assessment, 11.9% participants received NA grades for their Recipe scrapbook assessment.
- There was a 78.1% decrease in the percentage of participants that received A grades for their final Masterchef lesson assessment in comparison to their Recipe scrapbook assessment.
- There was a 165.3% increase in the percentage of participants that received M grades for their final Masterchef lesson assessment, in comparison to their Recipe scrapbook assessment.
- There was a 26.5% decrease in the percentage of participants that received E grades for their final Masterchef lesson assessment, in comparison to their Recipe scrapbook assessment.

Evaluation

Stress levels and the role of control perception

Intriguingly, unlike I predicted, the statistical results for the question: "Were you feeling stressed about this lesson?", were extremely similar for both Masterchef lessons (35.7% of participants felt stressed about the lesson) and for Recipe lessons (36.9% of participants felt stressed about the lesson). Hence, there isn't a notable difference between the responses for the Recipe lessons and the Masterchef lessons. However, only 50.0% of students felt like Masterchef lessons provided them with the sense of control, yet 74.6% of students felt like the Recipe lessons provided them with a sense of control (a 32.2% decrease in control perception when comparing Masterchef lessons with Recipe lessons). Also, only 2.1% of participants felt extreme stress during Masterchef lessons, when compared to the 5.6% of participants that felt extreme stress during the Recipe lessons (62.5% decrease in extreme stress level when comparing Masterchef lessons with Recipe lessons). Thus, it is evident that despite approximately the same percentages of students feeling stressed about both types of lessons, the stress appraisal process differed for each type of lesson (see theory on Lazarus's concept of primary and secondary appraisal). From the results although students felt like they were more in control during Recipe lessons, they also felt higher levels of stress. Conversely, students felt less in control during Masterchef lessons, yet felt less stressed. Consequently, the difference between participants' stress levels, and levels of control (i.e. the ability to complete the task at hand) ended up being approximately the same for both lesson types, resulting in the similar "Were you feeling stressed about this lesson?" results.

As participants progressed through the lesson, there was a more noticeable dichotomy between the results for the two lesson types. In fact, *during* the lesson 46.0% of participants felt in control and not stressed during Recipe lessons, and only 41.0% of participants felt the same way during Masterchef lessons; this is a 10.9% decrease in those that felt in control and not stressed during Masterchef lessons, when compared to recipe lessons. These results highlight the fact that control perception and stress levels do have a relationship, albeit not one that was as strong as I predicted.

For the question, “If you answered yes [for feeling stressed prior to the lesson], please tick the applicable reasons that lead to you feeling stressed”, the greatest percentage of participants ticked the “I was worried that the mystery ingredient was going to be a food that I had never heard of/hadn't cooked with” option for the Masterchef lessons, and “I had never cooked a dish like the one I planned on cooking today before” for recipe lessons. The common factor in both of these answers is the fact that both responses show that people feel stressed when introduced to new, foreign things (i.e. new ingredients and recipes). The second greatest percentage for the Masterchef lesson was “I was worried about having to cook a good, original dish in time”, and for the Recipe lesson was “I was unprepared for this lesson (e.g. didn’t fully plan my recipe)”. This result shows that the factor of time pressure in the kitchen, is extremely prevalent, which corresponds to my research. (The role of time pressure and stress is also depicted by the results for the question “What aspects of the lesson made you feel the most stressed?”, where for both lessons types the percentage of those who chose “time pressure” was the highest by far). Secondly, the fact that a high percentage of students weren’t fully prepared for their recipe lessons, reveals something that is very interesting: some students actually felt more prepared, and more in control during Masterchef lessons when compared to Recipe lessons. Therefore, unlike I predicted, control perception didn’t incur a direct, straight forward decrease when comparing Masterchef lessons to Recipe lessons, but rather, there was a notable percentage of students that felt more in control in both lesson types (but more so with Recipe lessons).

Performance - Students’ Predictions

40.9% more participants felt like their approach to the Masterchef lessons were absolutely exceptional (i.e. scored a 5/5), in comparison to the percentage of students that gave the same score for their approach to the Recipe lesson. 86.5% less participants felt their approach to the Masterchef lesson scored a 1/5 when compared to their approaches to the Recipe lesson. However, the majority of students received “middle-ground” marks (M) for their final Masterchef dishes, in comparison to their Recipe Scrapbook assessment. Much like my research, students felt like they were doing a better job during the Masterchef lessons, as they were creating the Masterchef dishes with their own ideas (ideas of which they valued highly, even if said ideas weren’t necessarily good).

Performance - Students’ Grades

The pressure and stakes were higher during Recipe lessons (as the Recipe Scrapbook results contributed a lot towards students’ final grades), however only some participants felt more prepared, and hence in control, during said lessons. Hence, whilst some students thrived during Recipe lessons and achieved highly, others crumbled under the pressures of stress and lack of control, and so performed badly. This is shown as the majority of students either achieved very highly (i.e. with Excellence), or lowly (i.e. Not Achieved, and Achieved) for their final Recipe lesson scrapbook results. This overall result, in correspondence to the other prior explained results, reflects our modern day society. With stress due to increased demand of people, increasing, the society has become split. While some people obtain helpful coping techniques which enable them

to feel in control and achieve well, others don't feel in control even when it seems fit (i.e. as reflected by the fact that some people found Masterchef lessons easier to control despite the mystery ingredient aspect). Consequently, such people crack under pressure, allow for stress to consume them, and achieve worse. This causes for there to be many people at both ends of the scale (i.e. many top achievers and many low achievers).

Outcomes that were close to my predictions

Some of my predictions were quite close:

- I predicted that 70% of students would follow the recipe during recipe lessons, whereas in reality 61.1% did (this is quite close).
- Like I predicted, the majority of participants (37.1%) decided to create their Masterchef dish by finding a recipe and slightly modifying it to incorporate the mystery ingredient. (Although, my prediction that the other most used method to create Masterchef dishes would be experimentation, was incorrect as the second most chosen option was "I/My group thought about yummy, create dishes that could incorporate the mystery ingredients, before proceeding to cook".
- Although more people felt high levels of stress during Recipe lessons, for both Masterchef and Recipe lessons, the percentage of those that felt a medium level of stress was very similar (Masterchef = 29.5%, Recipe lesson = 30.5%).
- As I hypothesised, the leading cause of participants' high stress levels during lessons was time pressure, for both lesson types. This is depicted by the graphs for "What aspects of the lesson made you feel the most stressed?"

11.Conclusion

To conclude, my results enabled me to answer the questions outlined in my aim.

Is there a strong, inverse relationship between control and stress (i.e. as control increases, stress decreases)?

Well, to put it simply, it's just not that simple! Firstly, some students felt like Masterchef lessons provided them with more control and freedom over their dishes. And even out of the participants that believed that recipe lessons provided them with greater control perception, the majority actually stated that they felt more stressed. In the end it was the dynamic relationship between participants' stress levels and increased control perception that lead to students feeling like the lesson was not extremely stressful overall. What this suggests is that the relationship between control perception and stress levels can't simply be depicted by an inverse linear graph, like I had hypothesised. Rather, as Lazarus expresses overall stress levels are derived from the primary and secondary appraisal process, even with the introduction of control perception. So instead of control altering this appraisal process by making one's initial primary stress appraisal of the stressful situation "benign", or a "positively challenging", it is the secondary appraisal process that is affected more, as participants felt that their preparation levels were enhanced when during the lesson where they felt in control. It was this sense of being very equipped for the stressful situation that reduced overall stress levels.

If so, in which ways can we enhance control perception?

As depicted by the outcome of my results, despite the fact that the majority of participants felt more in control during recipe lessons, there was a significant percentage of students that felt in control during Masterchef lessons also. What this portrays is that control perception can be enhanced in a multitude of ways, as each person gains control over various situations differently. While some prefer to have strict guidelines to follow in order to feel in control of their outcome, others find greater value in the ability to choose how they work and feel that this gives them greater control of their outcome.

Therefore, for some people, control perception is enhanced by limiting the amount of choice and providing them with simple instructions; whilst for others control perception is enhanced by providing them with increased choice options.

Will increasing control perception improve our performance in activities such as academic performance?

As my results highlight, participants either achieved highly during recipe lessons, or achieved low grades. Since students' primary appraisal of the recipe lesson was that it had a high stress factor (because there were increased stakes at hand for e.g. grades), yet only some students felt more in control during recipe lessons, there is an assumption that the students who received lower grades for the Recipe lesson scrapbook results felt extreme recipe lesson stress, yet low recipe lesson control perception. What this potentially means is that "yes" control perception does increase academic performance, by lowering overall stress levels via the

dynamic primary and secondary stress appraisal process. However, as prior explained, people feel in control of different kinds of situations, and hence when participants' stress levels were not compensated by higher control perception, they tended to crack under pressure, perform worse, and receive lower grades.

12. Discussion

The importance of my study

The most important data from my science fair experiment has been summarised in my Executive summary. This data is extremely important, especially since my experiment is in the context of school and education. Although the implementation of my results may not be directly applicable in the Food Technology classroom (as having Masterchef lessons and Recipe lessons is a fundamental part of the diversity of the Food Technology criteria), this knowledge can be applied to most subject areas. For example, in Math class, some people find that following the teacher's steps to find the answer to a question, to be very helpful as they find it allows them to understand the mathematical process much better. Conversely, some find it much more valuable to figure out the math problem themselves, even if it's a more strenuous task, as that's the only way they're able to feel confident about answering such maths questions in the future. However, many students find maths to be a stressful subject (as it is beneficial for a multitude of university courses, and is a highly advocated STEM subject), and so providing students with control perception during this subject (in whichever way suits them), may minimise the gap between those who achieve greatly at maths, and those who don't tend to achieve as well in this subject. In fact, the introduction of control perception, in such a way that is enhanced for each student's learning type, can be the fundamental factor that improves the New Zealand (and global) education system.

Primarily, in relation to my aim, control perception can help mitigate the risk of people developing stress based disorders. As long as people get to understand their own stress appraisal process, and understand how they could increase control perception in the most suitable way for themselves. People would then be able to isolate this, enhance their control perception, and hence reduce their stress levels. (As reflected by my results as students initially felt more stressed about the recipe lesson in general, albeit with increased control, overall stress levels decreased). With this, a question arises: "what simple, accessible tests can be developed in order for people to figure out the ways in which they can enhance their own control perception?" Who knows, maybe my next science fair experiment will involve me figuring out the most accurate way to figure this out!

Limitations

Much like all great scientific projects, my scientific endeavour encountered limitations. As mentioned prior in the 'Constraints' section, I was accompanied by a few restrictions throughout my trialling process. But on top of that, there were limitations to my data accuracy due to the following reasons:

<u>Problems</u>

1. *My surveying methods meant that my results were heavily reliant on participants.* What this means is that I had to trust that my participants were reading the survey questions correctly, and answering them truthfully. This also meant that I had to work hard to ensure that my survey questions could be easily understood by my target audience

(year 10s - 14/15 year olds). I questioned: "how truthful can people really?" However, I had to momentarily overlook this (due to equipment constraints), in order to even have an experiment.

2. *Bias*. As I wasn't working in a team for this project, I was the only one observing students and asking them questions during the trials. This meant that my interpretation of my observations and participants' answers, could be somewhat bias as I my viewpoints were not challenged by anyone else. However, due to cost and time constraints, asking someone with no connection to the experiment to make observations during trialling (i.e. to mitigate the risk of bias), wasn't feasible.

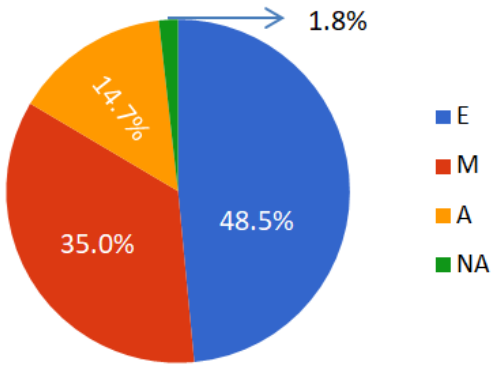
Solutions

1. To enhance data accuracy, I thus researched valid questionnaire/survey question writing techniques. One method that I used was "Reverse scoring". The idea of this is to flip the order that scale based questions (e.g. questions involving answers such as "extremely stressed", to "not stressed"), so that participants spent longer reading and digesting questions, enabling them to fill out the survey as best as possible.
2. To reduce the risk of bias, I recorded observations for each and every lesson, then collated my observational overview at the end. I also discussed my observations with my science fair mentor, and supervising teacher.

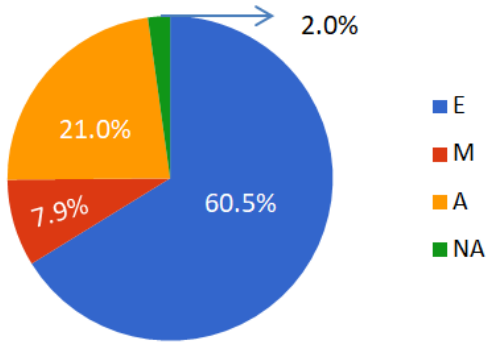
Validity

To ensure that my results were a good reflection of my participants (particularly the grades), I asked the Food Technology teachers for some data on student results during previous years. Below is a summary chart of how students achieved (note that the below grades were student grades for the entire year. Recipe Scrapbook hand-ins as well as Masterchef assessment results contributed towards this final grade. Also, these grades are a summary of multiple classes throughout the Food Technology Department).

2018



2019



I even received a quote from one of the teachers, "Generally, I think the standard of work and therefore grades has been better each year. I think students see ideas on instagram

and watch Masterchef more and have more sophisticated ideas now. They still need to learn the cooking methods and how to tidy up though! They have higher goals of what they want and some achieve this easily if they have good basic underpinning knowledge but others fall down on the basics of time management and cooking know-how."

Both the statistics and quote depict the prevalence of the divide in student achievement (i.e. the fact that there are some very high achievers, and very low achievers, all at once). In fact, this divide increased in 2019, with 26.1% less students achieving with Merit grades. Therefore, as this data reflects my own data, I am confident that my results are an accurate representation of reality.

13. Further Questions and future work

Further questions

1. A big question that I am still very intrigued about is: how does control perception affect the quality of someone's life in everyday life? (I.e. what is the long-lasting effect of gaining control over your own life, as unlike my experiment displays, stress reduction is important for more things than just good grades). I'd therefore like to have the opportunity to record data over a long period of time, in order to do this.
2. I'm also interested in the question: when does the degree of control present in one's life become too much and become negative? (E.g. resulting in perfectionism based mental health disorders such as OCD).

Future work

If I had the opportunity to work on a similar experiment In the future, I'd first like to redo a similar experiment but with a larger sample size, better control over my controlled variables, and access to scientific stress measuring devices (e.g. BP machine, HRV machine, Heart Rate machine, Salivary Cortisol testing equipment, etc.). I'd then proceed by making new experiments where I'd change other factors such as participants' age (as each age bracket finds differing things to be stressful), the stressor (to a stress applicable to the new that the age group), and the period of time that I would record the data for.

Other cool and intriguing science fair projects could include:

1. To gather data that more effectively relates to academic learning, I thought of the following idea. I could measure students' exam stress and see how different studying techniques (i.e. linking to stress reducing coping techniques), enhanced students' control, and affected their stress levels.
2. As I noticed that regardless of the lesson type, all students seemed notably more stressed during the final plating up countdown, I thought that gathering deeper insight on how time pressure affects stress levels, would be very beneficial (such knowledge could be applied to all areas in one's life). I thought that emulating time pressure in regards to an escape room puzzle experiment where participants had to try and solve an almost unsolvable puzzle with only minutes on the clock left, could be quite a revolutionary experiment.

I am currently working on a digital outcome (for Level 3 Digital Technologies/Scholarship Digital Technologies) that incorporates these results into a useful user interface that the masses can benefit from. My chosen digital outcome is an app called 'Channel V'. Below is an excerpt from my project:

"The main issues that Channel V will address, is the overarching predicament of the decline in mental health and wellbeing, felt by the global population. Specifically, my hope is to minimise suicide rates, particularly in NZ. My chosen method of minimising stress (the root cause of most mental health disorders), is through the perception of control. I believe that my app design enables users to gain this sense of control because of my chosen TV format (i.e. TVs have connotations with being in control). Also, the functionalities are designed to involve the

user's input, meaning that they have main control over how they interact with the app (e.g. with the rant pages). As well as this, the strength of the signal of the channels (friends, family and therapy), are dependent on how active the user is with the app and hence users have overall control of how strong their signals are (note that the strength of the channels symbolises the user's wellbeing). Therefore, users feel as though they are in control of their own wellbeing, which, as scientifically proven, lowers one's stress level."

←This is the logo that I designed for my app.

14.Reflective self-evaluation

Ideas and skills that I have developed personally by doing the project

- I have learnt how to think quickly on my feet. As outlined in my 'Ideation' section, I had to come up with a number of different ideas before settling on my final project. If I didn't apply creativity, I would've been stuck. Therefore, I'm glad that this CREST project enabled me to enhance my creativity skills.
- Something that I am very glad to have developed is systematic thinking. When planning out a science fair project of such a large degree, it is important to have "all your ducks in a row", be and be extremely organised. Planning this project was an extensive task (it included intensive research towards the study and finding a mentor, making many meetings with teachers, students, and my science fair mentor Professor Glynn Owens, and so much more), and by conquering this project, I have developed many coping mechanisms for handling large tasks.
- I have also learnt a lot about the scientific evaluation process. I feel as though this project has helped me immensely when it comes to drawing valid scientific conclusions; this will benefit me in all areas of my life.
- Alongside this, my curiosity has been enhanced even further. After the fascinating discoveries from this project, I have officially submerged myself in the world of science, and have no intention of withdrawing!

My understanding of science as a consequence of completing this CREST project

This project has allowed me to view science less narrowly. I now see science as being an extremely expansive topic; one that is relevant in all aspects of our lives. After realising that science is prevalent in all areas of life, I now navigate my day to day activities with a scientific mindset. Whenever I observe new things, or learn about intriguing scientific phenomena, I am constantly wondering how my new knowledge could be applied in an isolated experiment, and what the potential results would be.

What have I learnt about available career paths in science and technology?

I have learnt that there are a number of scientific career path options available, and that many of the sciences are interconnected. Personally, my favourite sciences are psychology, neuroscience, and computer science, and so I am hoping to combine these into a conjoint university study course.

15.Acknowledgements

I wouldn't have been able to have undertaken this amazingly fun and rewarding science fair experiment without the help of some absolutely amazing people. Below I will be acknowledging all the wonderful people that helped me along my scientific journey!

Firstly, I'd like to thank my superb science fair professor, Professor Glynn Owens. After sending what felt like millions of emails to a range of different emails to a number of different addresses, I was more than joyous when I found out that someone from the Psychology department of the University of Auckland was interested in mentoring me! Immediately after our first meeting, I became that much more excited as I knew that my mentor was someone who was interested in his line of work, and excited to guide me along my project. In fact, on the first day Professor Owens gifted me with a book in Health Psychology, and opened my eyes up to a range of psychology science resources. He has been someone who I have thoroughly enjoyed talking to, listening to, and explaining my ideas to. I honestly couldn't have asked for a better mentor, so thank you!

Secondly, I'd like to thank my exceptional science fair supervising teacher, Mrs Ghanim. Ever since year 10 I have been extremely interested in the NIWA and Crest Science Fair opportunities, and all throughout this time I have felt extremely supported and welcomed by Mrs Ghanim, who has provided me with the platform and resources to let my scientific creativity grow! I have been grateful to do my science fair project this year with her guidance and assurance, and couldn't have asked for a better supervising teacher. Not only has she encouraged my extended learning always, but has made me feel comfortable to share my ideas and thought processes with her, always. For this I will always be grateful!

Thirdly, I'd like to thank Mrs Riley and Miss Brooks (the Food Technology teachers that I liaised with in order to carry out this project). After asking far and wide (I even asked the Professional Hospitality Academy in Auckland) for a viable way to carry out my experiment, I felt like I was at a standstill. But things quickly turned around once Mrs Riley and Miss Brooks offered to help me out with my science fair project, by allowing me to observe their year 10 students during their normal school course. They may not realise it, but this small act of kindness was what birthed my project ideation into reality. They were both extremely nice to me, and welcomed me with open arms. For being so welcoming, understanding, and helpful, I thank both teachers to a high degree!

Lastly, I'd like to make a massive thank you to all of the science fair participants! I'm sure that it would've been a little weird for them to have me observe them every few lessons, so I'm grateful that they put up with that and continued with their learning to a high degree. Students promptly filled out forms and answered the questions that I asked them. It may not seem like much, but their efforts have been put towards a greater cause, and for that I thank them!

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13. https://theconversation.com/the-power-of-control-and-reducing-stress-at-work-9765 , published 25/09/12, viewed 02/06/19.
14. https://www.psychologytoday.com/us/blog/kidding-ourselves/201404/how-far-well-go-feel-in-control , published by Joseph T. Hallinan 24/04/14, viewed 02/06/19.
15. https://www.researchgate.net/publication/23297215_Lacking_Control_Increases_Illusory_Patter_Perception , published by Jennifer A. Whitson and Adam D. Galinsky November 2008, viewed 02/06/19.
16. https://en.wikipedia.org/wiki/Pattern_recognition_(psychology), last edited: 29/01/19, viewed 02/06/19.
17. https://www.youtube.com/watch?v=2YNzpoeYogU , published 29/10/17, viewed 02/06/19.
18. https://www.healthreviser.com/content/ways-measure-stress published 2010, viewed 22/06/19.
19. https://stressstop.com/pages/faqs published 2019, viewed 22/06/19.
20. https://www.mayoclinic.org/diseases-conditions/high-blood-pressure/in-depth/stress-and-high-blood-pressure/art-20044190 viewed 22/06/19
21. https://www.mayoclinic.org/diseases-conditions/high-blood-pressure/in-depth/stress-and-high-blood-pressure/art-20044190 published 21/06/19, viewed 22/06/19.

22. https://www.calmclinic.com/anxiety/symptoms/pupil, published by Daniel Sher 28/10/18, viewed 22/06/19.
23. https://www.researchgate.net/figure/Biomarkers-used-in-calculating-the-Allostatic-Load-Index-in-working-populations_tbl1_265690957, published by Daniel Mauss, Jian Li, Burkhard Smichdt, Peter Angerer, and Mark N. Jarczok 2015, viewed 14/07/19.
24. https://cyberleninka.org/article/n/875754.pdf, published by Erkan Kiral 2014, viewed 14/07/19.
25. https://www.mentalhealth.org.nz/assets/Uploads/MHF-Quick-facts-and-stats-FINAL-2016.pdf, published 2014, viewed 26/07/19.
26. https://www.mayoclinic.org/diseases-conditions/mental-illness/diagnosis-treatment/drc-20374974, viewed 27/07/19.
27. Book: *'An introduction to Health Psychology'*, by Val Morrison and Paul Bennett, published 2012. (Viewed all throughout the science fair process).
28. Book: *'Neuroscience, Science of the brain, An introduction for young students',* by the Briticch Neuroscience Association European Dana Alliance for the brain, published 2003. (Viewed all throughout the science fair process).
29. Knowledge from my Science fair Mentor, Professor Glynn Owens.

17.Appendices:

1. *Appendix 1*: Pictures of student dishes.
2. *Appendix 2*: All Google form responses
3. *Appendix 3*: Ethics approval (permission slips) layout (Signed ethics approval from participants is attached to the science fair board).
4. *Appendix 4:* Log book (this can be found near the science fair board).

Appendix 1

Photos from the trials

Recipe Lessons

MasterChef Lessons

Appendix 2

Data from all surveys

Questionnaire to do before the experiments start

QUESTIONS RESPONSES 44

44 responses

SUMMARY INDIVIDUAL

Accepting responses

Who has responded?

