Mana Tohu Mātauranga o Aotearoa
New Zealand Qualifications Authority

Level 2 Technology 2024

91359 Demonstrate understanding of the role of material evaluation in product development

EXEMPLAR

Achievement

TOTAL 04

AS91359: Demonstrate understanding of the role of material evaluation in product development.

Introduction: By improving pay,working conditions, and rights for farmers and employees in nations that are poor changes trade. It affects businesses and governments by connecting producers with consumers. Customers can improve their lives and effect change by selecting fair commerce, and fair trade products provide them with more control of their future.

Brief: I aim to use a variety of flours to ensure strength and structure in my cafe-style chocolate chip cookie. I will test different flours, such as plain, self raising, wholemeal, almond, oat and gluten free flour, to make sure the product holds up when dipped into a hot drink.

Conceptual Statement: I plan aims to create a cafe-style product in New Zealand, aimed at providing farmers and workers in developing countries with decent income and credit.

Discussion: To find the most effective flour for a product's density and taste features, the experiment tested many different flours, including pain, self-raising, wholemeal, almond, oat, and gluten-free.

Product specification: Chocolate Chip Cookies

Attributes	**Description**
Colour	The cookie's appearance and colour, particularly its golden brown edges, significantly influence its appeal and potential consumption.
Shape/ Size	Chocolate chip cookies should be median-sized, 6cm by 6cm, and 1.5cm in height typically sold in stores and cafes.
Aroma	The cookie should have a sweet aroma during its baking process and before consumption to enhance its appeal to its intended audience.
Texture	The cookie should have a chewy and soft texture when bitten into, with a crunchy exterior.
Flavour	The cookies should have a subtle sweetness, primarily due to the chocolate content, ensuring a good balance between the chocolate and cookie

	flavours.
Harmony of ingredients	A balanced cookie should consist of a variety of ingredients that complement each other, ensuring good taste, aroma, texture, shape, and appearance.
Density	In order to keep the cookie in shape and not crumble or break when dipped in a hot drink, it must be fairly dense.
Fit for purpose	This fair trade product uses approved, fair trade chocolate and sugar as ingredients, contributing to its fair trade style.

Stakeholder Profile: (Dad) **Ethnicity -** NZ European **Nutritional Status -** Healthy **Dietary Requirements -** None **Allergies -** None **Religious constraints -** None **Reference to any ingredients and meals -** He likes sweet foods more than savoury as he feels it has more flavour and wants chocolate chips to be involved somehow. **Likes -** Chocolate, muffins, brownies, and scones **Dislikes -** Beetroot. **What do you know about** is an organisation promoting fair treatment for farmers and workers in the supply chain." **If you went to a cafe, which product would you most like to buy? Sweet:** Coffee, Muffins, Apple Pie **Savoury:** Sandwich

Recipe: Chocolate Chip Cookies
Link: **Chocolate Chip Cookies**

Ingredients:	**Method:**
½ cup salted butter softened ½ cup granulated sugar ½ cup light brown sugar packed 1 teaspoon pure vanilla extract 1 Large egg 1 ½ cups of flour ½ teaspoon baking soda ¼ teaspoon baking powder ½ teaspoon sea salt ½ Whittaker chocolate	1. Preheat over to 190 degrees C. Line three baking sheets with parchment paper and set aside. 2. In a medium bowl mix flour, baking soda, baking powder and salt. Set aside. 3. Cream together butter and sugars until combined using an electric beater. 4. Beat in eggs and vanilla extract until light (about 1 minute) 5. Mix in dry ingredients until combined. 6. Cut chocolate chips into small pieces or to your liking. 7. Add Chocolate chips and mix well. 8. Roll 2-3 tablespoons (depending on how large you like your cookies) of dough at a time into balls and place them evenly spaced on your prepared cookie sheets. 9. Bake in a preheated oven for approximately 8-10 minutes. Take them out when they are just

	barely starting to turn brown. 10. Let them sit on the baking pan for 2 minutes before removing them.

Objective Test: In order to find the right density and structure for hot espresso, I studied six flour types for chocolate chip cookies: Plain, Self-raising, Wholemeal, Oat, Almond, and gluten-free.

Methodology: To find out the density of the chocolate chip cookie, the cookie will be weighed both before and after baking. It will also be dipped in a hot drink beverage for five seconds. To find out the cookie's spread and rise, measurements of its height and size will be taken. To choose the suitable cookie, the density of different flour will be measured.