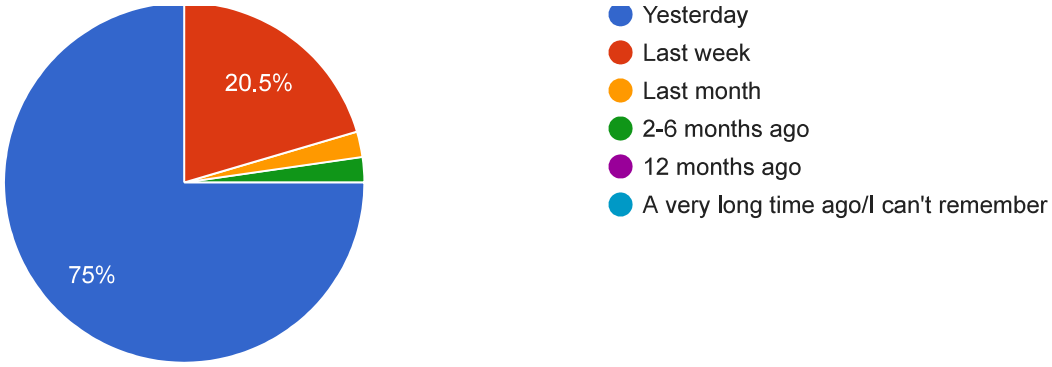
Email

[redacted]

The difference between "eustress" and "distress"

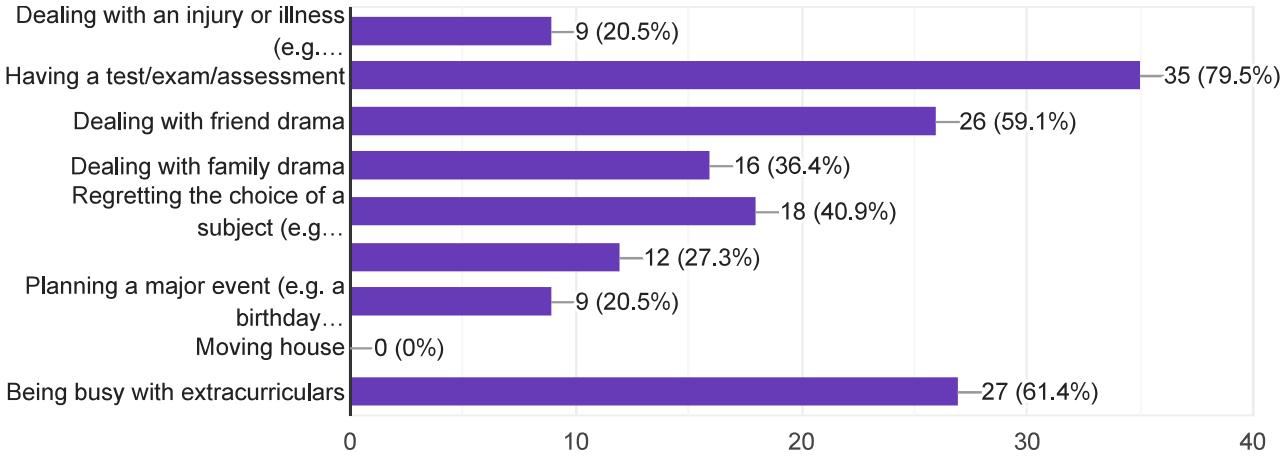
When was the last time you experienced a situation which caused you to feel stressed?

44 responses

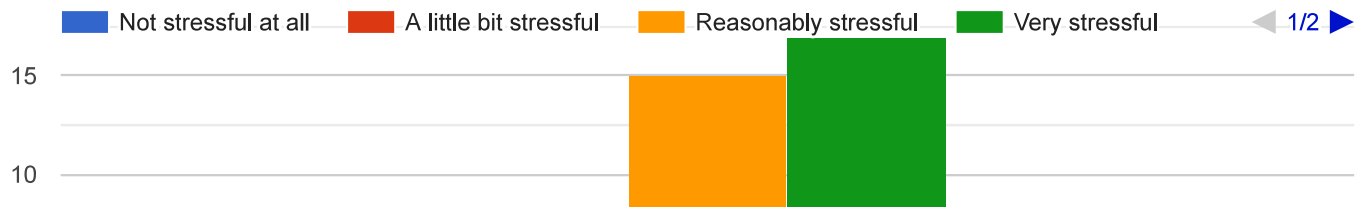


What stressful things have you experienced within the last 12 months?

44 responses



Based off of the boxes ticked in question 2, how stressful would you say the last 12 months have been for you?

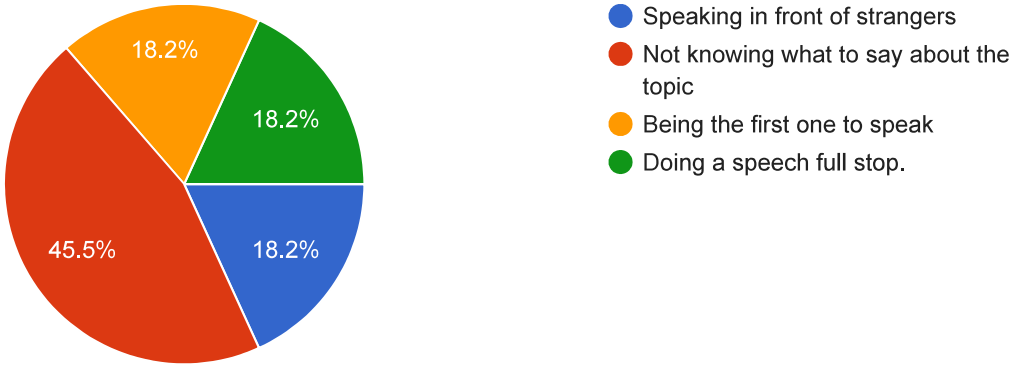


Scenario 1

The following scenario will be applicable for this section of questions

What aspect of this scenario do you find most stressful?

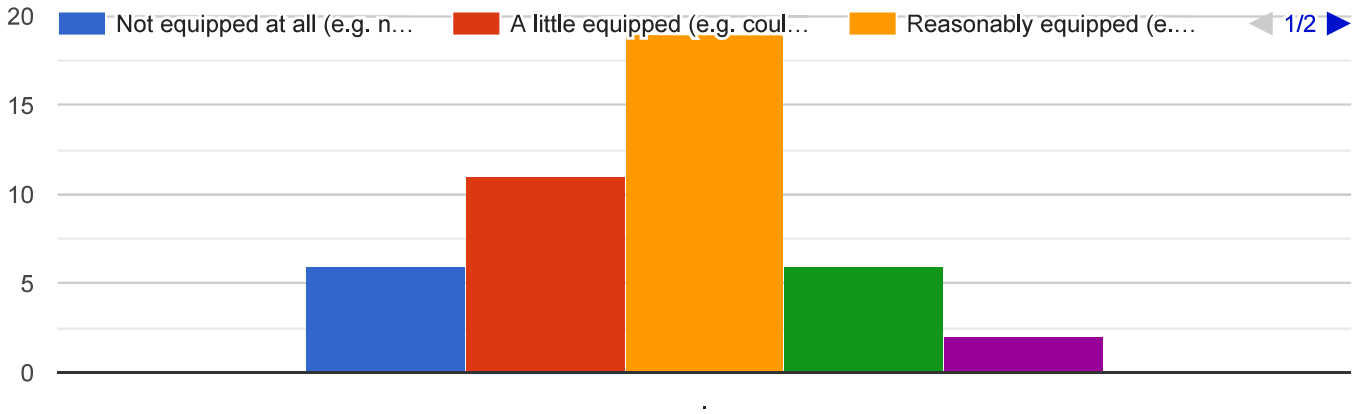
44 responses



Do you find this situation to be embarrassing, stress inducing, positively challenging, or neither.

44 responses

How equipped are you to handle this situation?

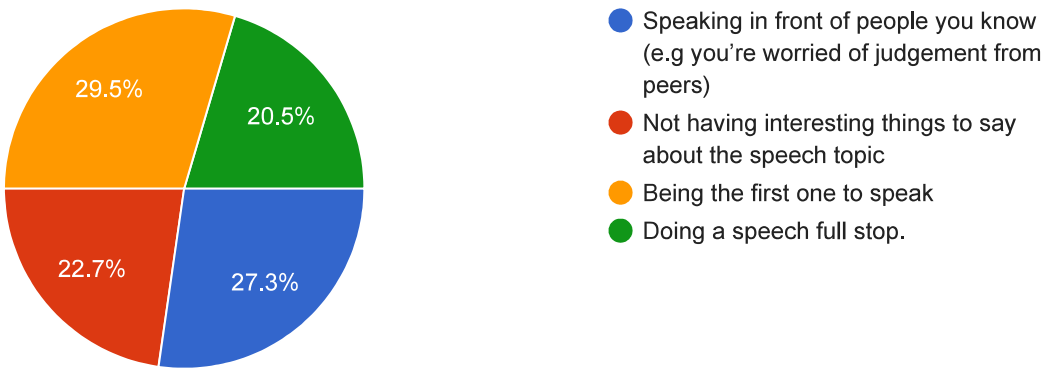


Scenario 2

The following scenario will be applicable for this section of questions

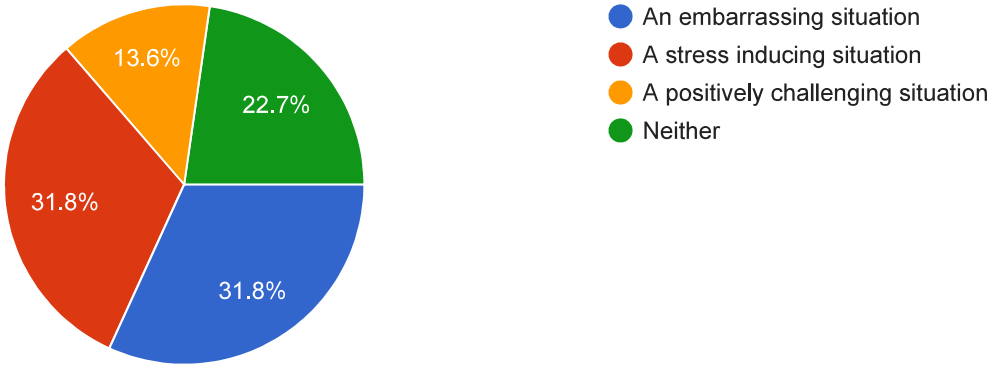
What aspect of this scenario do you find most stressful?

44 responses

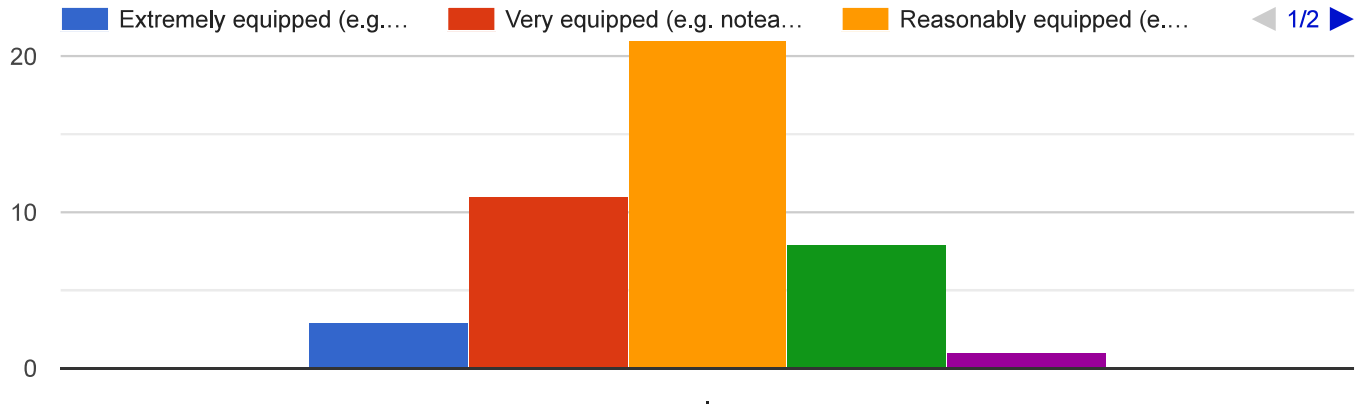


Do you find this situation to be embarrassing, stress inducing, positively challenging, or neither.

44 responses



How equipped are you to handle this situation?



Scenario 3

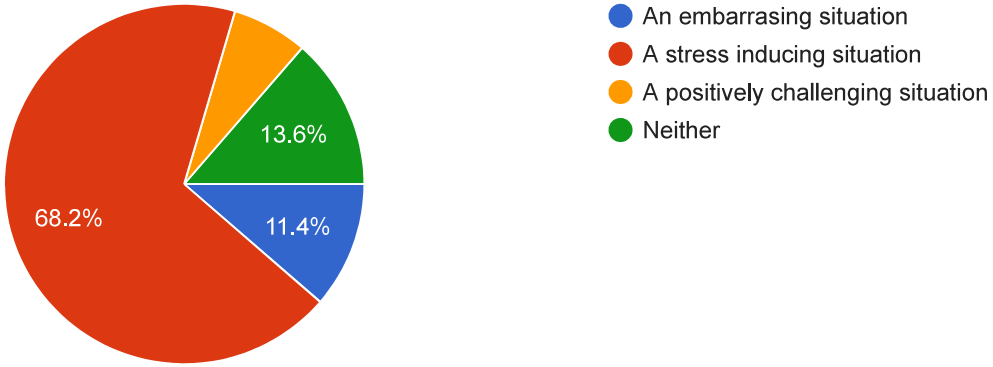
The following scenario will be applicable for this section of questions

What aspect of this scenario do you find most stressful?

44 responses

Do you find this situation to be embarrassing, stress inducing, positively challenging, or neither.

44 responses

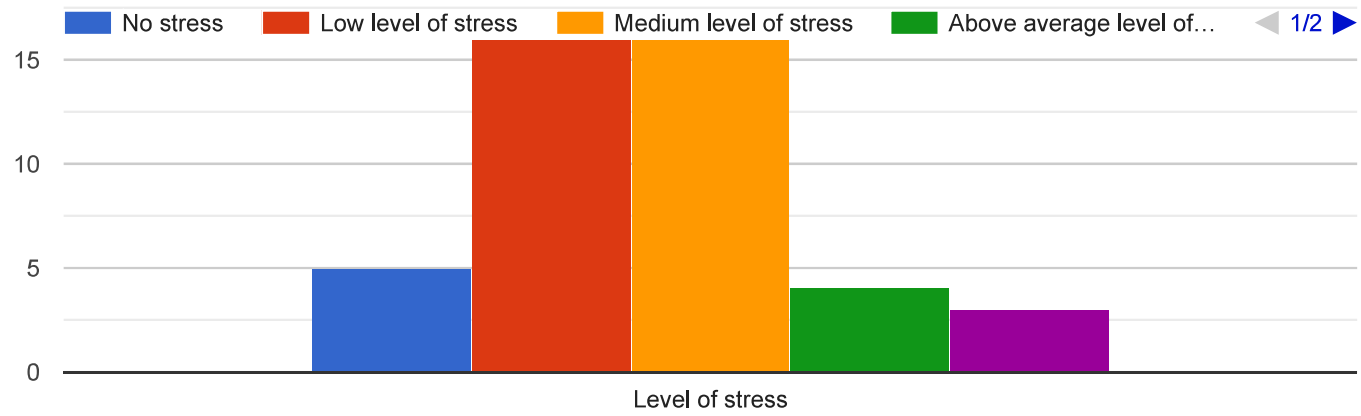


How equipped are you to handle this situation (i.e. having to deliver a 3 minute speech in front of a teacher who's grading you)?

20

Optimal Performance and Stress

What level of stress allows you to perform daily activities and achieve goals best?

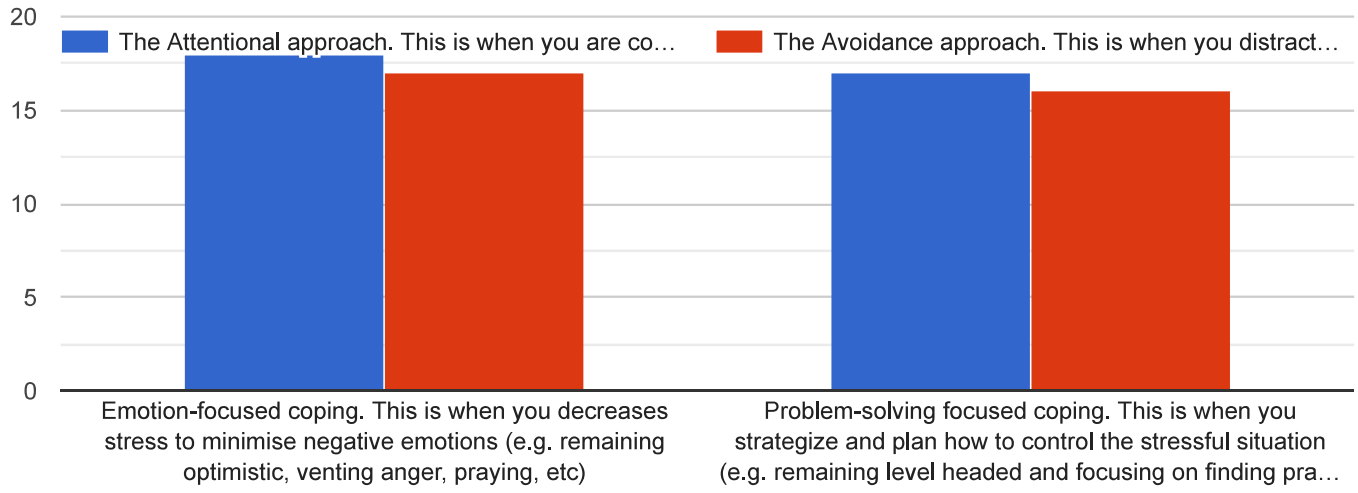


Relating to the Trial

When it comes to cooking, preparing meals, and baking, how skilled would you say you are?

44 responses

Coping Mechanisms



You've finished the questionnaire! Thank you so much!

02/07/19: Recipe Lesson - Questionnaire for after each trial

QUESTIONS RESPONSES 8

8 responses

SUMMARY INDIVIDUAL

Accepting responses

Who has responded?

Email

[redacted]

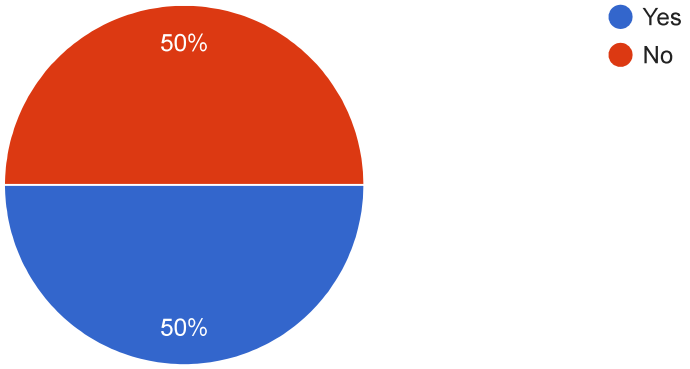
This section is about how you felt before starting the lesson

Was this Food Technology lesson a lesson where you used your own recipe, or one from the teacher?

8 responses

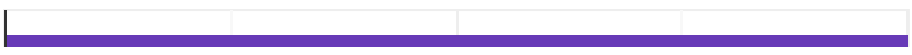
Were you feeling stressed about this lesson?

8 responses



If you answered yes, please tick the applicable reasons that lead to you feeling stressed.

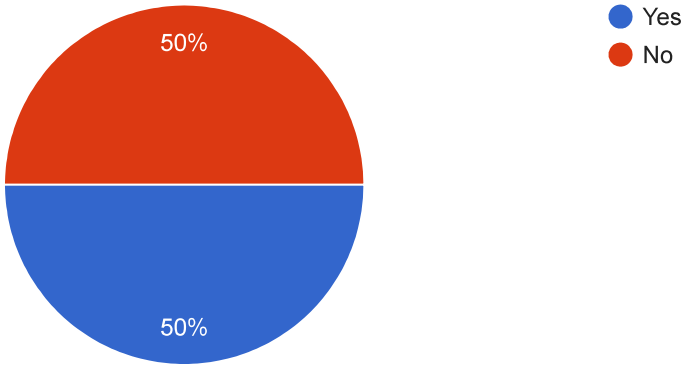
3 responses



This section is about how you felt during the lesson

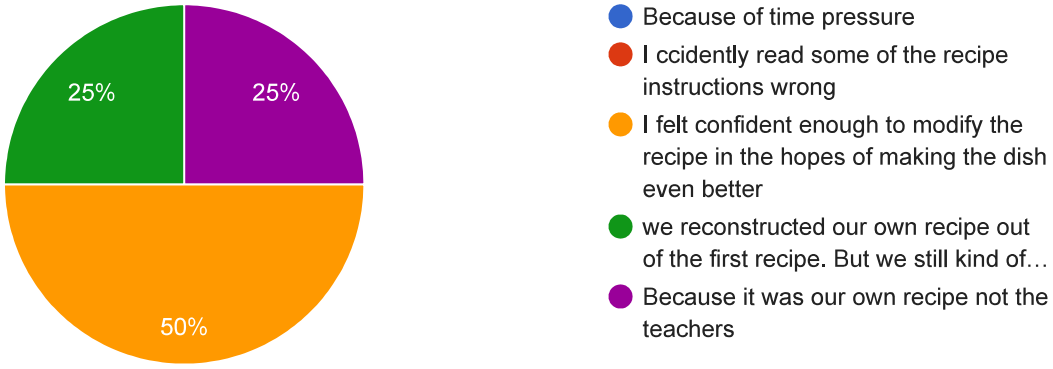
Were you following the recipe?

8 responses



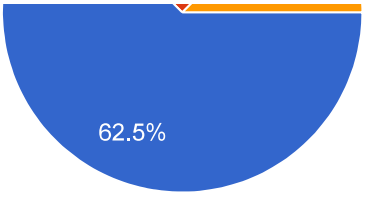
If you answered no, then why didn't you follow the recipe?

4 responses



How did your approach to following the recipe affect you as you were cooking?

8 responses



Considering the prior question, how much stress did you feel throughout this lesson?

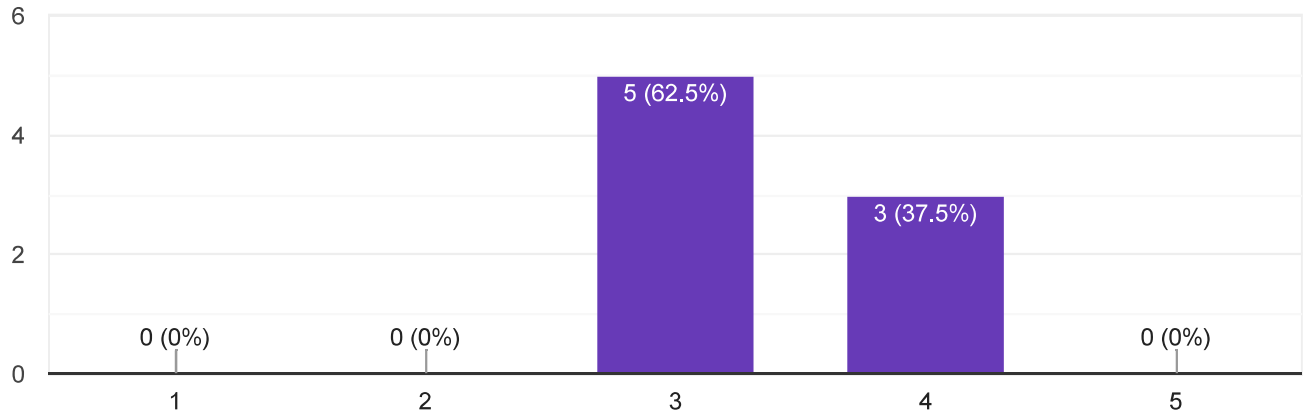
What aspects of the lesson made you feel the most stressed?

8 responses

This section is for assessing how you feel now, after completing the lesson.

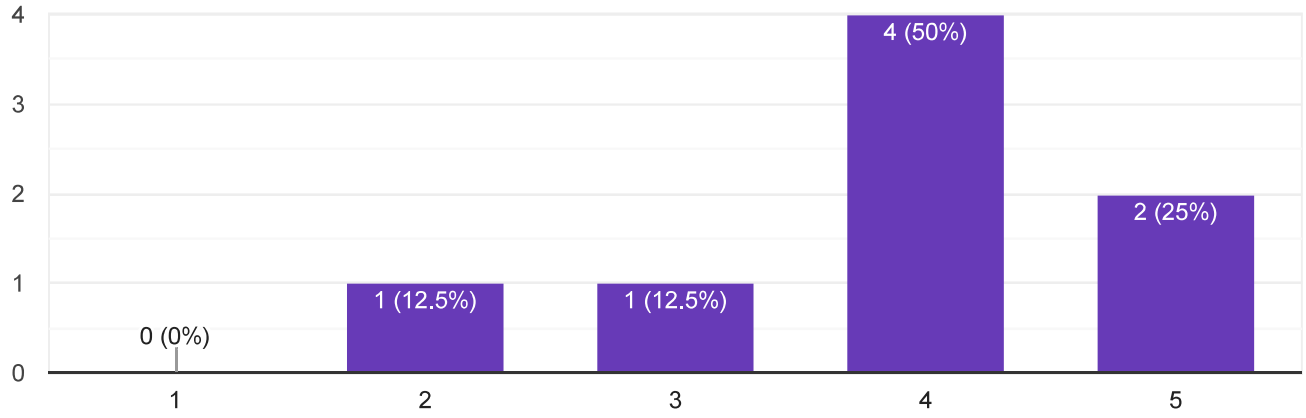
How well do you think your dish turned out to be?

8 responses



How well do you think you stuck to the recipe?

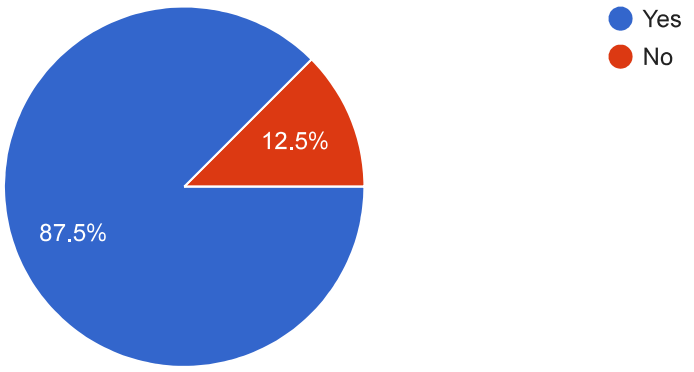
8 responses



Did having a recipe to follow make you feel like the outcome of your dish

was easy to control (i.e. did having a recipe make you feel like completing the lesson was more doable)?

8 responses



Please breifly explain why/why not.

8 responses

Having a recipe tells you what you need to do but if it's your own you can modify it

we haven't made the recipe before so I was stressed that it wouldn't work

Yes, because we would know which ingredients to use and not to us, as well as knowing the measurements and amounts of ingredients we needed.

we had trialed it before so knew it would work

it helps keep on task

Because we didn't have to waste our time on arguing on what to make.

Yes we knew what we were doing as we just modified one of our recipes we had already done

having a recipe was good because we knew that following a recipe we would know that it would turn out how it looked. but also we had to do a lot of things to our dish

04/07/19: Recipe Lesson - Questionnaire for after each trial

QUESTIONS RESPONSES 3

3 responses

SUMMARY INDIVIDUAL

Accepting responses

Who has responded?

Email

[redacted]

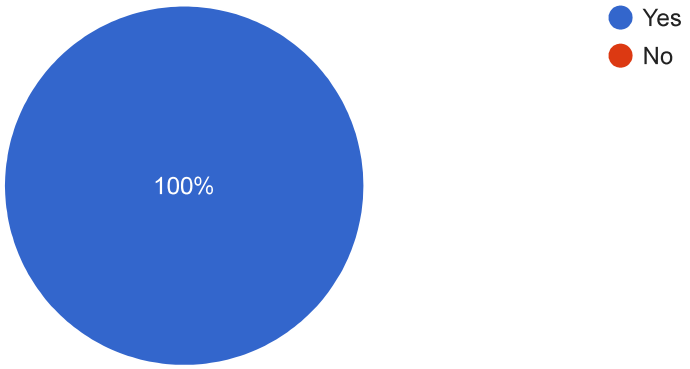
This section is about how you felt before starting the lesson

Was this Food Technology lesson a lesson where you used your own recipe, or one from the teacher?

3 responses

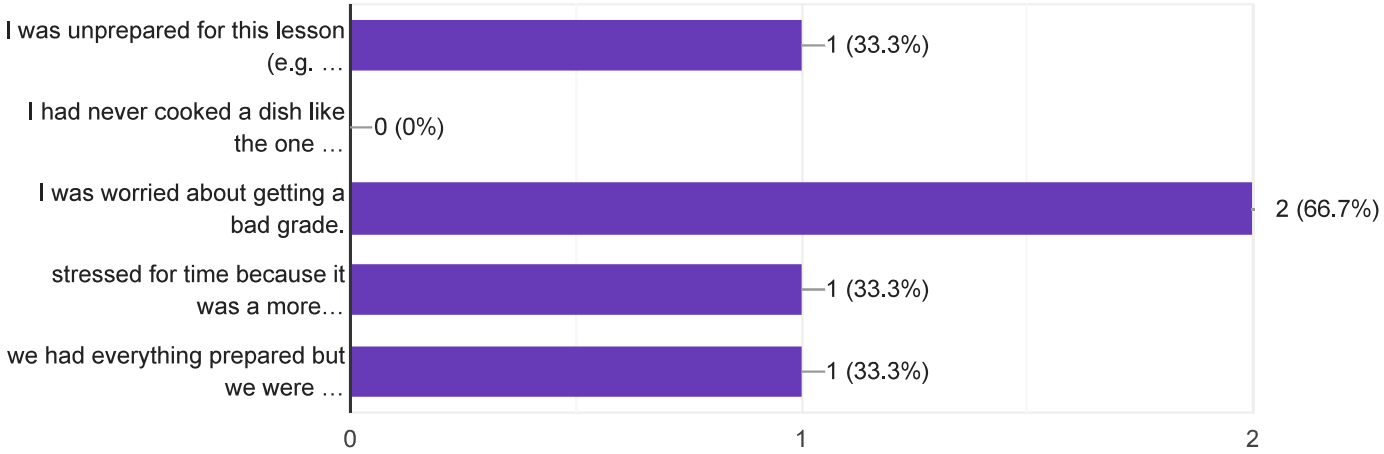
Were you feeling stressed about this lesson?

3 responses



If you answered yes, please tick the applicable reasons that lead to you feeling stressed.

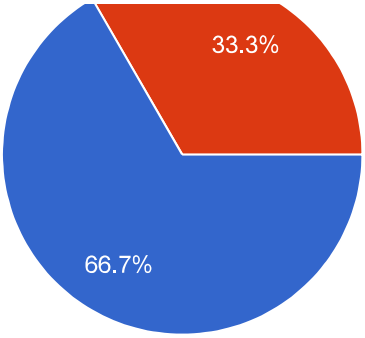
3 responses



This section is about how you felt during the lesson

Were you following the recipe?

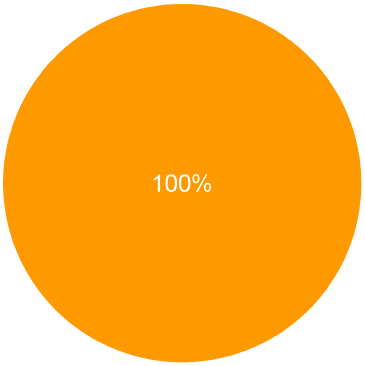
3 responses



No

If you answered no, then why didn't you follow the recipe?

1 response



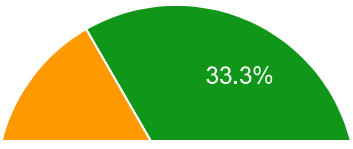
Because of time pressure

I ccidently read some of the recipe instructions wrong

I felt confident enough to modify the recipe in the hopes of making the dish even better

How did your approach to following the recipe affect you as you were cooking?

3 responses



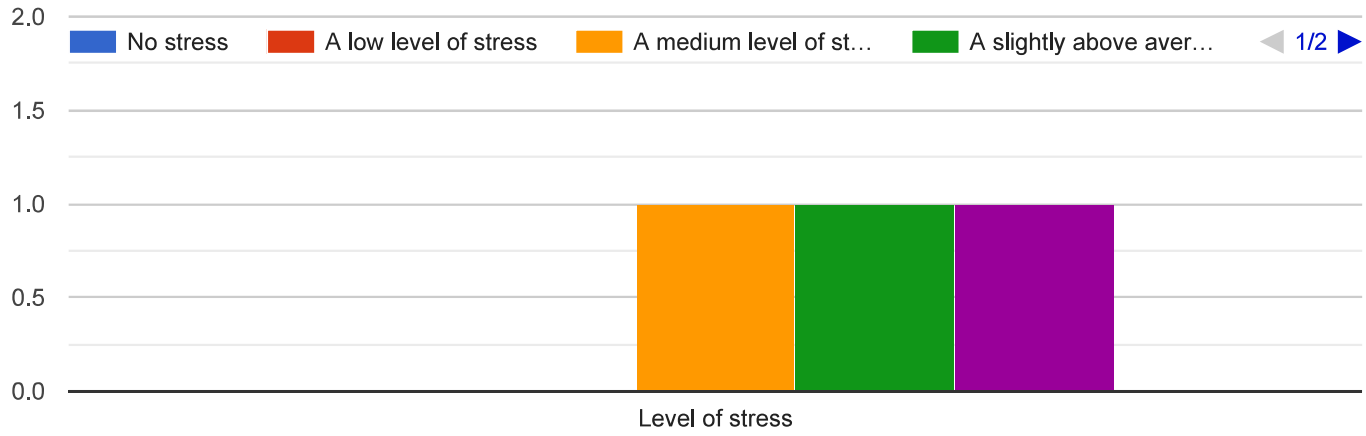
I felt in control, yet stressed

I felt in control and wasn't stressed

I lacked control and was stressed

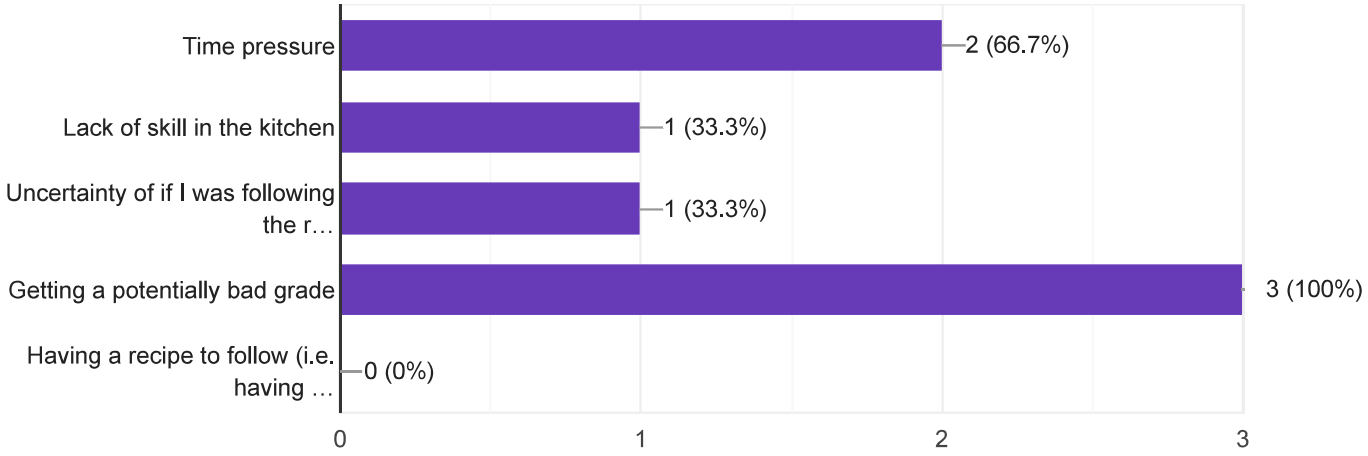
I lacked control and wasn't stressed

Considering the prior question, how much stress did you feel throughout this lesson?



What aspects of the lesson made you feel the most stressed?

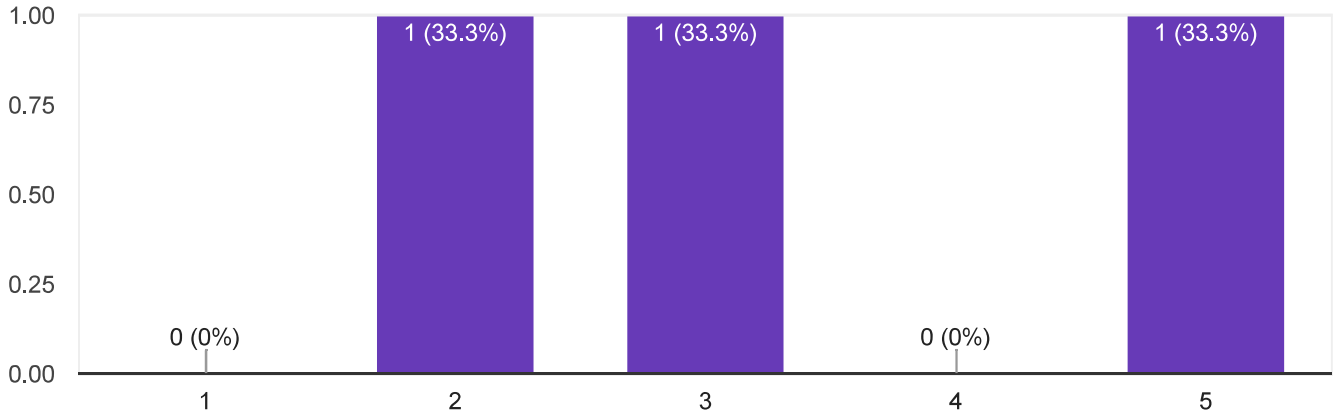
3 responses



This section is for assessing how you feel now, after completing the lesson.

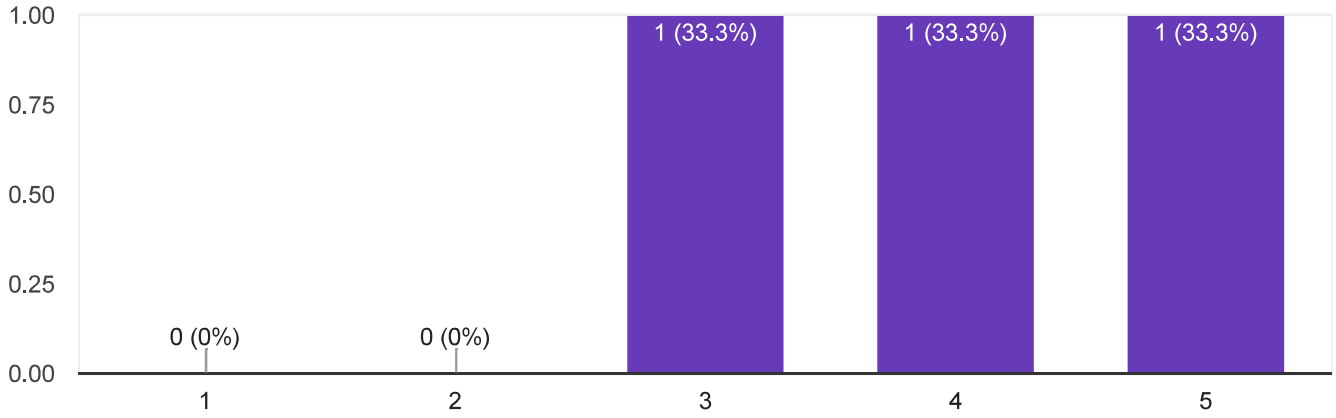
How well do you think your dish turned out to be?

3 responses



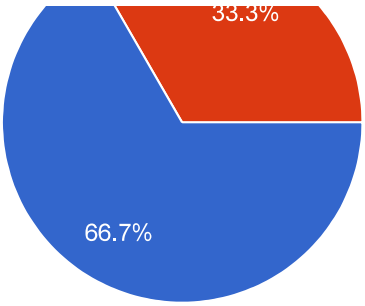
How well do you think you stuck to the recipe?

3 responses



Did having a recipe to follow make you feel like the outcome of your dish was easy to control (i.e. did having a recipe make you feel like completing the lesson was more doable)?

3 responses



Please breifly explain why/why not.

3 responses

personally, following instructions are easier than having to think for yourself in stressed situations

recipes guide us and they tell us about cooking times.

no i didnt i feel that following a recipe isnt very out of my comfort zone so i try to upskill myself by making it my own

10/05/19: Recipe Lesson - Questionnaire for after each trial

QUESTIONS RESPONSES 13

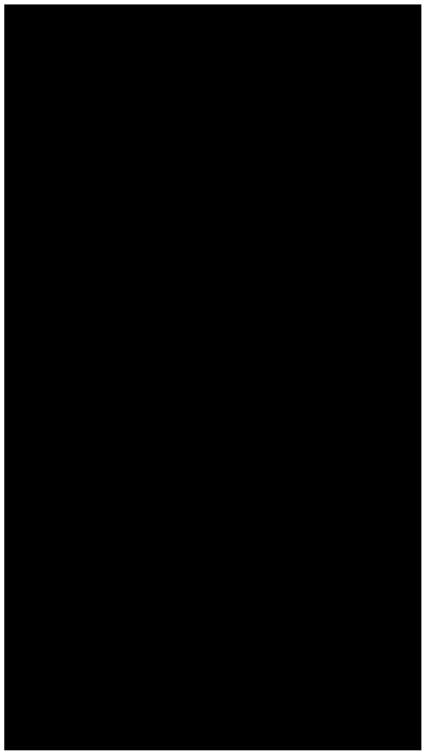
13 responses

SUMMARY INDIVIDUAL

Accepting responses

Who has responded?

Email



Waiting for 1 response

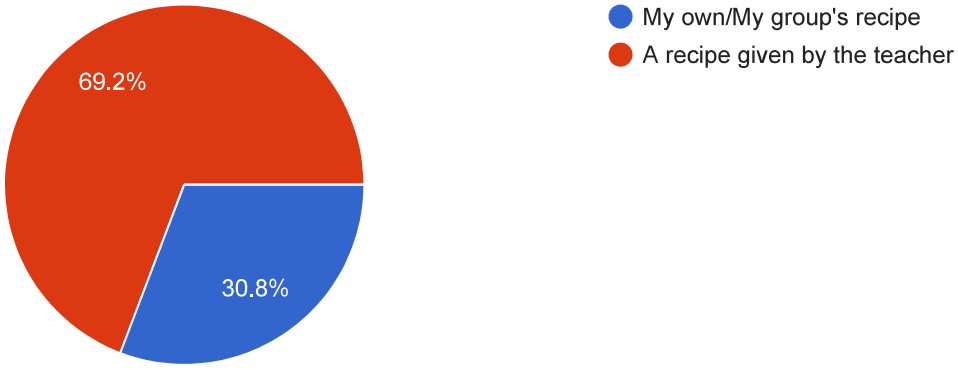
SEND EMAIL REMINDER

poakindeju@gmail.com

This section is about how you felt before starting the lesson

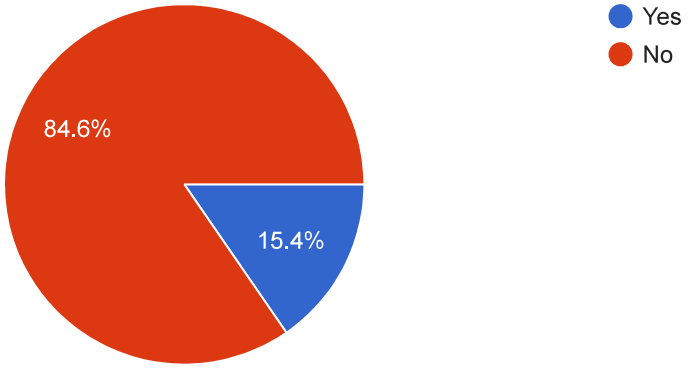
Was this Food Technology lesson a lesson where you used your own recipe, or one from the teacher?

13 responses



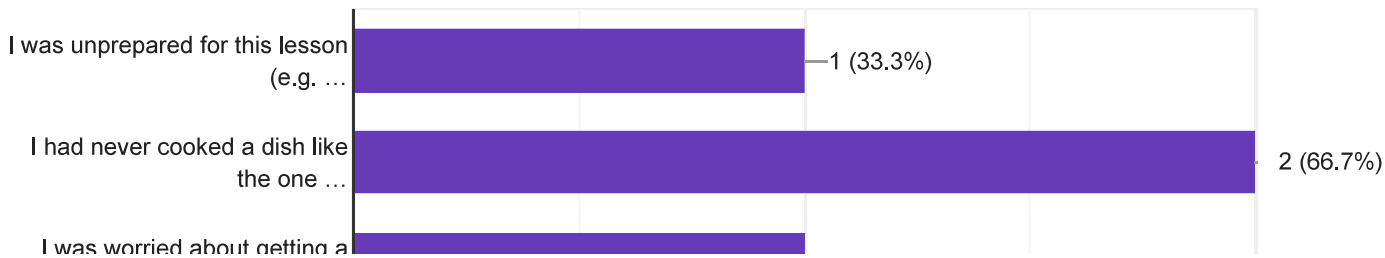
Were you feeling stressed about this lesson?

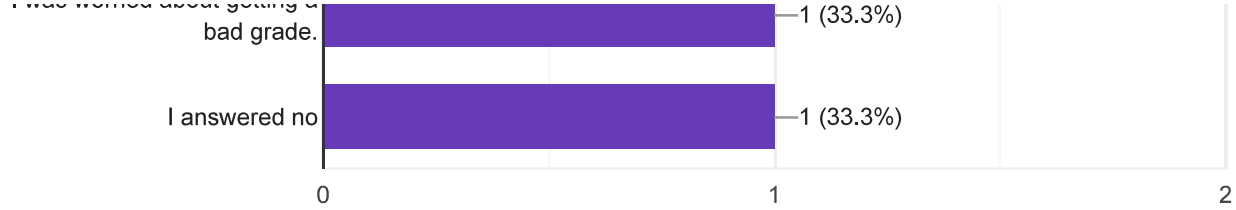
13 responses



If you answered yes, please tick the applicable reasons that lead to you feeling stressed.

3 responses

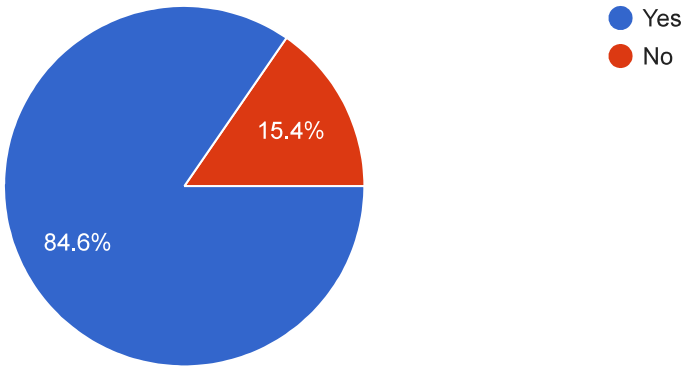




This section is about how you felt during the lesson

Were you following the recipe?

13 responses

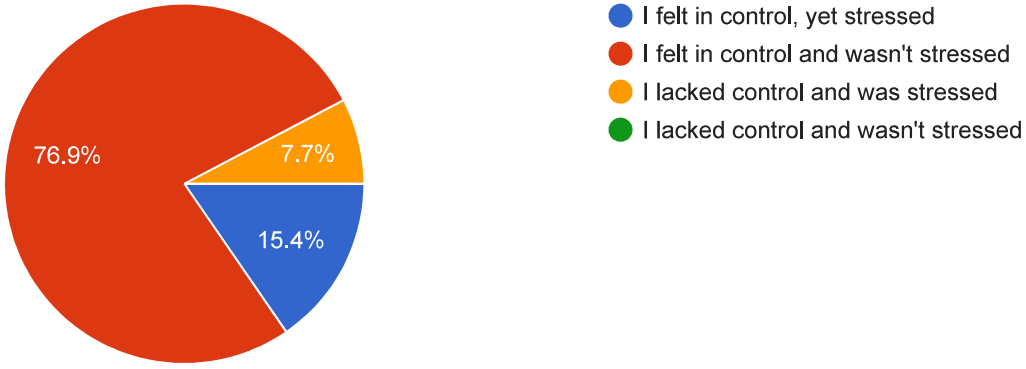


If you answered no, then why didn't you follow the recipe?

2 responses

How did your approach to following the recipe affect you as you were cooking?

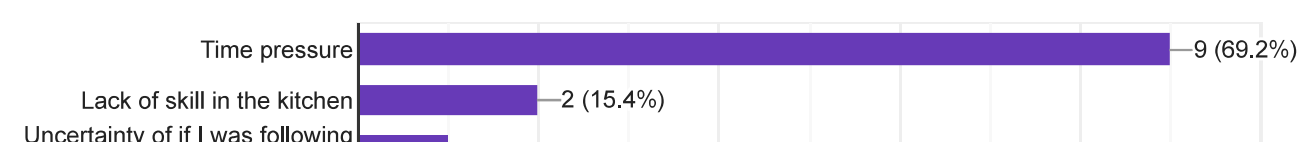
13 responses

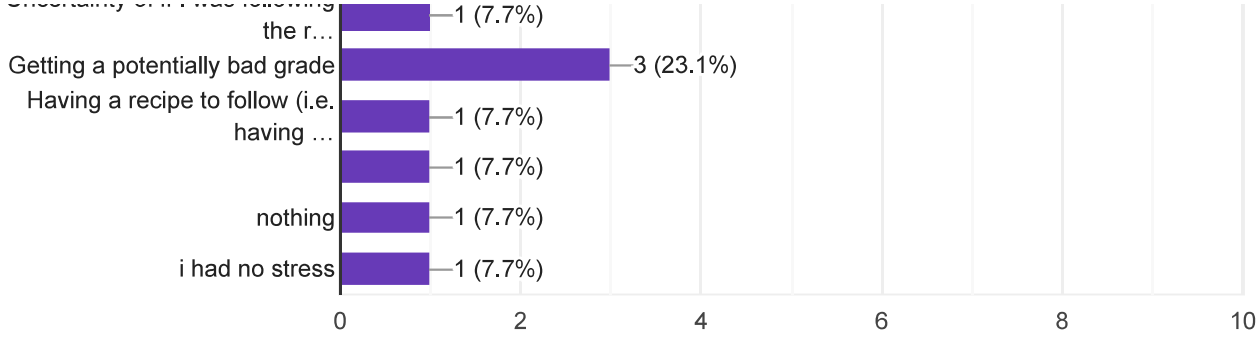


Considering the prior question, how much stress did you feel throughout this lesson?

What aspects of the lesson made you feel the most stressed?

13 responses

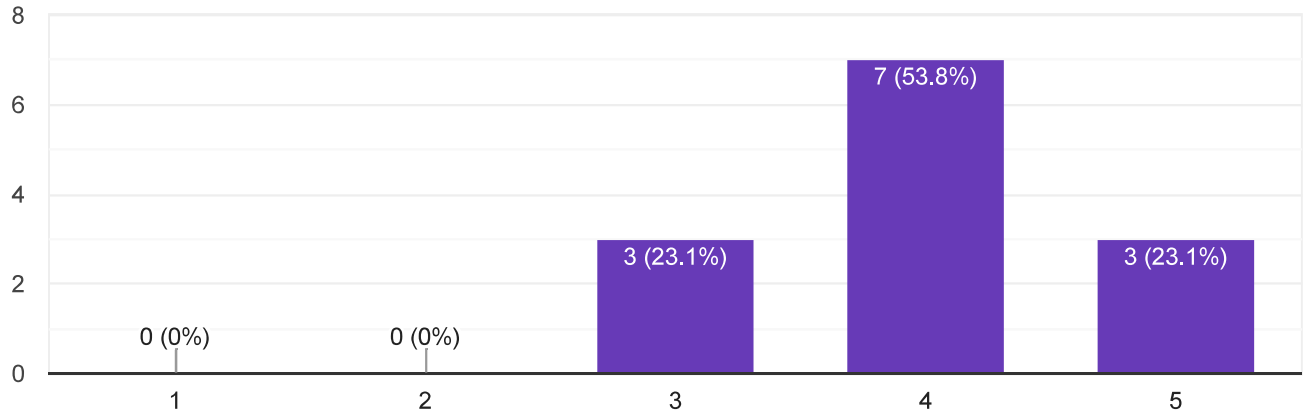




This section is for assessing how you feel now, after completing the lesson.