Flours and the outcome	**Height and Diameter**	**Weight and Density**	**Evaluation**
Plain Flour 	BB:1cm AB:4.3cm	BB:25 grams AB:30 grams AD:35 grams Density:6g/cm3	For the chocolate chip cookies, the plain flour works best because the taste, texture, and shape came out the best. The height, length, and weight of the chocolate chip cookie are all affected by the low gluten level. The density of the chocolate chip cookie made from plain flour was 6g/cm3. This is because it absorbed liquid well and held its structure.
Self Raising Flour 	BB:1.5cm AB: 1.2cm	BB:22 grams AB:29 grams AD: 33 grams Density:7.25g/cm3	The chocolate chip cookie made with self-raising flour had a nice texture to it, which was similar to the plain flour cookie. The cookie was able to hold its structure after being dunked into a hot drink. The density of the chocolate chip cookie made from self-raising flour was 7.25g/cm3 which was a bit more bigger compared to the chocolate chip cookies made with plain flour. I also noticed that the measurements for the plain flour and self-raising flour are very closely similar.

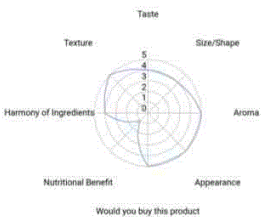
Wholemeal Flour 	BB:2 cm AB:2.5cm	BB:26 grams AB:34 grams AD:39 grams Density:7.8g/cm3	When the chocolate chip cookies were made with wholemeal flour the taste and texture was different. The wholemeal flour didn't absorb much moisture compared to the plain and self-raising flour but, even after the chocolate chip cookie made from wholemeal flour being dipped in a hot drink it surprisingly kept its structure. The density of the chocolate chip cookie made from wholemeal flour was 7.8g/cm3.
Almond Flour 	BB:2.6cm AB:2.3cm	BB:29 grams AB:32 grams AD:37 grams Density:6.4g/cm3	The chocolate chip cookies made with Almond flour had a more grainy texture. When dipped into a hot drink the cookie kept its structure. The density of the chocolate chip cookie made from almond flour was 6.4g/cm3.
Oat Flour 	BB:3.8cm AB:1.6cm	BB:30 grams AB:34 grams AD:37 grams Density:11.3g/cm3	The chocolate chip cookies made with oat flour had a crunchie texture and weren't as golden brown compared to the other cookies made with almond flour, when the cookie was dipped in a hot drink it was able to hold its structure. The density of the chocolate chip cookie made from oat flour was 11.3/cgm3

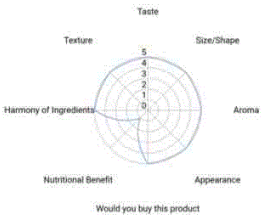
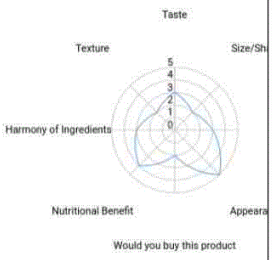
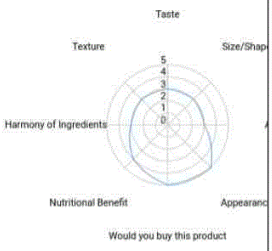
Gluten Free Flour 	BB:2.5cm AB:1cm	BB:27 grams AB:32 grams AD: 35 grams Density: 10.7g/cm3	The chocolate chip cookies made with gluten free flour were very dry, no flavour at all and not really appetising. The chocolate chip cookies that contained gluten free flour didn't hold its shape while being dipped in the hot drink and while being made it was difficult for it to absorb liquid. The density of the chocolate chip cookie made from oat flour was 10.7g/cm3.

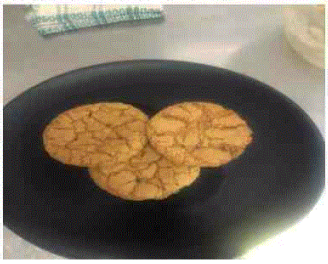
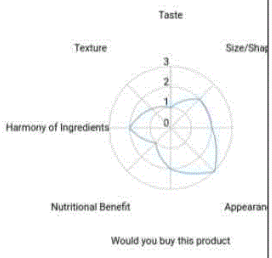
BB:Before Baking **AB**:After Baking **AD:**After Dunking
BBH: Before Baking Height **ABH:** After Baking Height
BBD: Before Baking **ABD:** After Baking Diameter

Subjective: The best flour to use for a cafe-style fair trade chocolate chip cookie is decided using the star diagram, which is used to get the stakeholders feedback and has eight features. Which are taste, size/shape, aroma, nutritional benefit, harmony of ingredients, texture, and fit for purpose.