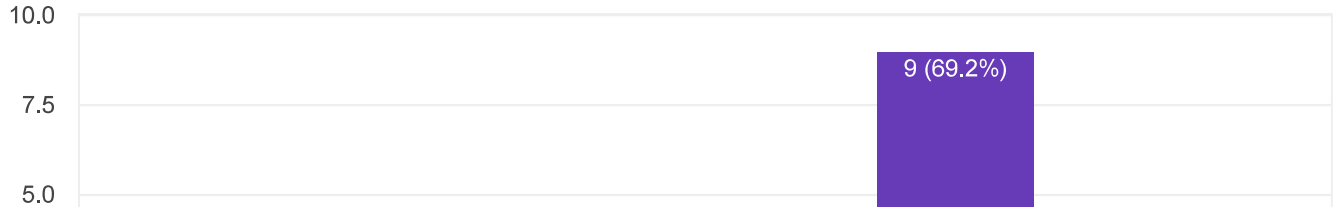
How well do you think your dish turned out to be?

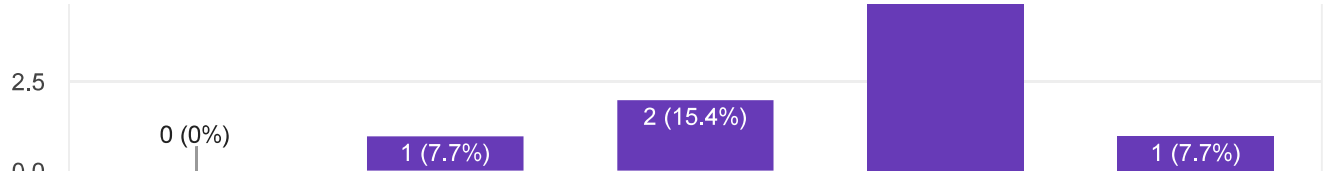
13 responses



How well do you think you stuck to the recipe?

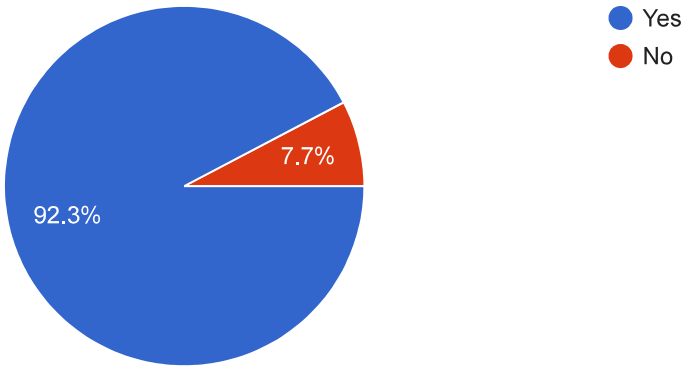
13 responses





Did having a recipe to follow make you feel like the outcome of your dish was easy to control (i.e. did having a recipe make you feel like completing the lesson was more doable)?

13 responses



Please breifly explain why/why not.

13 responses

because it gave us more time we we didn't have to find/think of a recipe and others were doing the same recipe and therefore made us feel like we weren't going too slow because they were at the same point

I felt like if the cookies didn't come out well it wasn't my/my groups fault because we followed the recipe the best we could so it should come out tasting good and looking like the picture.

because it was easy and we didn't have to make decisions on the flavours, ingredients etc. like we would have had to if we weren't following a recipe.

I think that the recipe is really important beacsue it guides you with what steps you need to take inorder to have a good outcome.

Because the recipe tells you what you need to do and you don't have to worry about it

.

Our cookies tasted amazing and we were finished and ready to leave bang on when the bell rung.

It was easy to control because we knew what we had to do and how much time we had to make the food

It was easy to control because we knew what we had to do and had something to follow.

I don't know.

while it was definitely helpful I think it probably wouldve been similarly doable without it.

Because i knew that the recipe had been used by other people before

we knew what we had to do and had all the measurements and steps printed out for us

17/05/19: Recipe Lesson - Questionnaire for after each trial

QUESTIONS RESPONSES 12

12 responses

SUMMARY INDIVIDUAL

Accepting responses

Who has responded?

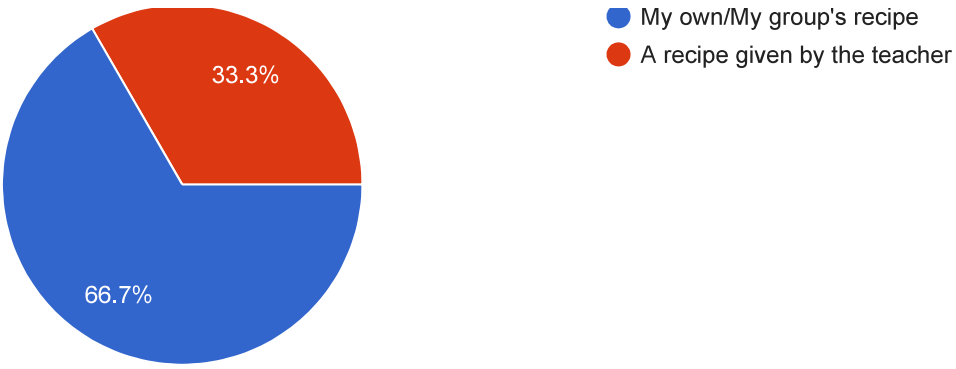
Email

[redacted]

This section is about how you felt before starting the lesson

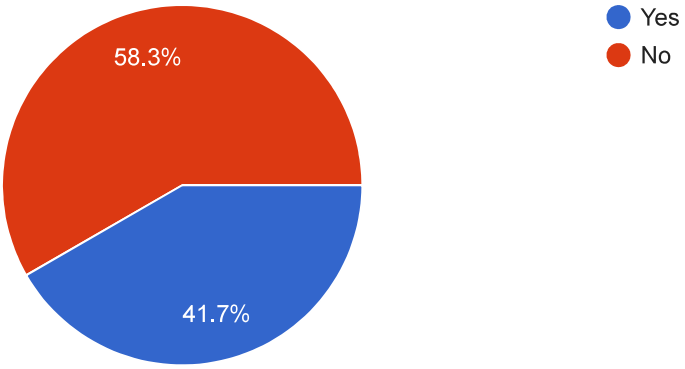
Was this Food Technology lesson a lesson where you used your own recipe, or one from the teacher?

12 responses



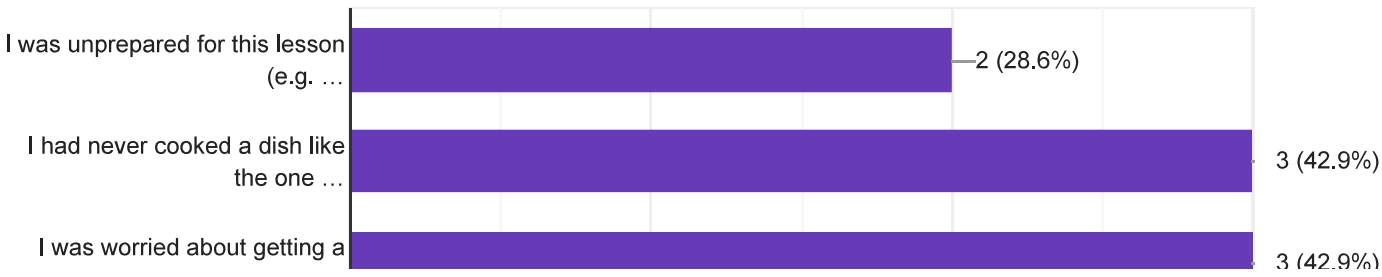
Were you feeling stressed about this lesson?

12 responses



If you answered yes, please tick the applicable reasons that lead to you feeling stressed.

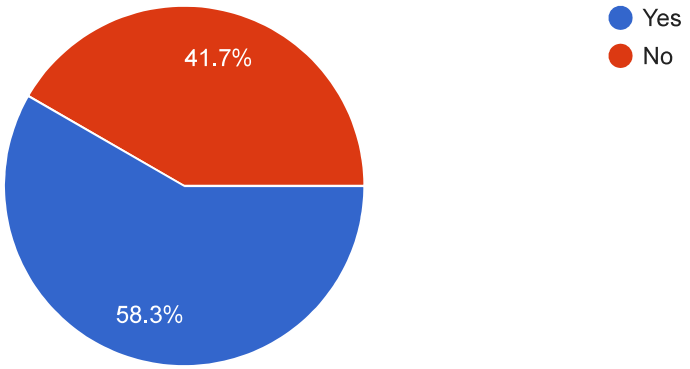
7 responses



This section is about how you felt during the lesson

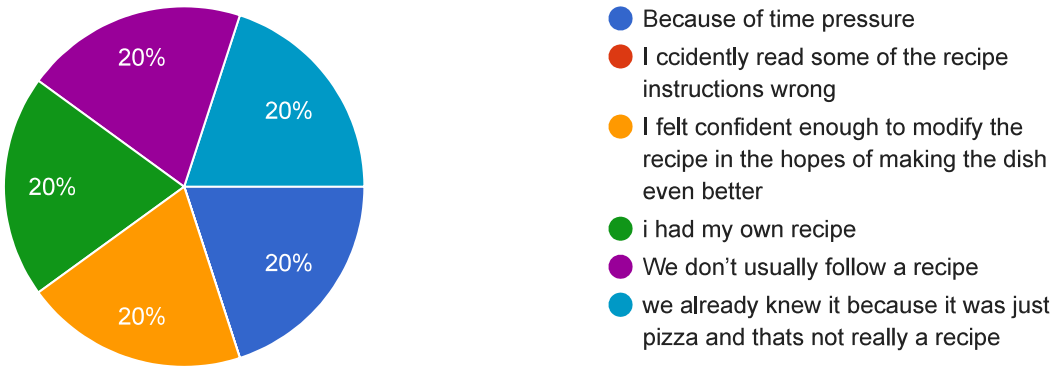
Were you following the recipe?

12 responses



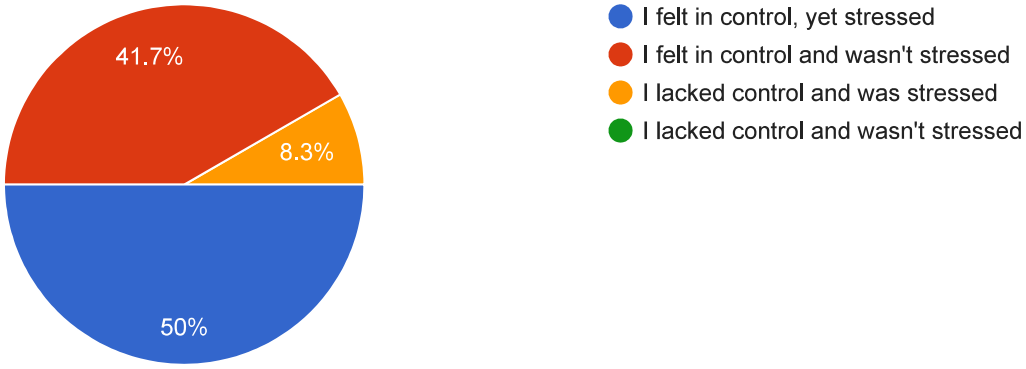
If you answered no, then why didn't you follow the recipe?

5 responses



How did your approach to following the recipe affect you as you were cooking?

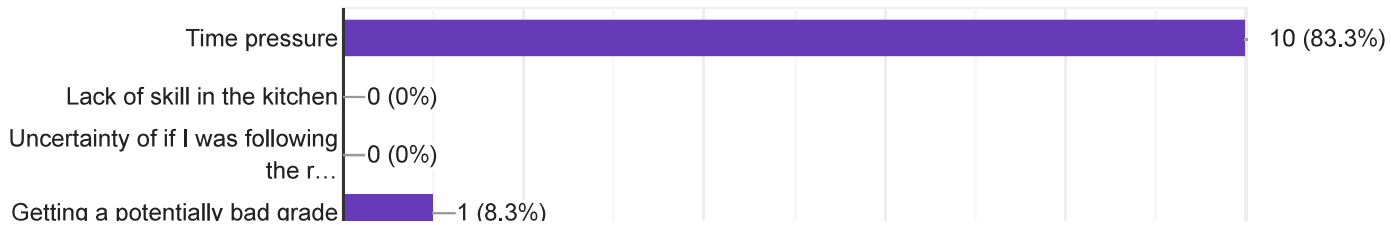
12 responses



Considering the prior question, how much stress did you feel throughout this lesson?

What aspects of the lesson made you feel the most stressed?

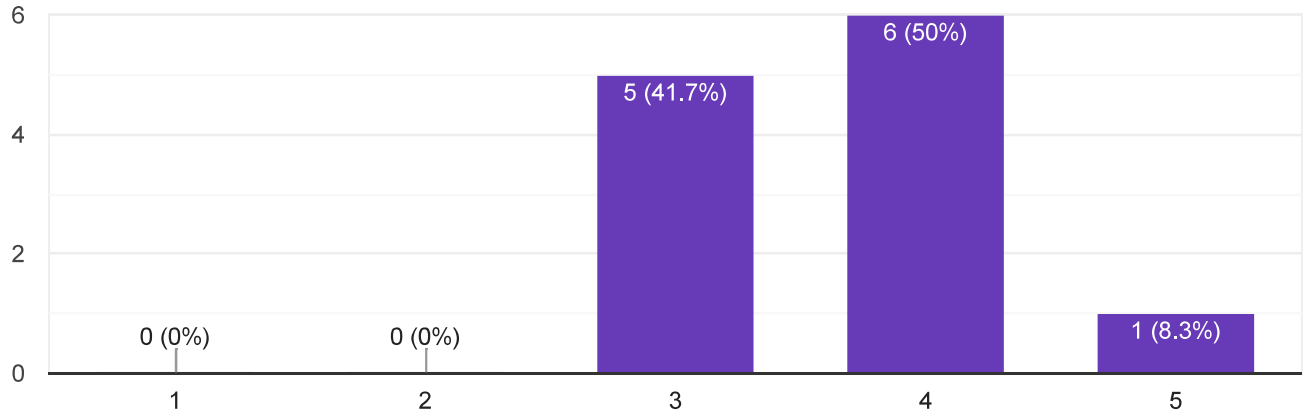
12 responses



This section is for assessing how you feel now, after completing the lesson.

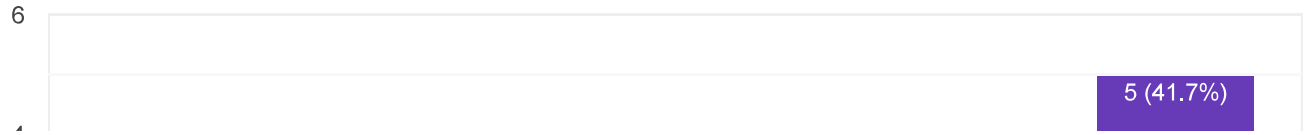
How well do you think your dish turned out to be?

12 responses



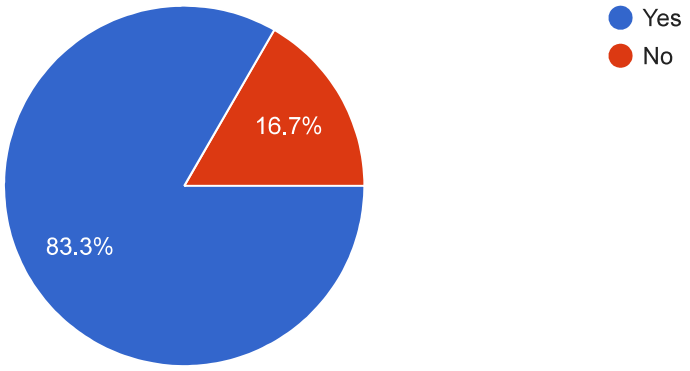
How well do you think you stuck to the recipe?

12 responses



Did having a recipe to follow make you feel like the outcome of your dish was easy to control (i.e. did having a recipe make you feel like completing the lesson was more doable)?

12 responses



Please breifly explain why/why not.

12 responses

because we didnt have a recipe

Usually having a recipe puts an image in my head of exactly what I have to do

Because you know exactly what you need to do and it is very likely that it will be nice if you do everything right

I didn't feel stress because I knew what I was doing

I was not stressed.

/

Because we didnt have to stress about searching up a recipe

could follow it and felt in control

.

I think our dish turned out great we followed the recipe ingredients wise but we just wanted to put a little twist on the recipe.

we did good

because I feel like when you follow a recipe your dish will turn out more like the recipe the not following it

24/05/19: Recipe Lesson - Questionnaire for after each trial

QUESTIONS RESPONSES 7

7 responses

SUMMARY INDIVIDUAL

Accepting responses

Who has responded?

Email

[redacted]

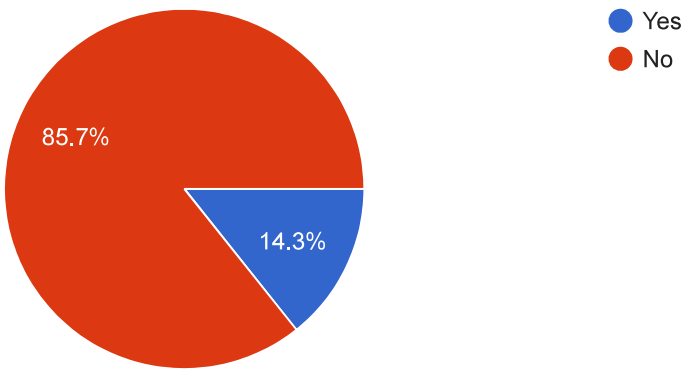
This section is about how you felt before starting the lesson

Was this Food Technology lesson a lesson where you used your own recipe, or one from the teacher?

7 responses

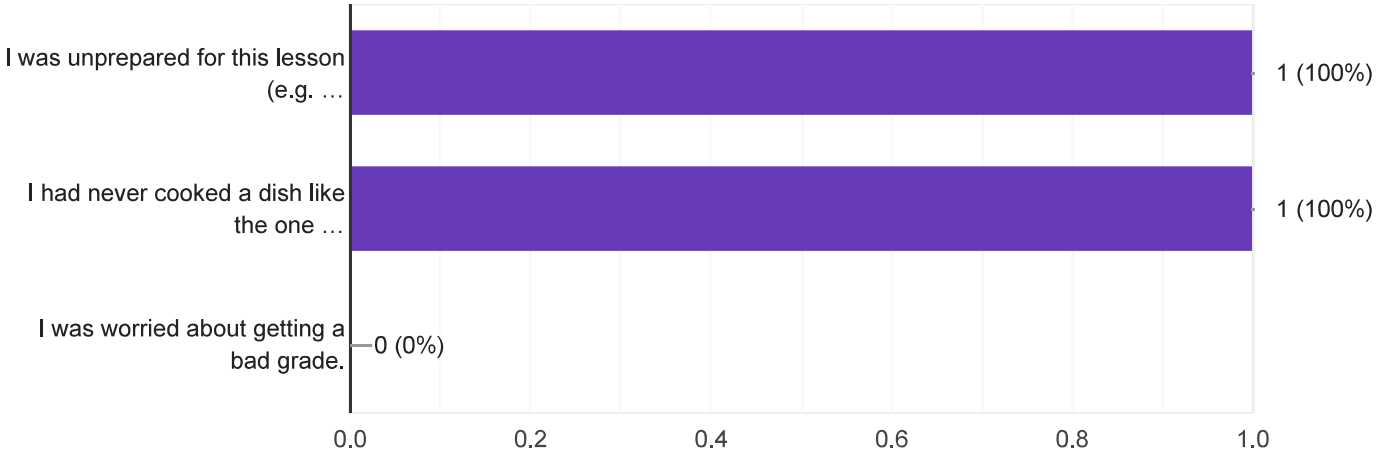
Were you feeling stressed about this lesson?

7 responses



If you answered yes, please tick the applicable reasons that lead to you feeling stressed.

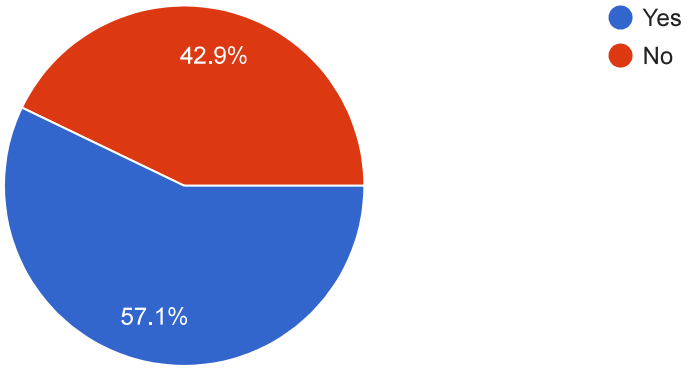
1 response



This section is about how you felt during the lesson

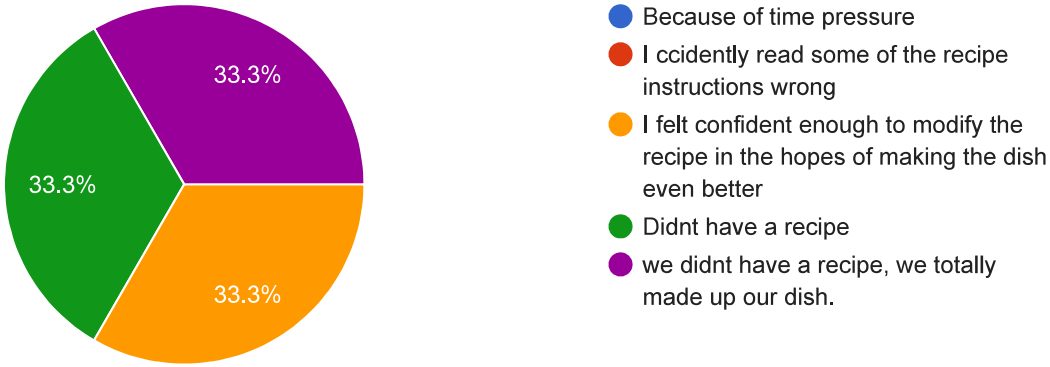
Were you following the recipe?

7 responses



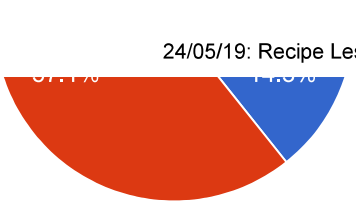
If you answered no, then why didn't you follow the recipe?

3 responses



How did your approach to following the recipe affect you as you were cooking?

7 responses



Considering the prior question, how much stress did you feel throughout this lesson?

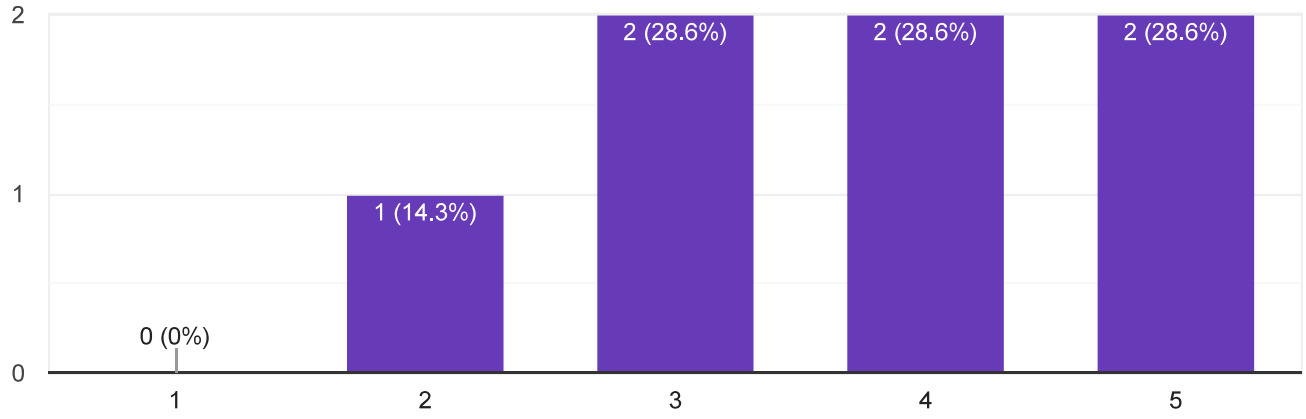
What aspects of the lesson made you feel the most stressed?

7 responses

This section is for assessing how you feel now, after completing the lesson.

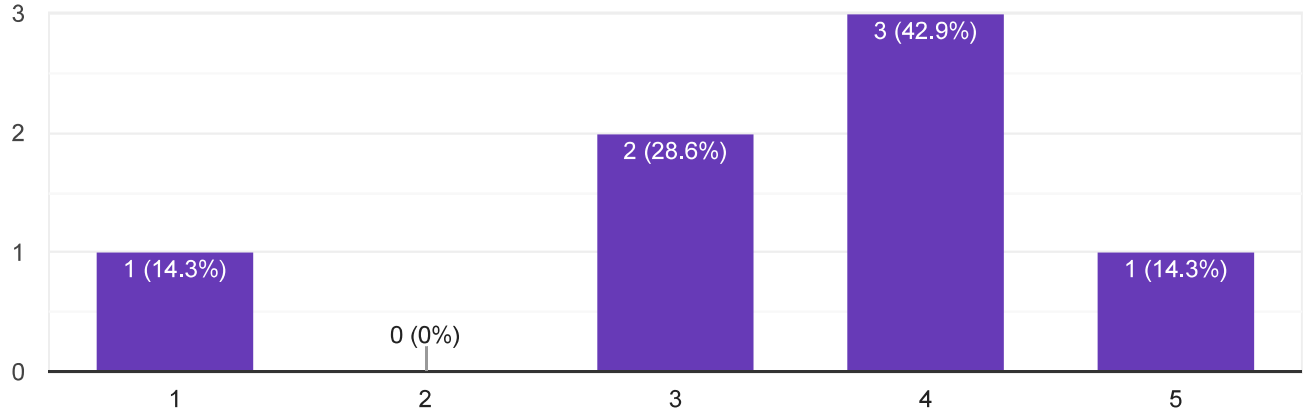
How well do you think your dish turned out to be?

7 responses



How well do you think you stuck to the recipe?

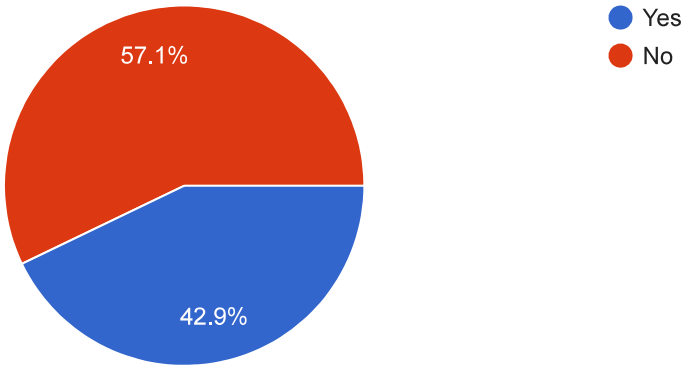
7 responses



Did having a recipe to follow make you feel like the outcome of your dish was easy to control (i.e. did having a recipe make you feel like completing

the lesson was more doable)?

7 responses



Please breifly explain why/why not.

7 responses

it was more doable because it gave us more direction and what flavors to add but at the same time my group didn't follow our recipe that much except for the tart base. The instruction for the tart base helped us give certainty what to do

the teachers kept telling us to refer to the recipe and asking us questions about the recipe but we didn't need to be constantly checking it. maybe if we didn't have one we would've been able to spend less time explaining to the teachers and more time cooking and cleaning?

No because it was a shorter lesson and still was hard with the time limit.

Didnt have a recipe

because I didnt have a recipe and i hate using recipes, it leaves no room for creativity

The recipe was crucial as it went through vital steps that tell us what we needed to do.

because we chose a recipe we've never done so having the steps were easy to understand and control

31/05/19: Recipe Lesson - Questionnaire for after each trial

QUESTIONS RESPONSES 4

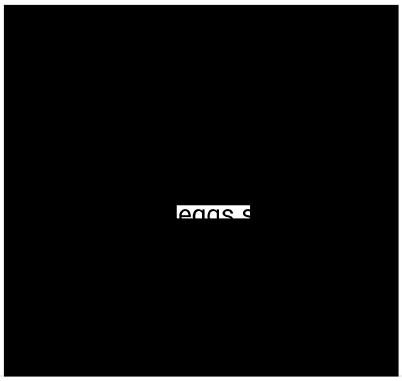
4 responses

SUMMARY INDIVIDUAL

Accepting responses

Who has responded?

Email



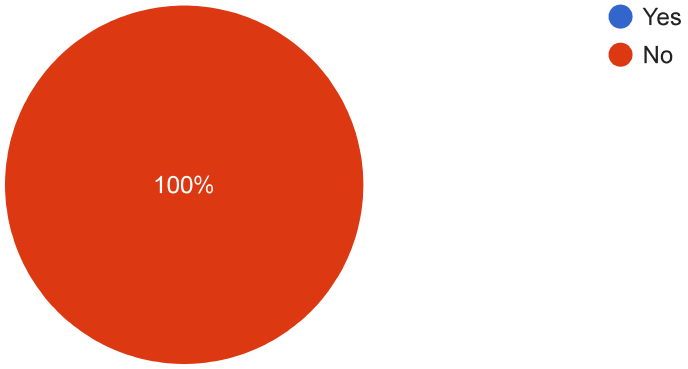
This section is about how you felt before starting the lesson

Was this Food Technology lesson a lesson where you used your own recipe, or one from the teacher?

4 responses

Were you feeling stressed about this lesson?

4 responses



If you answered yes, please tick the applicable reasons that lead to you feeling stressed.

0 responses

No responses yet for this question.

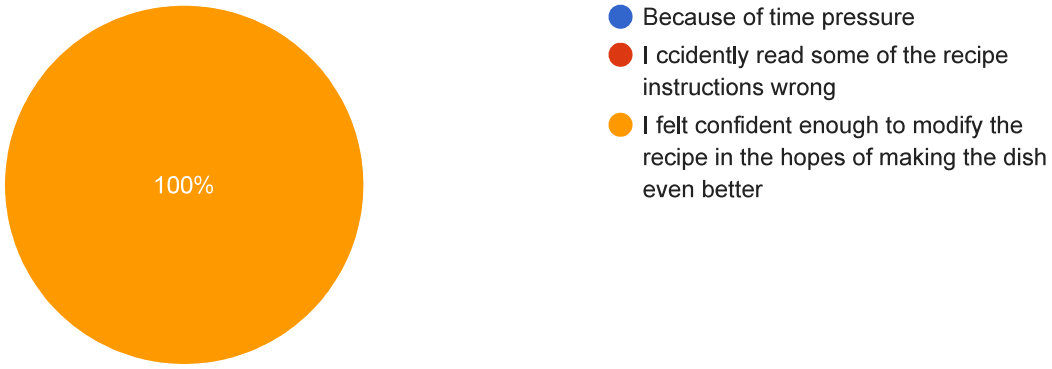
This section is about how you felt during the lesson

Were you following the recipe?

4 responses

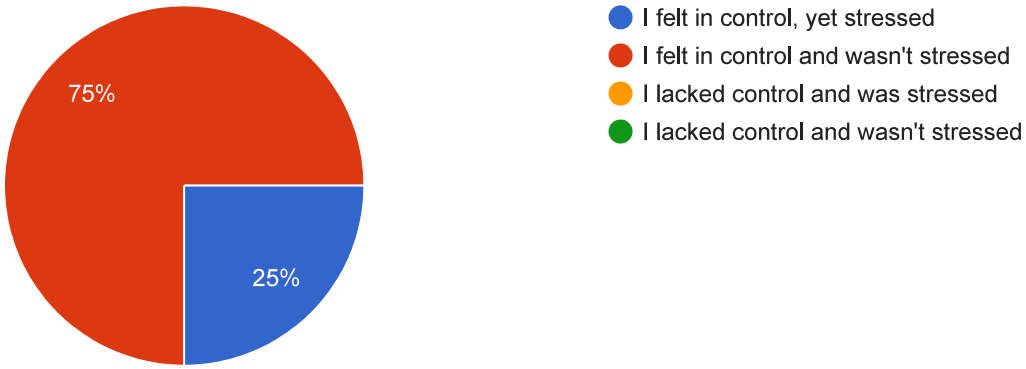
If you answered no, then why didn't you follow the recipe?

2 responses

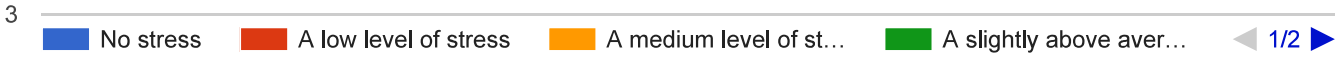


How did your approach to following the recipe affect you as you were cooking?

4 responses

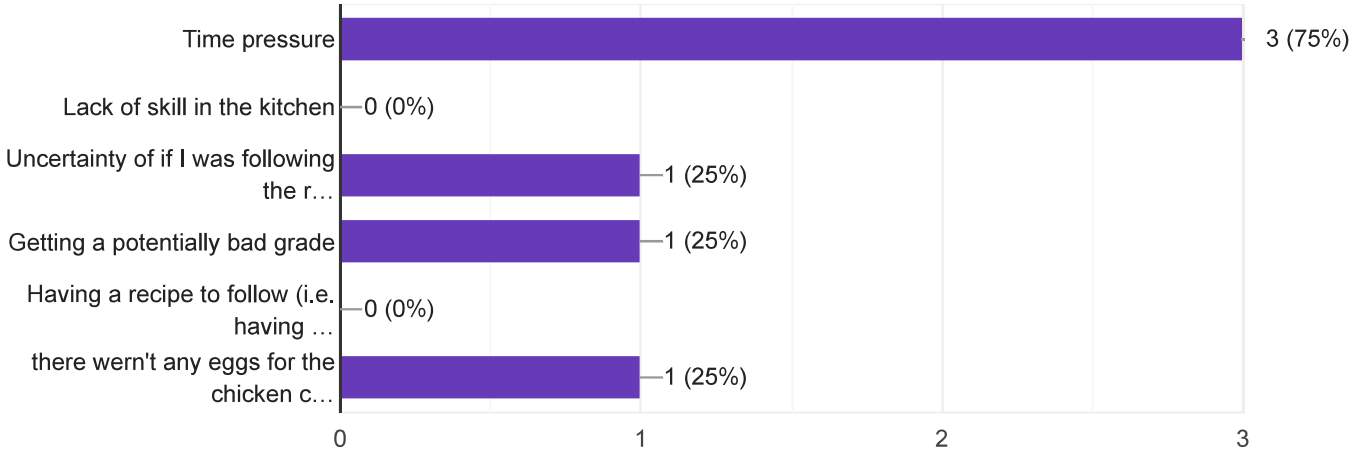


Considering the prior question, how much stress did you feel throughout this lesson?



What aspects of the lesson made you feel the most stressed?

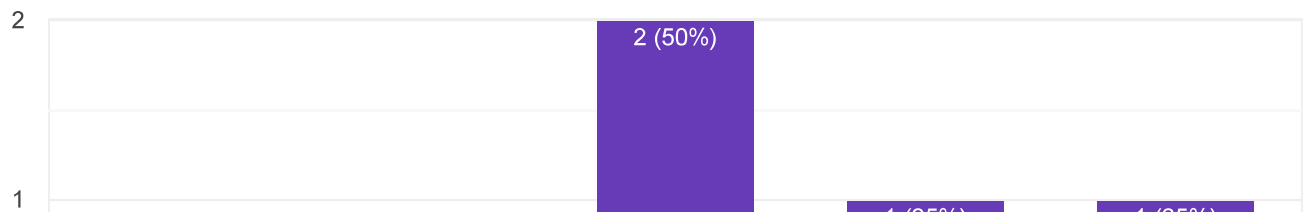
4 responses

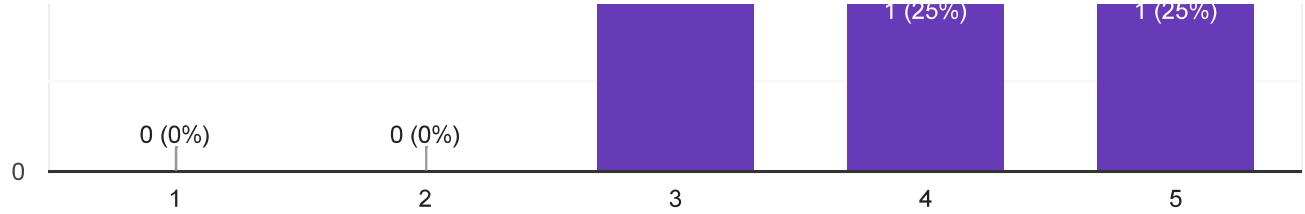


This section is for assessing how you feel now, after completing the lesson.

How well do you think your dish turned out to be?

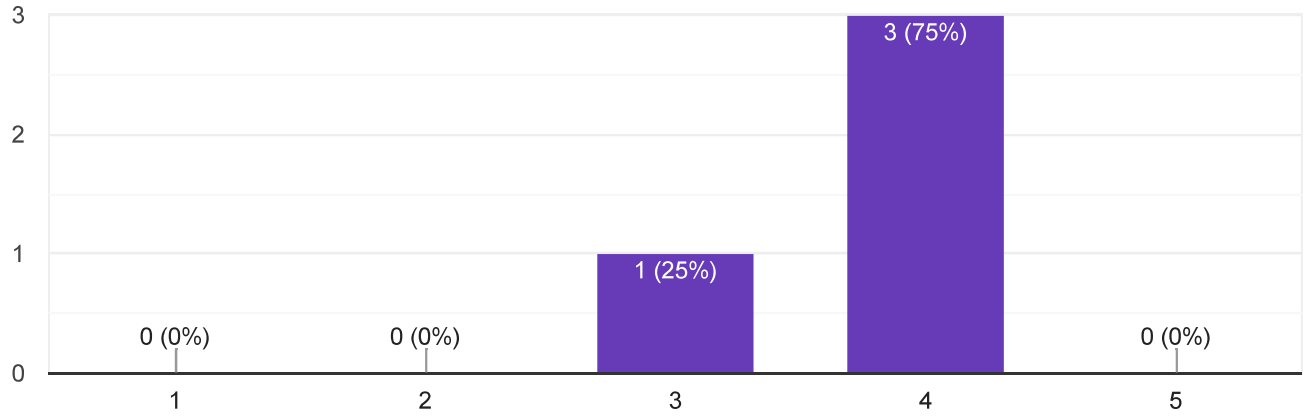
4 responses





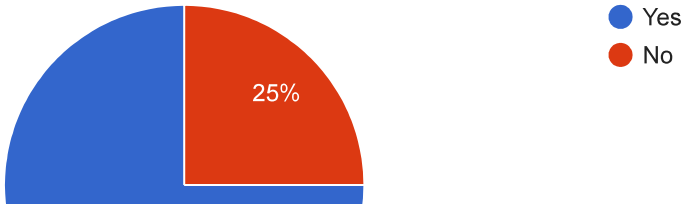
How well do you think you stuck to the recipe?

4 responses



Did having a recipe to follow make you feel like the outcome of your dish was easy to control (i.e. did having a recipe make you feel like completing the lesson was more doable)?

4 responses



Please breifly explain why/why not.

4 responses

because we had already made it before with the same recipe and knew it would most likely okay :)

because i dont like recipes

because we knew how it was going to turn out

Because you knew that the recipe had been tested by other people before you but it also was a bit scary because we added out own twist to the recipe

14/05/19: MasterChef Lesson - Questionnaire for after each trial

QUESTIONS RESPONSES 23

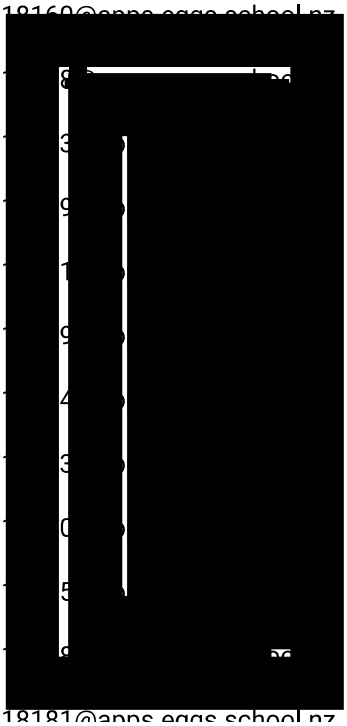
23 responses

SUMMARY INDIVIDUAL

Accepting responses

Who has responded?

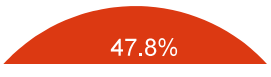
Email

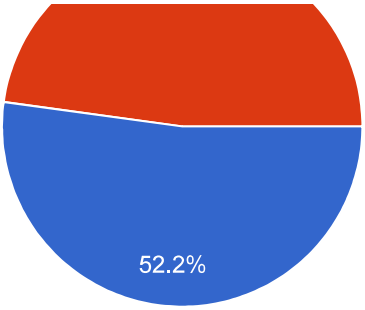


This section is about how you felt before starting the lesson

Were you feeling stressed about this lesson?

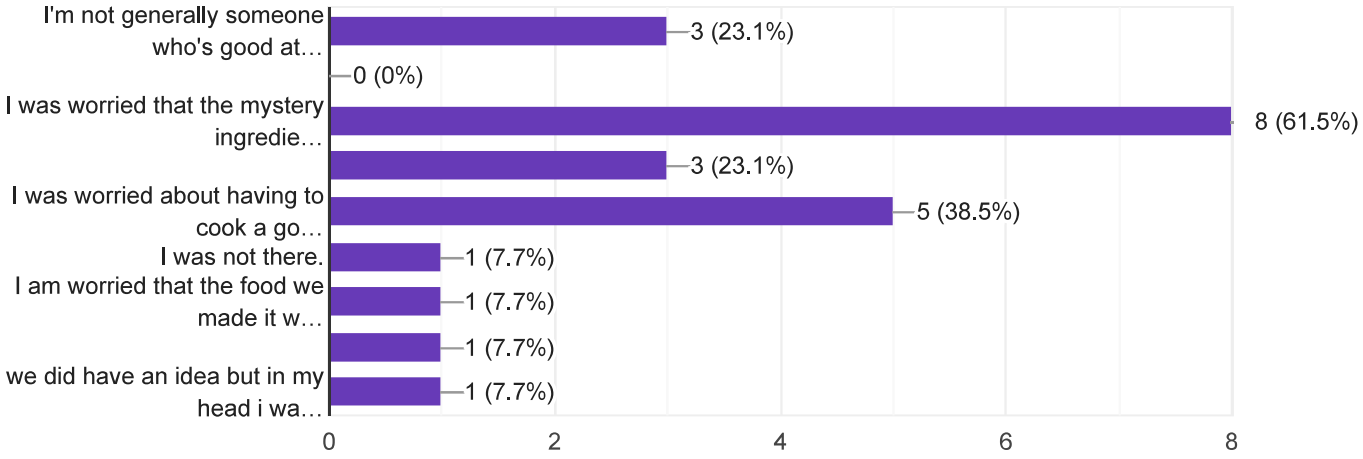
23 responses





If you answered yes, please tick the applicable reasons that lead to you feeling stressed.

13 responses



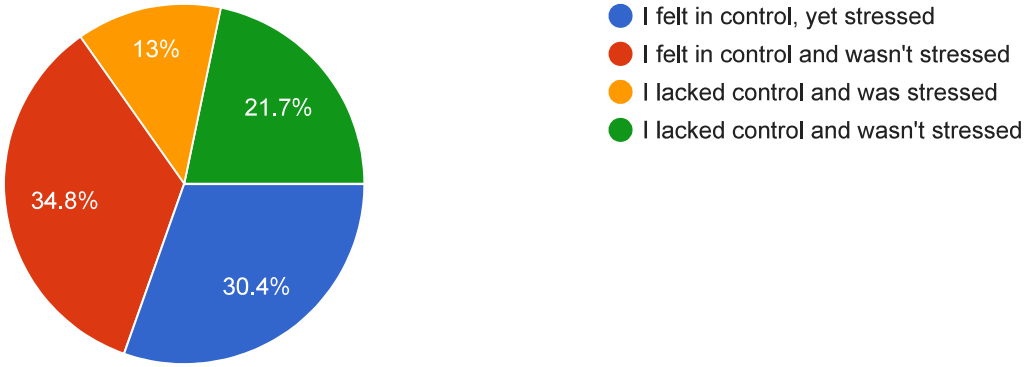
This section is about how you felt during the lesson

How did you go about creating your MasterChef dish?

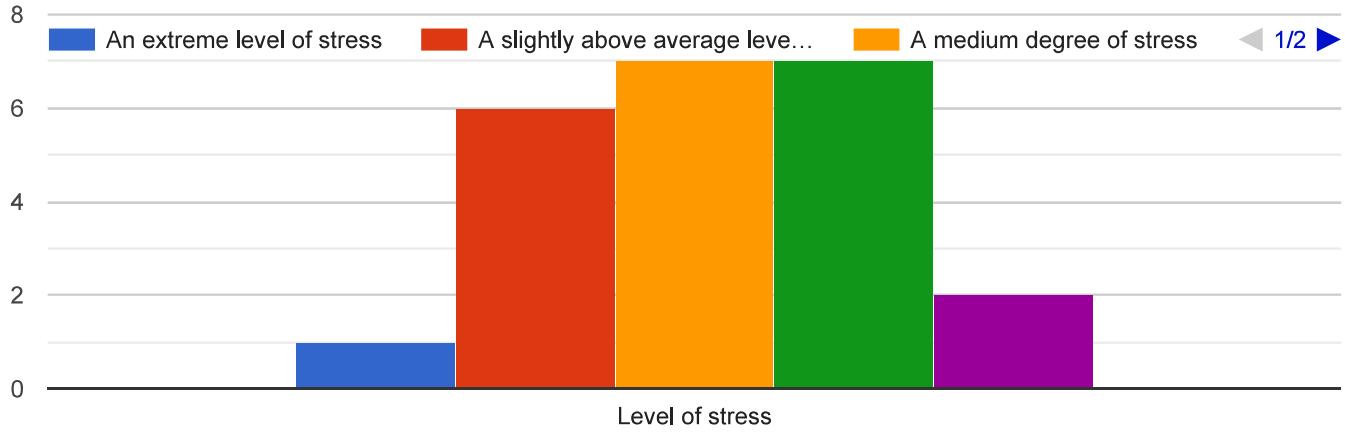
23 responses

How did your approach to the MasterChef task affect you as you were cooking?

23 responses

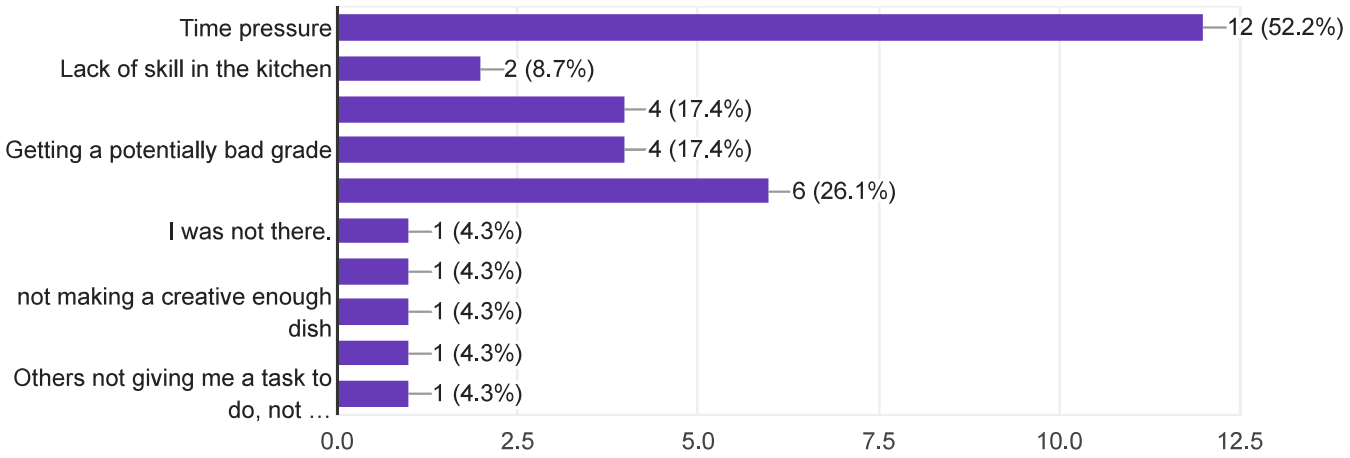


Considering the prior question, how much stress did you feel throughout this lesson?



What aspects of the lesson made you feel the most stressed?

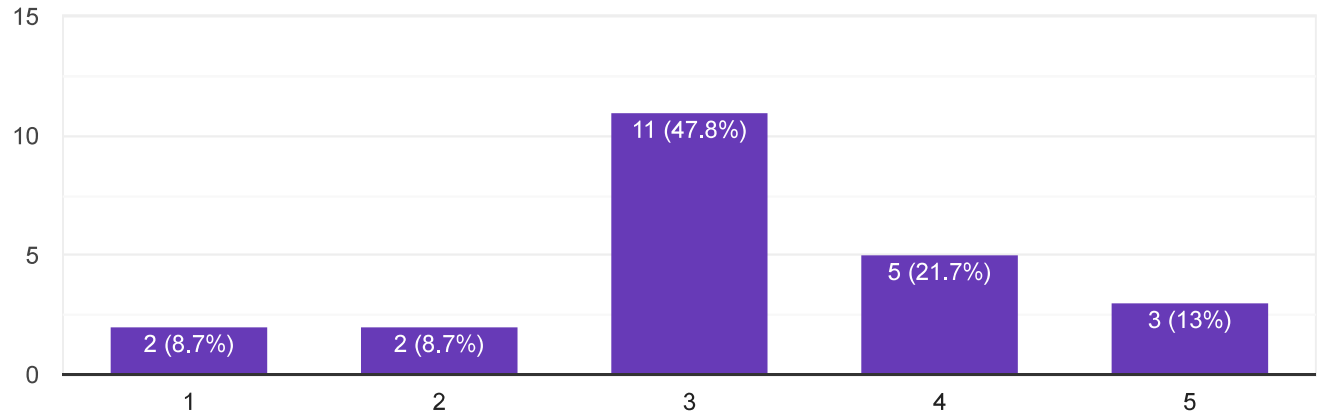
23 responses



This section is for assessing how you feel now, after completing the lesson.

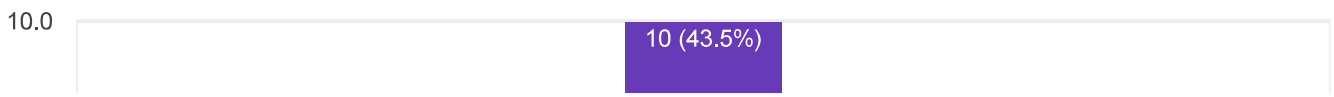
How well do you think your dish turned out to be?

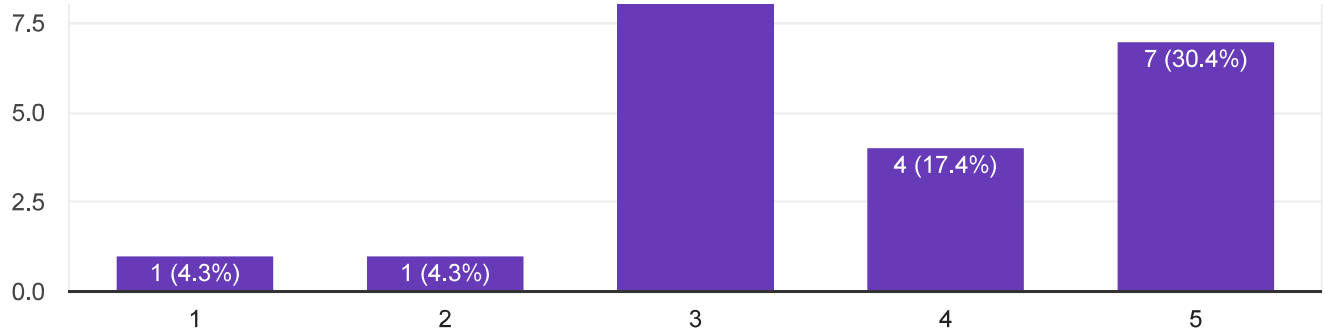
23 responses



How good do you think your approach to the MasterChef challenge was?

23 responses





Please breifly explain why you think this

23 responses

well I wasn't stressed and we worked well together and managed to incorporate the mystery ingredients

Actually I have not there

We managed to make a tasty dish without a recipe

Even though our team had totally different ideas we ended up doing a great job

our dish wasn't very original

I think I approached the masterchef challenge well because I wasn't stressed and knowing what the ingredients were made it easier to come up with a recipe.

Our dish didn't look perfect and could of turned out way better but we tried our best.

we were done on time and it tasted good

my group tried but some time lack the communicating with each other

idk just think it was a bit of a mess

because our icing didn't set

Because we were very prepared and worked together well.

I did feel stressed about not having it done on time and that the dish wasn't completed to the best standard but I felt in control and didn't let it get to me, so I carried on and just went with it without panicking.

Well the dish we chosen were extraordinary and unique and turn out to be great

Because we were stressed because we burnt the chocolate but we persevered and we finished our dish

we had rough ideas and felt comfortable to test and experiment

Becuase I wasn't too stressed, I was really excited and looking forward to the challenge

even though some of us had different ideas our dish came out really great and exactly what we wanted it to be like.

I think that my approach was good, because I can think of recipes instantly on the spot with a mystery ingredient, but I am unsure about how well it will turn out, even if we follow an online recipe.

I think my group and I did good but was lacking on the communication to each other and we didn't know who was doing what.

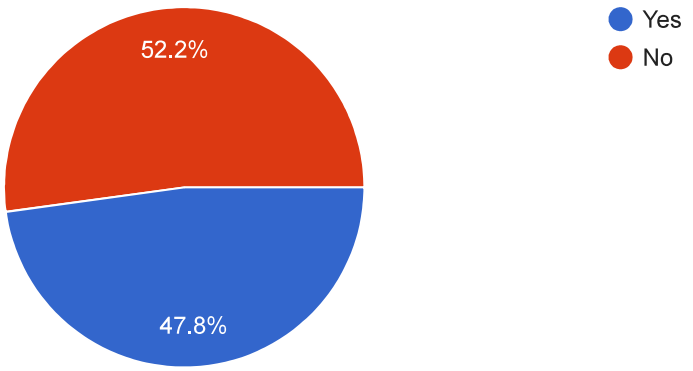
i think i approach it well but could have been better

it wasnt bad but not the best

we did not use the main ingredients in the dish and was rushed

Did not having a recipe to follow make you feel like the outcome of your dish was easy to control (i.e. did having the freedom of how you were going to incorporate the mystery ingredient into a dish make you feel that completing the lesson was more doable)?

23 responses



Please briefly explain why/why not

17 responses

I was not there.

Because we didnt have to worry about using the wrong amount if the ingredients

because you are making it up on the spot

kj,rfnvs

I like knowing what it needs to be like so i can make it like that but when I have no control or instructions I don't like it

because we all have our own ideas and have a recipe and structure is so restricting

lack of communicating

because it was very hard to do what no one else was doing

because we knew it would most likely taste good

I feel you do need a recipe to make sure your measurements are right and equal and so that you don't forget anything into your dish and then realize just before your about to cook/bake it.

i think it was somewhat easy to control but i still found it slightly difficult to control (due to the unknown-ness of the items we would be cooking with)

Because as you were thinking it up yourself it wasn't as easy to control and you didn't know if it was going to work out

I think yes, because we have a lot more freedom and variety to make something instead of following a given recipe and we can use our creativity.

Because we won't know what to make and if what we are making taste any good or not.

because we didnt have an idea on what to do or the measurments

bec we had one

becuase we less time to cook which makes us stress

16/05/19: MasterChef Lesson - Questionnaire for after each trial

QUESTIONS RESPONSES 12

12 responses

SUMMARY INDIVIDUAL

Accepting responses

Who has responded?

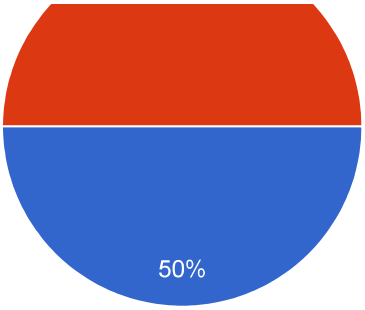
Email

[redacted]

This section is about how you felt before starting the lesson

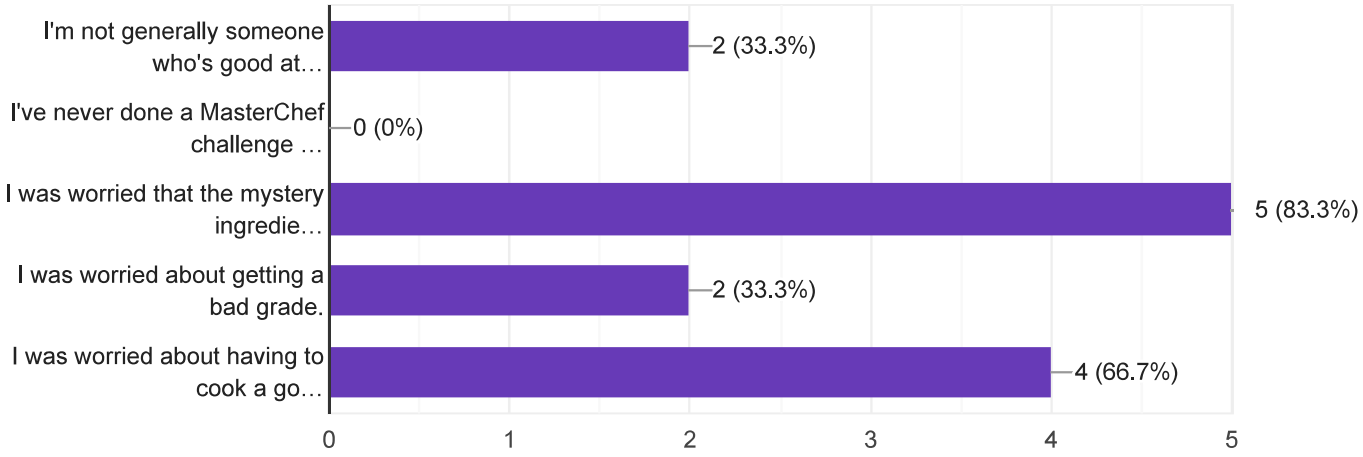
Were you feeling stressed about this lesson?

12 responses



If you answered yes, please tick the applicable reasons that lead to you feeling stressed.

6 responses



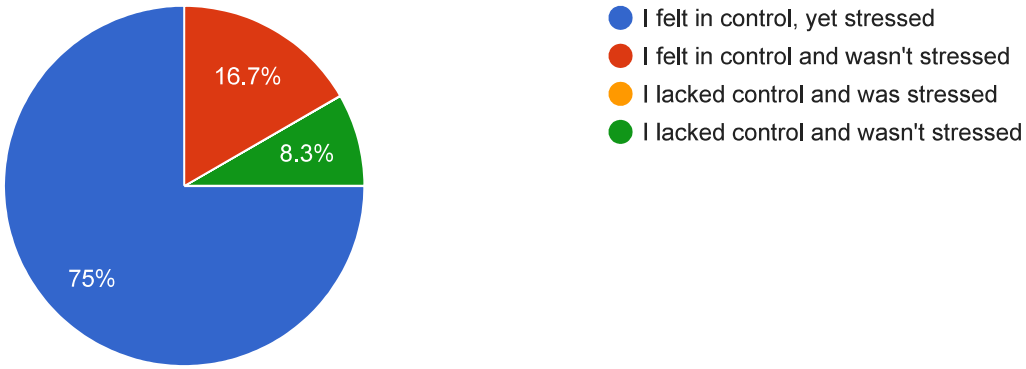
This section is about how you felt during the lesson

How did you go about creating your MasterChef dish?

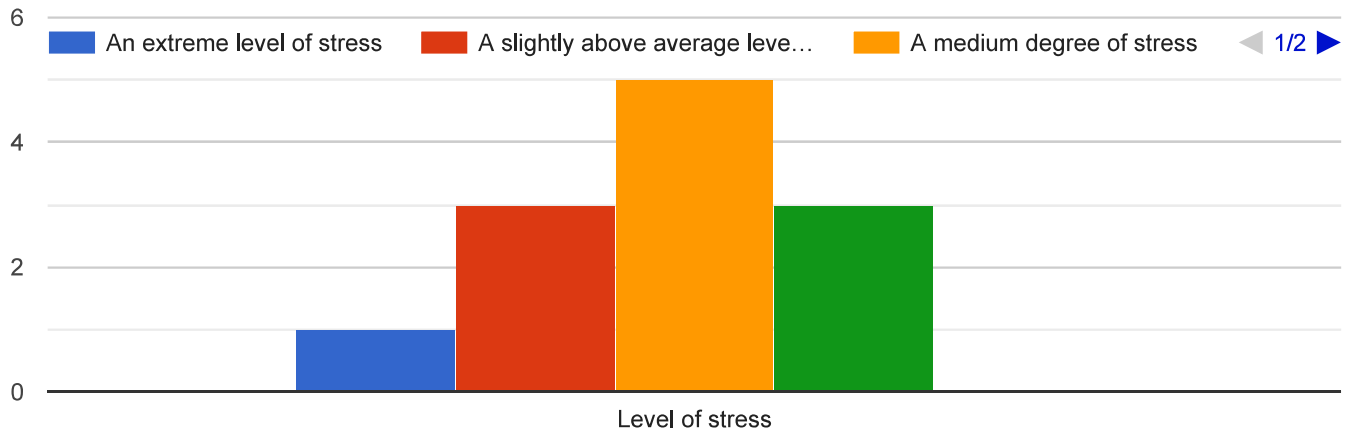
12 responses

How did your approach to the MasterChef task affect you as you were cooking?

12 responses

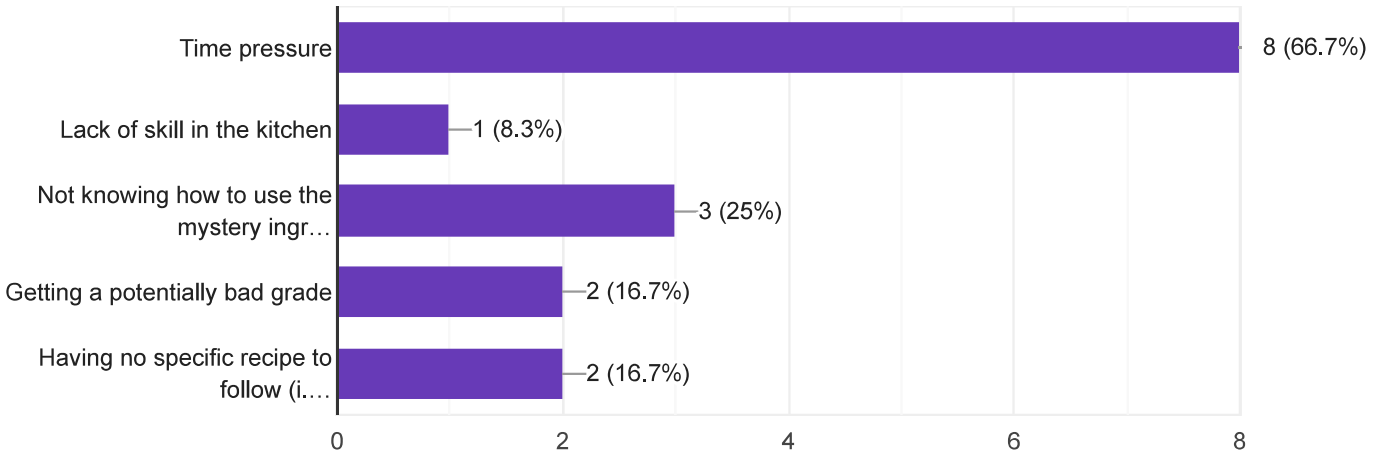


Considering the prior question, how much stress did you feel throughout this lesson?



What aspects of the lesson made you feel the most stressed?

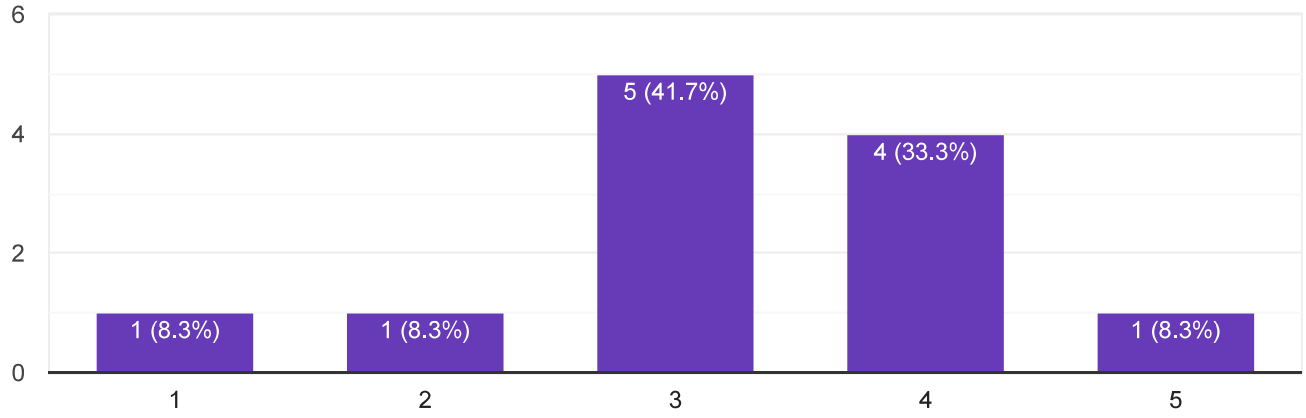
12 responses



This section is for assessing how you feel now, after completing the lesson.

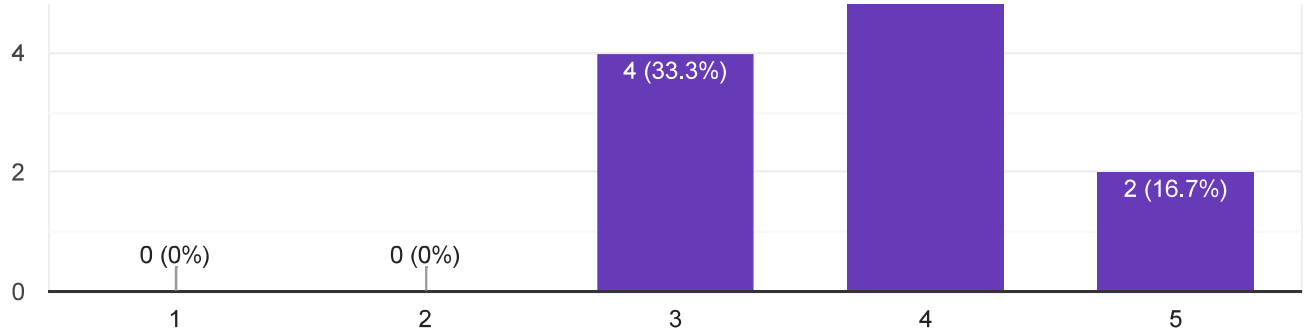
How well do you think your dish turned out to be?

12 responses



How good do you think your approach to the MasterChef challenge was?

12 responses



Please breifly explain why you think this

12 responses

I think we created a unique dish that had good flavour and was well produced in the time given.

I think we could have definately done better if we were more familiar with th ingrediants. We just struggled on how we should make the cauliflower the star of the dish tbh.

We didn't really know what we were doing but we still figured it out.

Because our group didnt agree on the same recipe yet because of time pressure i had to carry it out and it was very annoying and stressful

Because our goal is to have a unique dish and be very open minded coming into the lesson.

While we don't have a firm plan, we have a general idea and then from that we improve and can divide the jobs up.

Because our dish was very average and not that creative

We thought about what we could do with the ingredients and therefore had a complete plan layers out for the time

Because i dont like recipies so i realĺy enjoyed thjs challenge: we got to be creative.

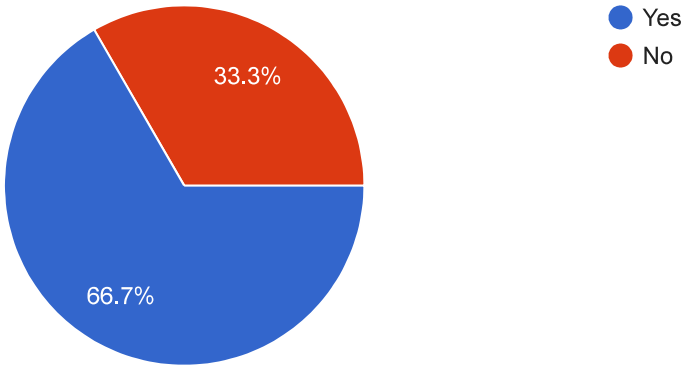
Our dish didn't turn out well but we tried something creative.

i think it was good because we had an idea and stuck with it

we thought of a dish pretty quick , but didn't have a recipe to follow , our final dish came out good

Did not having a recipe to follow make you feel like the outcome of your dish was easy to control (i.e. did having the freedom of how you were going to incorporate the mystery ingredient into a dish make you feel that completing the lesson was more doable)?

12 responses



Please briefly explain why/why not

12 responses

We could just add whatever we wanted and didn't have to follow A strict guide.

We kind of had a recipe but in the end we just eyeballed it and put random things togther.

It was hard to think of what to do with all the ingredients.

Wr had a recipe but even if we didnt I think we could have nailed it

Yes however we search up a recipe to semi follow but we do make some modifications to the recipe

We weren't restricted to using the ingredients in a specific way, we could use it however we liked.

Not having a recipe makes me feel lost and I didn't understand what exactly we were doing. We were kind of just going either the flow

it was just easier to incorperate the mystery ingredients not having a recipe and choosing one

Because i dont know the outcome if the dish hasnt been created yet.

Because we didn't really know how to make it properly

yes because we could be creative and try new things with out cooking

we didn't have a recipe so just guessed what to put in our dish and we just tried to incorporate the mystery box ingredients , despite that though the final outcome of our dish came good

21/05/19: MasterChef Lesson - Questionnaire for after each trial

QUESTIONS RESPONSES 6

6 responses

SUMMARY INDIVIDUAL

Accepting responses

Who has responded?

Email

[redacted]

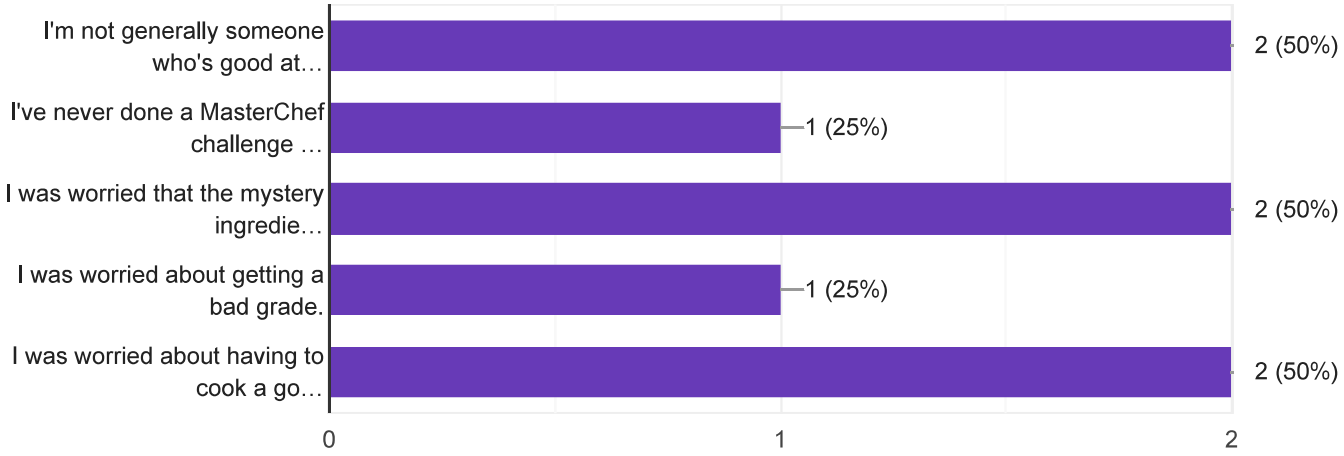
This section is about how you felt before starting the lesson

Were you feeling stressed about this lesson?

6 responses

If you answered yes, please tick the applicable reasons that lead to you feeling stressed.

4 responses



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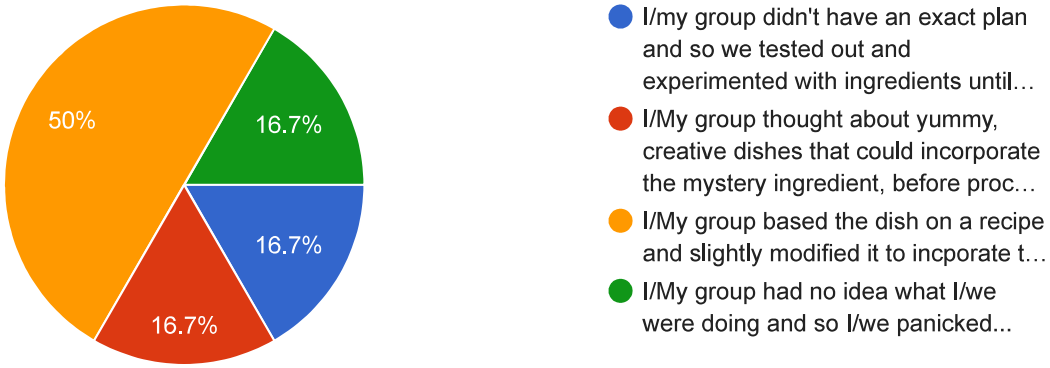
How did you go about creating your MasterChef dish?

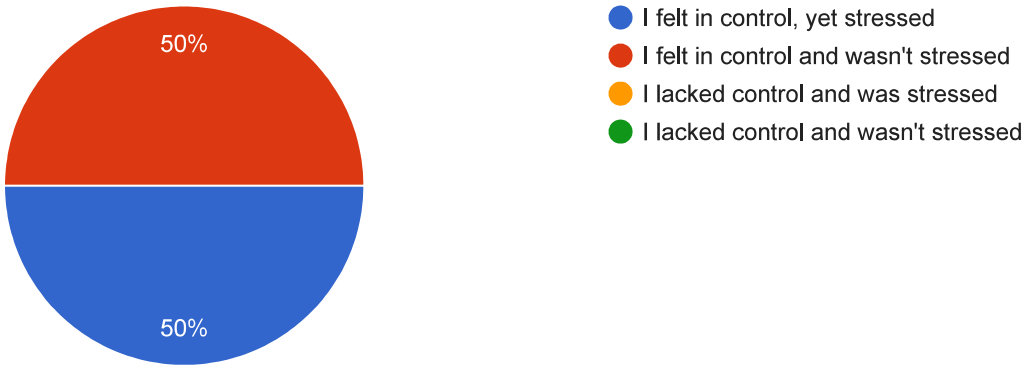
6 responses



How did your approach to the MasterChef task affect you as you were

cooking?

6 responses



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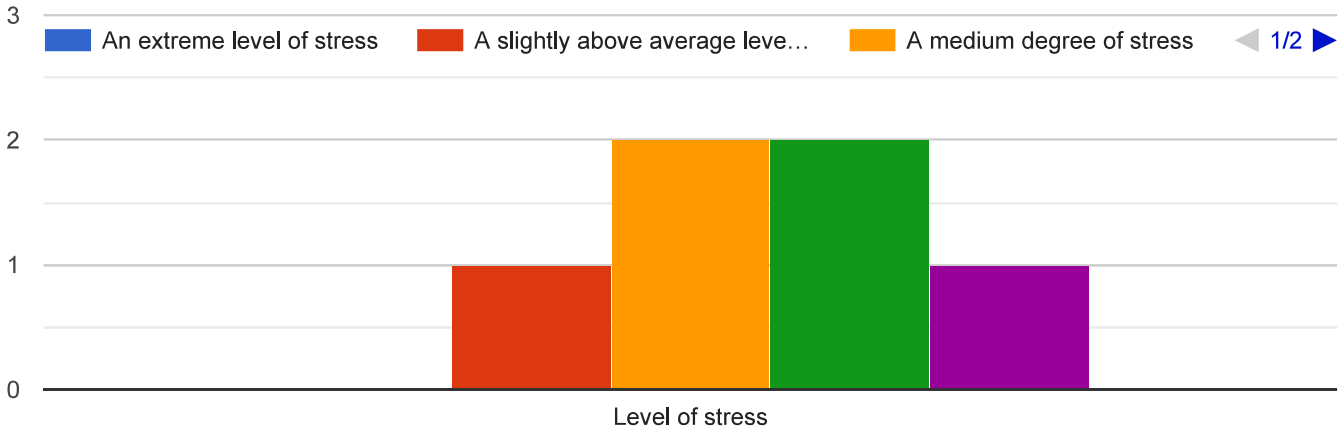
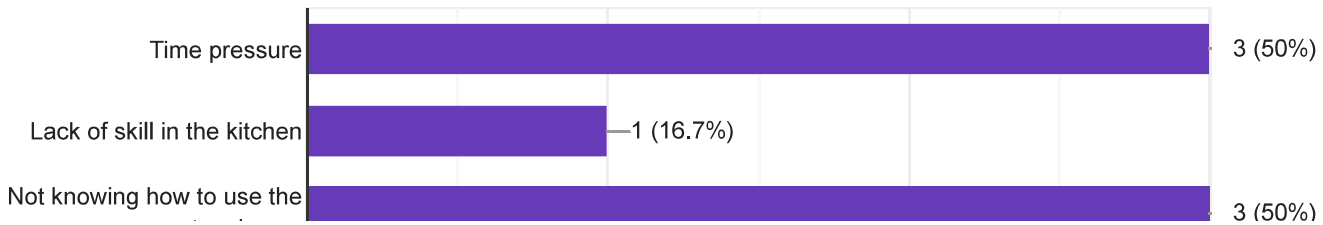
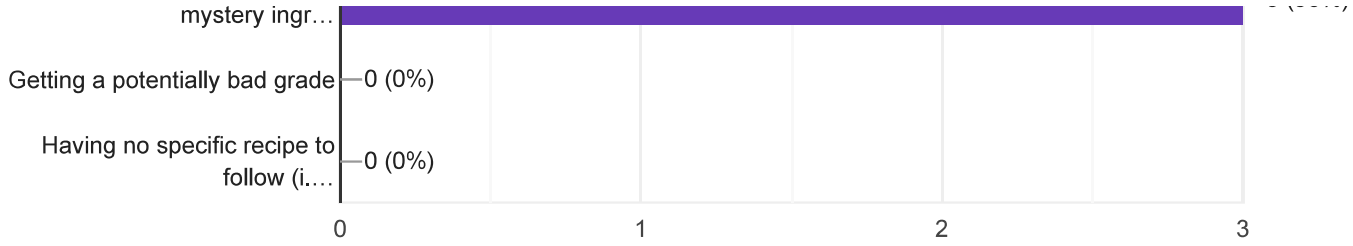


What aspects of the lesson made you feel the most stressed?

6 responses

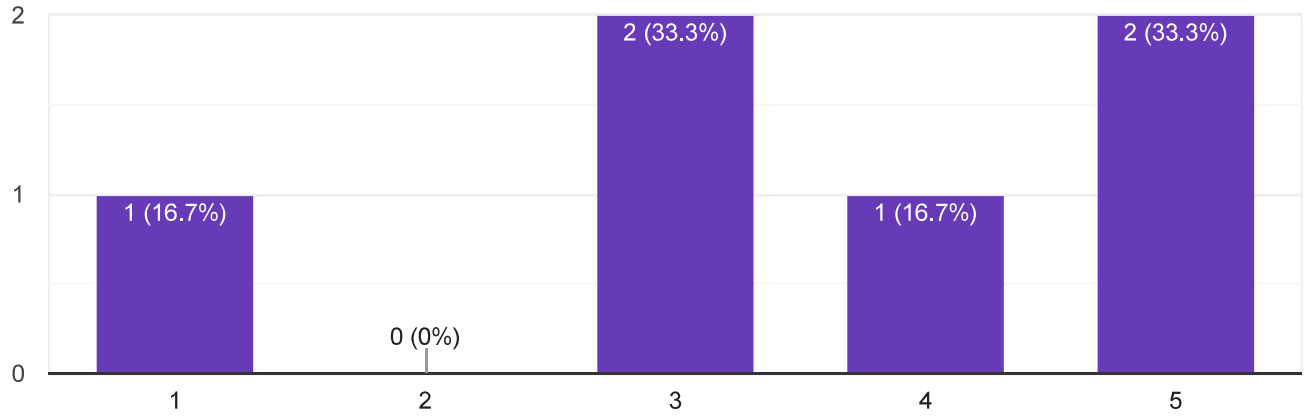




This section is for assessing how you feel now, after completing the lesson.

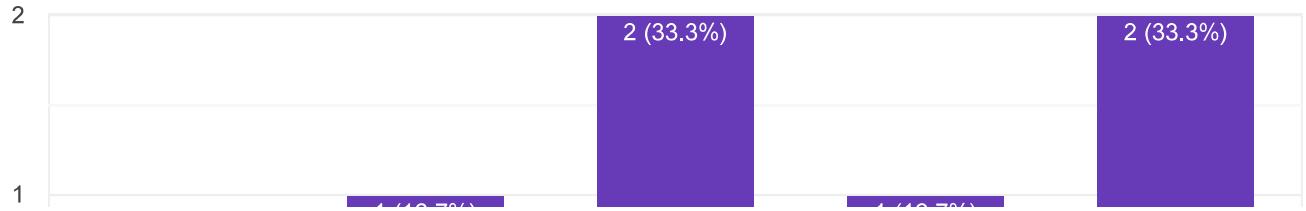
How well do you think your dish turned out to be?

6 responses



How good do you think your approach to the MasterChef challenge was?

6 responses



Please breifly explain why you think this

6 responses

we used all the ingredients and it tasted good-ish

it was well presented

it is ok.

We knew who was doing what and our dish turned out great because everyone in the group helped equally well

because we failed and didn't get in done in time

we did not think we did a good job of our dish and it took a lot of time to decide on what we were going to cook

Did not having a recipe to follow make you feel like the outcome of your dish was easy to control (i.e. did having the freedom of how you were going to incorporate the mystery ingredient into a dish make you feel that completing the lesson was more doable)?

6 responses

Please briefly explain why/why not

6 responses

because it was easy to incorporate a random ingredient into a dish that u are making up on the spot

because it was stressful

it is a little easy when we have are own recipe.

?

because it was hard

becuase we have to think of a dish which we waste to much time on

23/05/19: MasterChef Lesson - Questionnaire for after each trial

QUESTIONS RESPONSES 16

16 responses

SUMMARY INDIVIDUAL

Accepting responses

Who has responded?

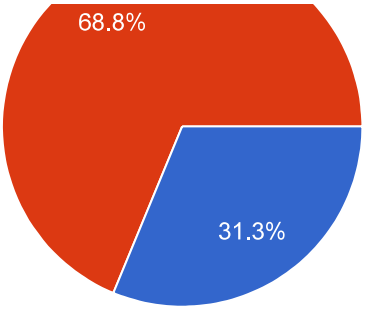
Email

[redacted]

This section is about how you felt before starting the lesson

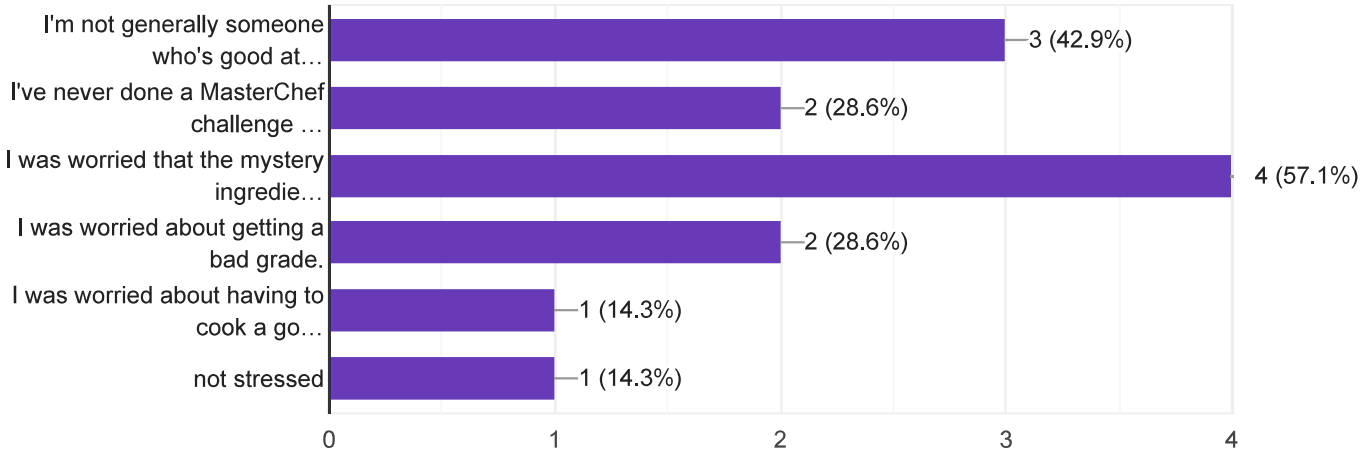
Were you feeling stressed about this lesson?

16 responses



If you answered yes, please tick the applicable reasons that lead to you feeling stressed.

7 responses



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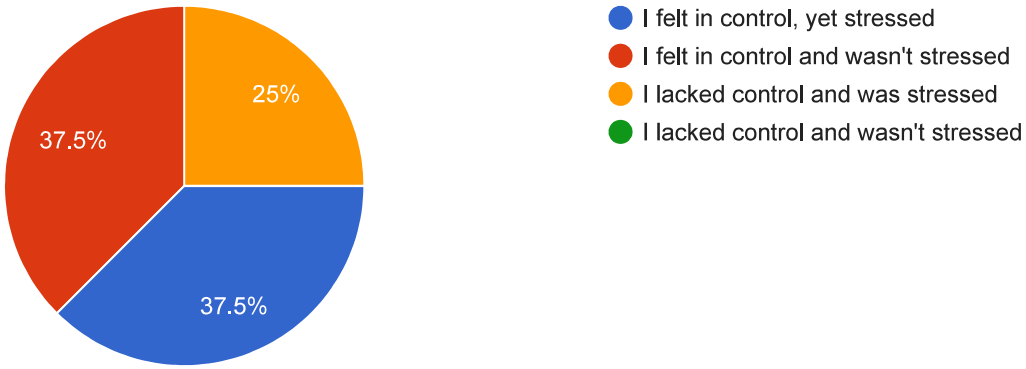
How did you go about creating your MasterChef dish?

16 responses

and slightly modified it to incporate t…

How did your approach to the MasterChef task affect you as you were cooking?

16 responses



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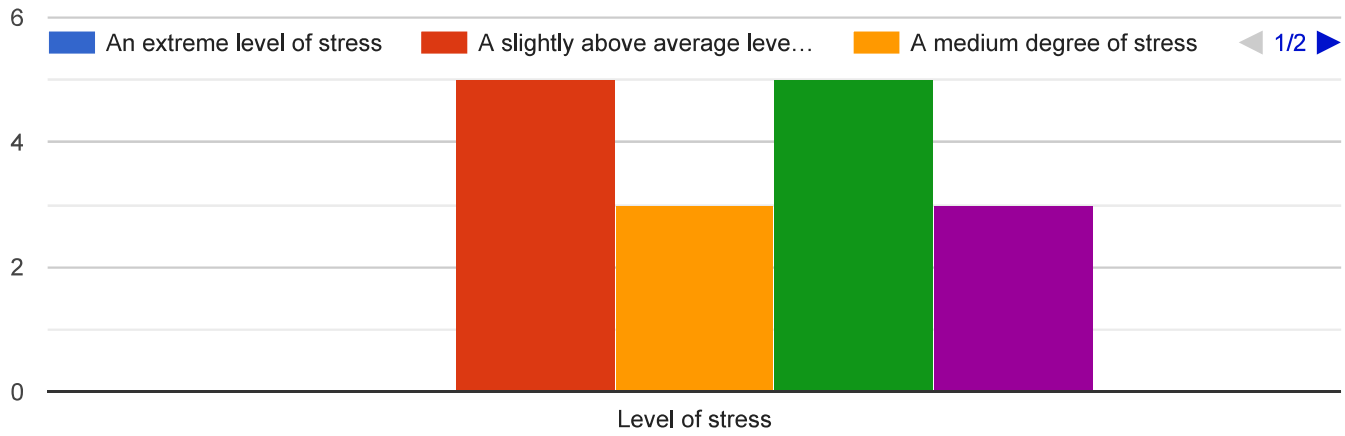
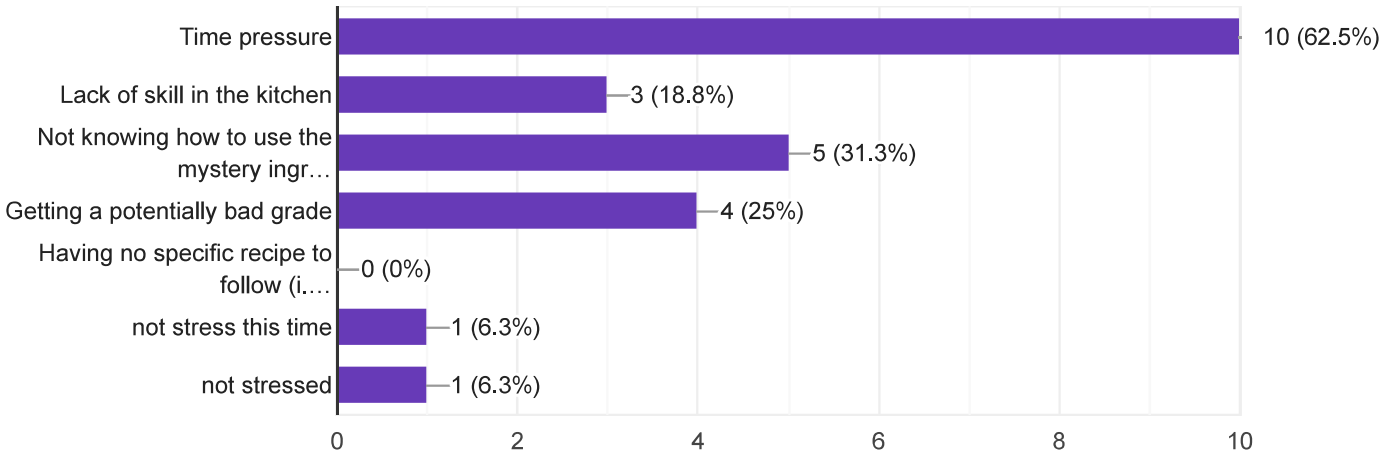


What aspects of the lesson made you feel the most stressed?

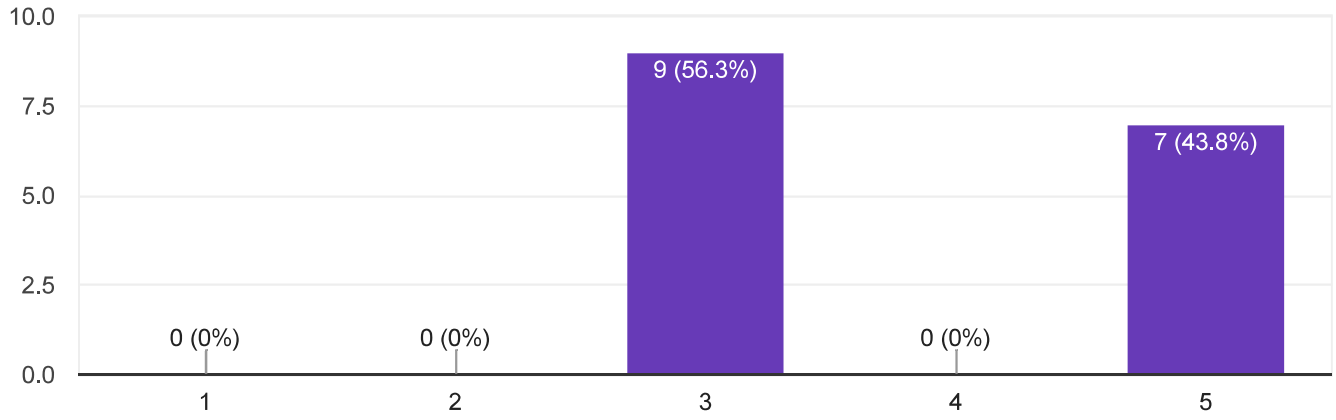
16 responses



This section is for assessing how you feel now, after completing the lesson.

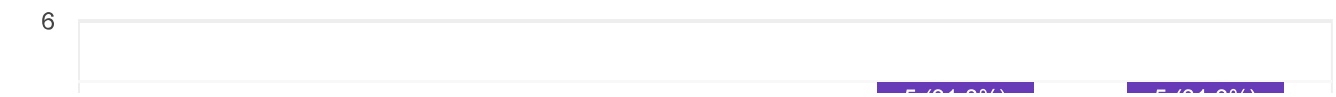
How well do you think your dish turned out to be?

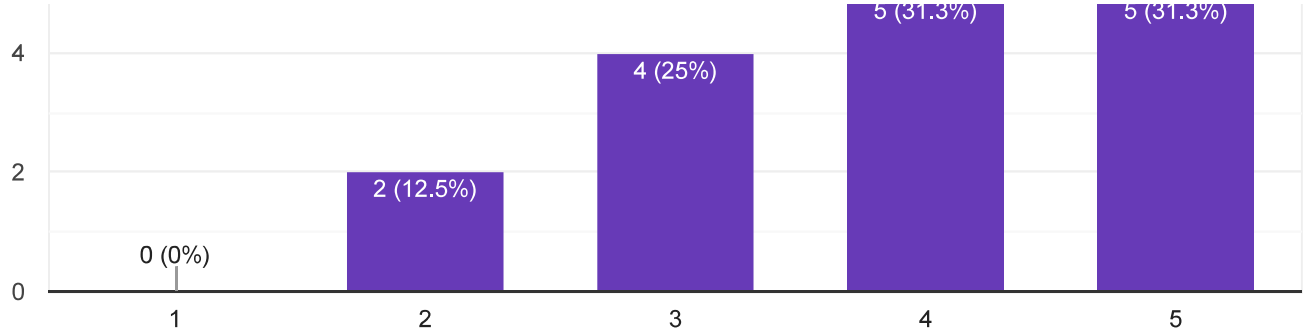
16 responses



How good do you think your approach to the MasterChef challenge was?

16 responses





Please breifly explain why you think this

16 responses

we created a good dish that had nice flavours and included all the ingrdients nesessary and in the time frame

because i made a dish and finished on time

we knew what we were doing and got it under control

we were organised and we each did something

Because i was running around not always knowing what to do

because we all know what we needed to do

no one was stressed

We found a recipe quickly and started making the dish however we took too long to make the dish

I don't know

I think my dish was okay because we incorporated each of the different ingredients into it well but there were some aspects that weren't that good.

Wasn't as good as we thought it will look like at the end.

i enjoyed it and tried my best

I think me and my friends really knuckled down and decided what to do fast.

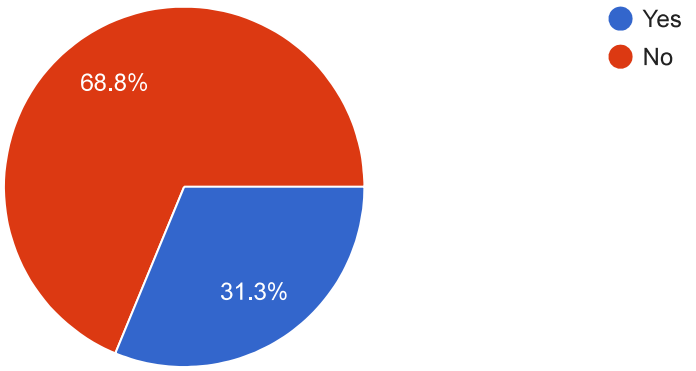
We got stuck right in

because I like a challenge and hardly ever use recipes when cooking so this was not unusual for me.

i think we were stressed in the first half of the lesson and we didn't have good time management, but we produced a good dish in the end

Did not having a recipe to follow make you feel like the outcome of your dish was easy to control (i.e. did having the freedom of how you were going to incorporate the mystery ingredient into a dish make you feel that completing the lesson was more doable)?

16 responses



Please briefly explain why/why not

16 responses

it was good because we could add wat we wanted, but it was also hard in the fact of having to estimate how to cook certain things

just cos we didnt know many cauliflower recipes

because we can do what we want

because you don't now the out come of the dish a the measurements

i like knowing what to do

because you wont know if it taste any good or not

we knew what we were doing

Because it made it harder to try find a way to incorporate ingrediants especially the chilli.

it is good to make a dish which we know.

because we could change what we wanted about our dish if something wasn't working.

There would be some disagreements in picking what dish to make for our mystery box.

because it takes time to find a recipe

we thought of the idea first but we needed some guidance through the recipe, however this doesn't mean that we were completely reliant and dependant on the recipe. We also had to moderate it inorder to incorporate the special ingredients.

We had a recipe

because most of the ingredients are quite versatile as well as being good flavour combinations.

for this week i found it hard incorporating all the ingredients because i didn't have prior knowledge for a dish with all three ingredients , so a recipe would've helped

28/05/19: MasterChef Lesson - Questionnaire for after each trial

QUESTIONS RESPONSES 18

18 responses

SUMMARY INDIVIDUAL

Accepting responses

Who has responded?

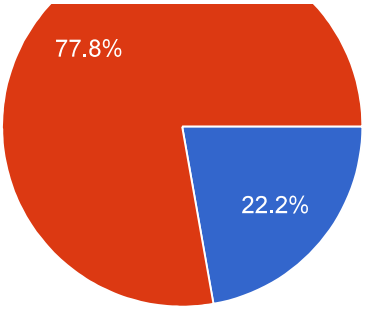
Email

[redacted]

This section is about how you felt before starting the lesson

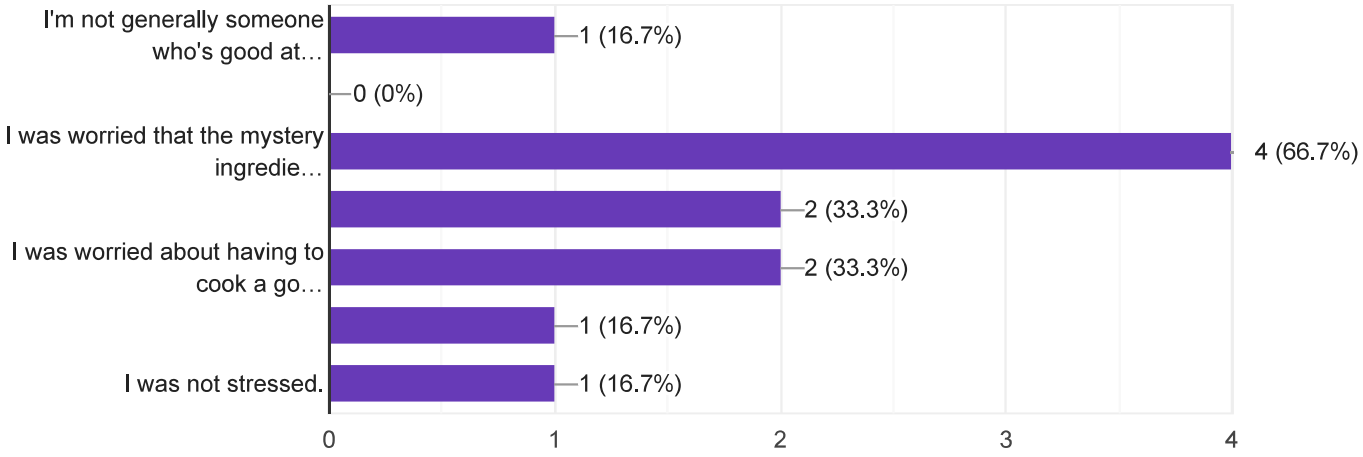
Were you feeling stressed about this lesson?

18 responses



If you answered yes, please tick the applicable reasons that lead to you feeling stressed.

6 responses



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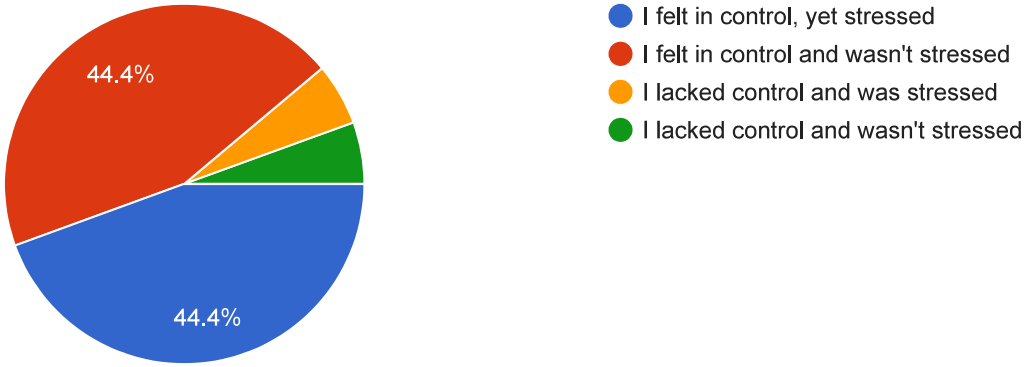
How did you go about creating your MasterChef dish?

18 responses

and slightly modified it to incporate t…

How did your approach to the MasterChef task affect you as you were cooking?

18 responses



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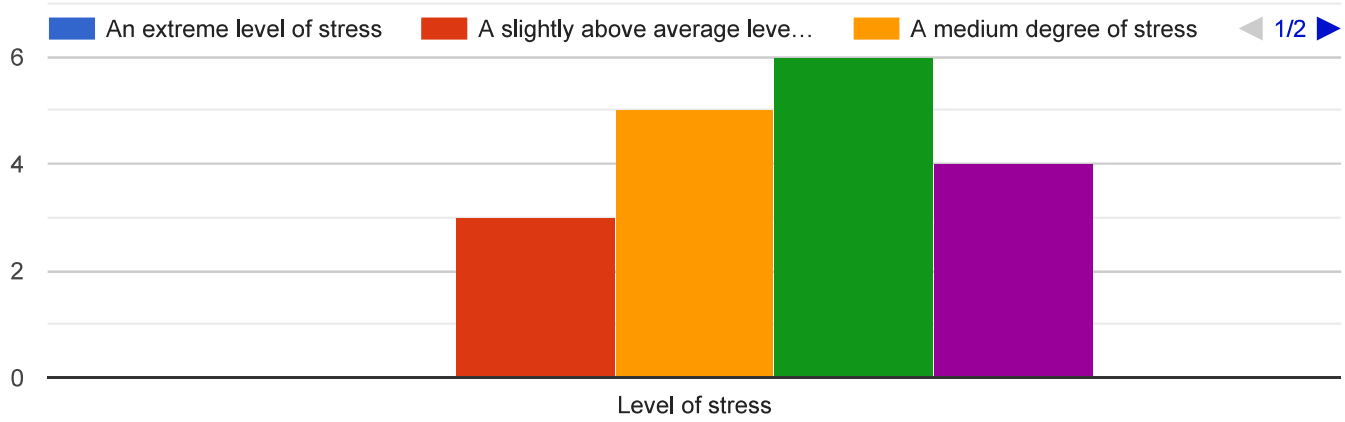
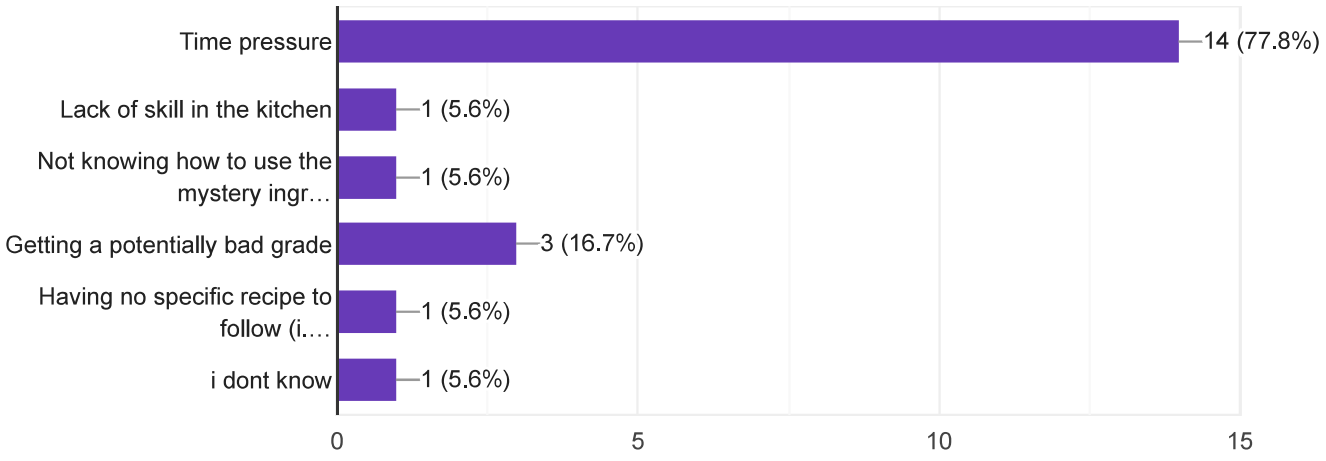


What aspects of the lesson made you feel the most stressed?

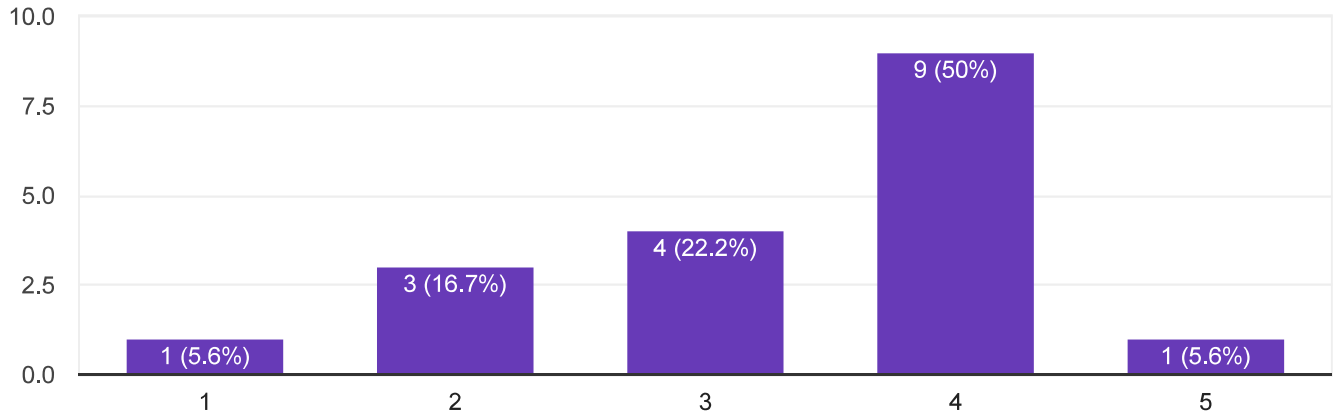
18 responses



This section is for assessing how you feel now, after completing the lesson.

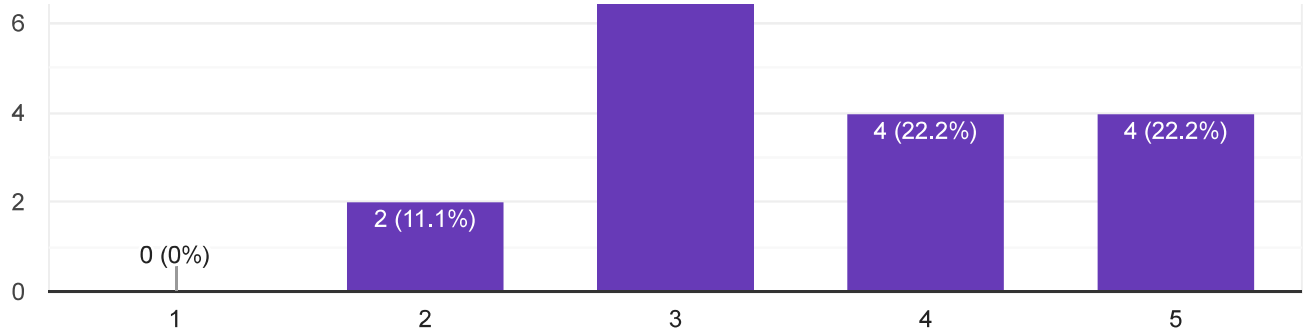
How well do you think your dish turned out to be?

18 responses



How good do you think your approach to the MasterChef challenge was?

18 responses



Please breifly explain why you think this

18 responses

we used the mystery ingredients in a creative way and the end product tasted really good

Because We have an open mind and it becomes easier to work along side eachother.

our cookie was raw inside

i think i did well because i didnt burn the cookies

because it did

Because our group all agreed to the same recipe and we were able to make it without disagreeing.

it tasted awesome

it wasn't that creative

It wasnt very creative

i think we had a good plan but were not prepared

we knew what we were doing and worked together together to get our dish

Because we made something different.

it was too sweet

It went alright, the dish was not perfectly cooked.

Because we were prepared and had recipes to choose from and divided the tasks between us equally.

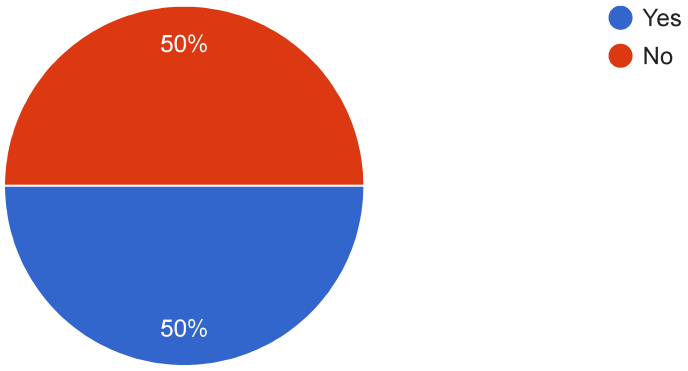
We did quite a basic cookie recipe but we added our own twist with the melted chocolate

We were doing ok at the start then ran out of time

i really enjoyed doing it but i was very stressd

Did not having a recipe to follow make you feel like the outcome of your dish was easy to control (i.e. did having the freedom of how you were going to incorporate the mystery ingredient into a dish make you feel that completing the lesson was more doable)?

18 responses



Please briefly explain why/why not

18 responses

for our recipe this week we briefly search up some casserole recipes just to learn the techniques but for our actual dish we did not follow A recipe, we just added what we thought would taste nice in the dish.

Its an average amount of control through out everyone in the kitchen.

we had to make it up on the spot

because we had a recipe and our dish was well presented

it was hard to find a recipe online and most of the people were doing the same so we couldn't to others for help

Because we have the freedom and creativity to make a dish which we want to make and we can express our skills.

.

/

idk

yes i like choosing something to cook so we would actully make something that you like

because we can do whatever we want

No

nothing

Didn't work well as a group, didn't get to participate in any cooking.

well we did have a recipe and everything was in control we just got a bad grade

Phoebe had a cookie recipe that she knew

Being given a recipe can ensure that the creative side is already done

yes

30/05/19: MasterChef Lesson - Questionnaire for after each trial

QUESTIONS RESPONSES 8

8 responses

SUMMARY INDIVIDUAL

Accepting responses

Who has responded?

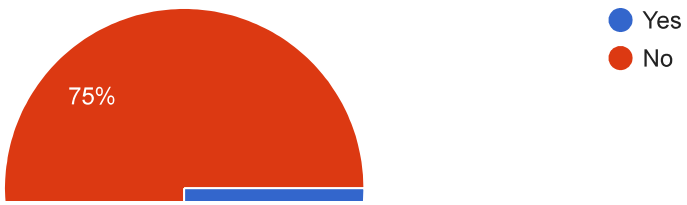
Email

[redacted]

This section is about how you felt before starting the lesson

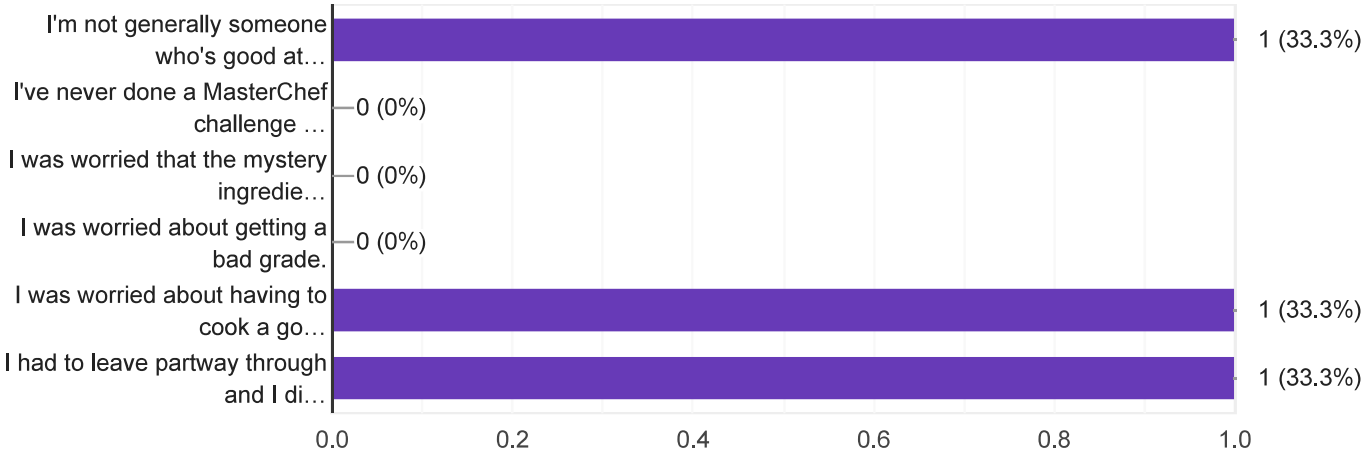
Were you feeling stressed about this lesson?

8 responses



If you answered yes, please tick the applicable reasons that lead to you feeling stressed.

3 responses



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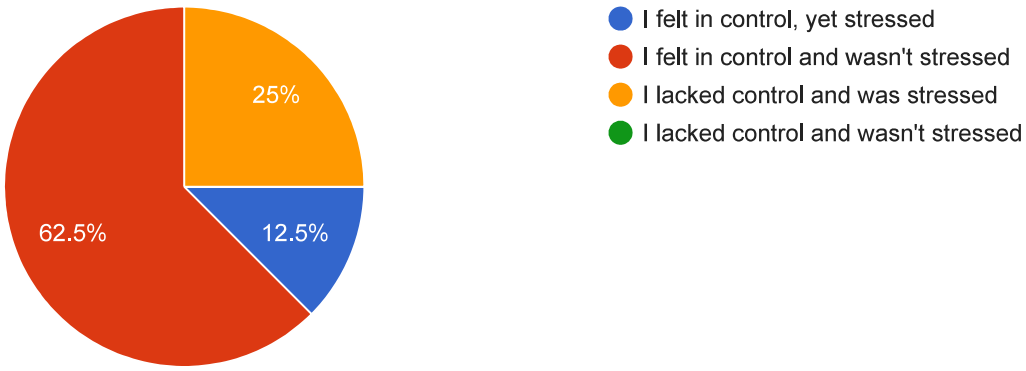
How did you go about creating your MasterChef dish?

8 responses

How did your approach to the MasterChef task affect you as you were cooking?

8 responses



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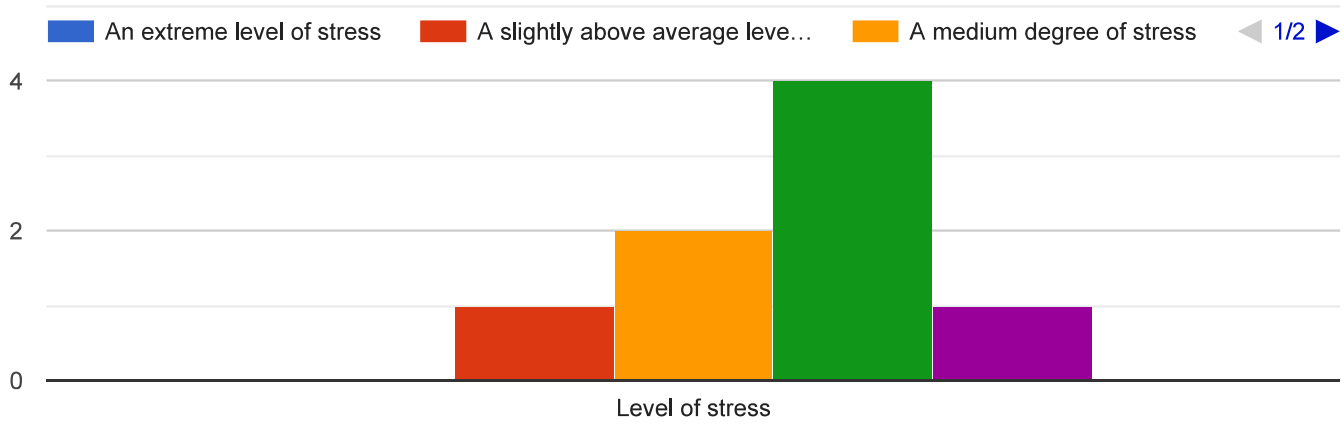
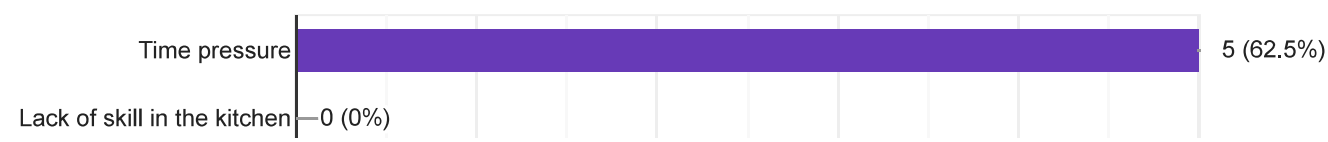
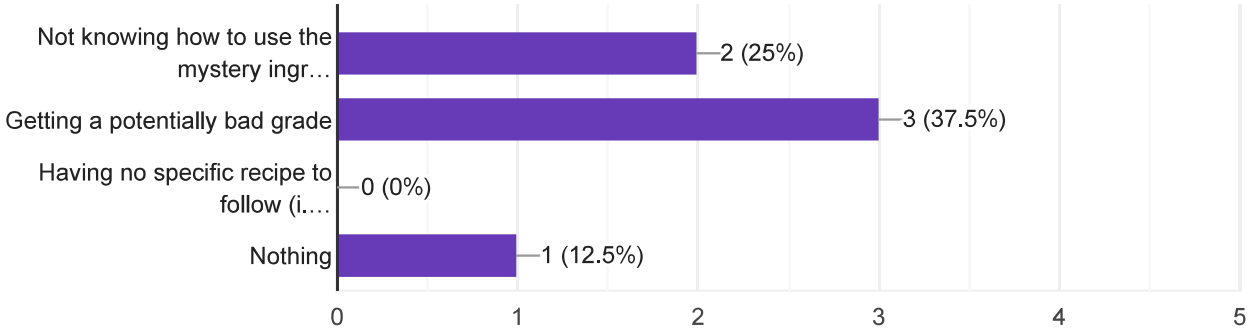


What aspects of the lesson made you feel the most stressed?

8 responses





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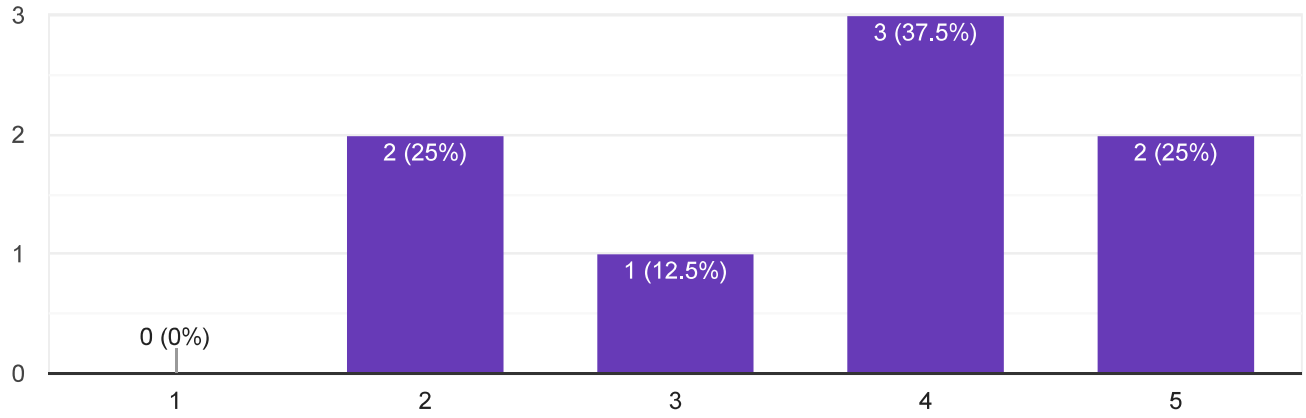
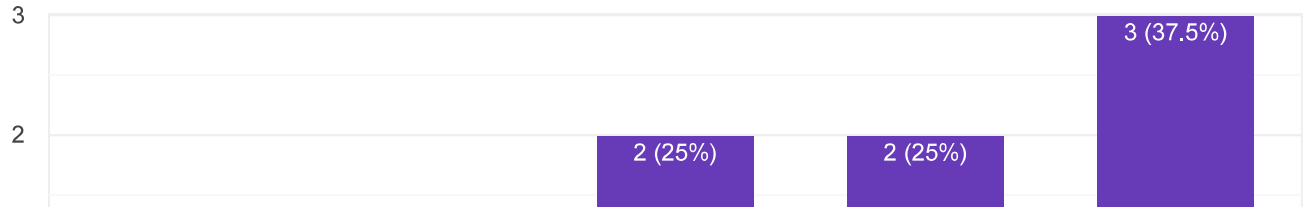
How well do you think your dish turned out to be?

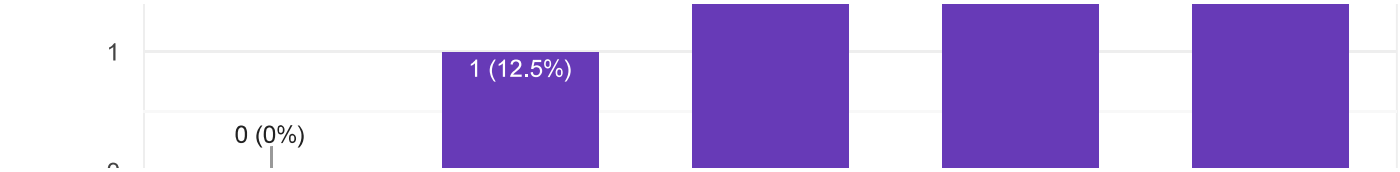
8 responses



How good do you think your approach to the MasterChef challenge was?

8 responses





Please breifly explain why you think this

8 responses

because we went outside of the book and used coconut and was diffrent to everyone else's

Our team worked well

We were very decisive and just went with it! For our salad we followed a recipe which made it easier. We understood what each indvidual needed to do inorder to get to the common goal of putting up a great dish.

Because I was calm and thought of ways we could use the ingredients well, without panicking

we thought of a easy meal and made it quickly so was not very stressed

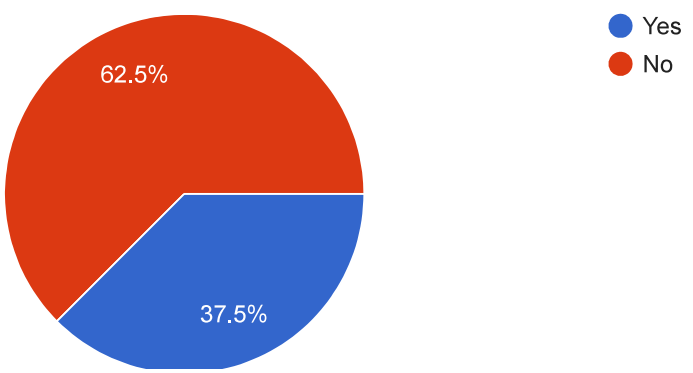
didn't look at certain aspects in the recipe (setbacks) and we'd already started baking

We've definitely done better in other weeks. I think this may have been because we didn't know how to use the ingredients

i think we incorporated all the main ingredients well together and knew what we had to do

Did not having a recipe to follow make you feel like the outcome of your dish was easy to control (i.e. did having the freedom of how you were going to incorporate the mystery ingredient into a dish make you feel that completing the lesson was more doable)?

8 responses



Please briefly explain why/why not

8 responses

because we were able to choose any cookie to make

?

Witha recipe we are bal to know the timing, presentation and what it's supposed to tunr out as. But with this said, we didn;t follow the recipe like it was the bible, we added and changed and modified to our likings and what we thought would be best for our dish.

Because we could just do what we wanted with the ingredients we were given

We could chose how to do it which just made it less stressfull

don't really understand the question

I think if we had had a recipe our end result may have been better

i think it was easy to control because there wasn't a set recipe to follow so we could do what we thought would taste good from previous dishes

Appendix 3

Ethics approval (permission slip layout)

Note that signed permission slips are attached to the board.