Methodology: I did my subjective test by baking chocolate chip cookies and getting feedback from my stakeholders.They made a star diagram by giving scores and comments about the cookie made with different flours. The best result was then found by analysing the star diagrams that were used for different flour and containing all the stakeholders comments and feedback.

Flours (Outcome)	**Star Diagram**	**Evaluation**
Plain Flour 	 **Total Score: 32/40**	My stakeholder said the appearance of the cookie was great as the edges were slightly golden and not overdone making it taste great especially with a hot cup of coffee. My stakeholder said the texture of the cookie was nice as there wasn't too much chocolate chips in the cookie making it taste overpowering

Self-Raising 	 **Total Score: 36/40**	My stakeholder said the texture was a lot more crunchy for some reason but had the same appearance as the one made with plain flour. The aroma of the cookie smelled chocolate and sugar as my stakeholder said that made the cookie more attractive and eye-catching.
Almond Flour 	 **Total Score: 25/40**	My stakeholder enjoyed the taste but wasn't a big fan of the size of the cookie as they felt that it was a bit too large for their liking. But once it was dipped into a hot drink it did hold its structure and tasted a bit better. My stakeholder also felt it was a bit on the cry side.
Oat Flour 	 **Total Score: 26/40**	My stakeholder enjoyed the chocolate chip cookie made with oat flour as he felt that the size/shape could have been better to make it more appealing to the eye as it looked very lumpy. My stakeholder said it smelt like a normal cookie, and the texture was weird because of the oat flour.

Wholemeal 	 **Total Score: 18/40**	My stakeholder said this was his least favourite as it had too much sugar and broke as soon as he held it in his hands. My stakeholder did say that the appearance was ok but it wouldn't be his first choice if it was in a cafe, and didn't go well with a hot drink as it just fell into the hot drink while being dipped in.
Gluten Free Flour 	 **Total Score: 17/40**	The stakeholder didn't like the gluten free cookies as well as he thought that it just tasted like sugar and chocolate like the one made with wholemeal flour. My stakeholder also said the texture was like eating sugary fondant or a lollipop.

Research:

Flours	Description	Performance Properties	Ref
Plain Flour	Plain flour is a flexible flour to use as it is good for baked goods such as cookies, muffins, breads and biscuits, because wheat grain has a 75% it can be bleached or unbleached	Bleached or unbleached, plain flour is a mixture of hard and soft wheat flour with a protein concentration of 10% to 12%. It gives baked goods a better flavour, and consistency and can be mixed with baking powder or a rising agent like baking soda. If plain flour is stored in a fridge it can last up to two months.	Link
Self-Raising Flour	Self raising flour is good for making baked goods especially pancakes, cakes and scones have a lower protein form compared to the plain flour. In order to make self raising flour you combine 1 cup of plain flour , 1 ½ teaspoon baking powder, and 1 ¼ teaspoon salt.	Similar to plain flour, self–raising flour is soft due to its lower protein level of 8.5%. Because self-raising flour contains baking soda and sodium. This makes the self-raising flour rise.	Link
Wholeme	Wholemeal flour is good for	Wholemeal flour is made entirely out of wheat	Link

al Flour	baking pasta and pastries because it has a higher nutritional value as it is made from 100% wheat grain and needs less processing than regular flour, making it perfect for baking, especially when it comes to bread.	grain and is fine, light, and is a nutrient-dense flour. It has a low gluten density but does contain more fibre. Wholemeal flour can absorb more liquid due because wholemeal has lots of compounds.	
Almond Flour	Almond flour is made from peeled and blanched almonds making the almond flour fine. Almond flour has a light coloured blend of red and brown that can be used as a substitute for baked products such as cakes, pie crusts, pancakes, breads, and cookies.	Almond flour is suitable to any diet because of its high protein level and how it contains low carbs. Almond Flour can be used in baked goods and can enhance flavour and texture. Blanched almond flour can last up to 6 weeks in the freezer.	Link
Oat Flour	Oat flour contains Avena Sativa and is used as a smooth and grainy flour. Which is good for baking certain products such as bread and muffins. .	Oat flour is nutritious as it contains protein, iron, calcium, and other nutrients that can be found in oat flour. This improves texture and flavour and absorbs more water than regular flour, giving the baked items contained.	Link
Gluten-Free Flour	Gluten-free flour is a good choice when making baked goods as it can be suitable for people with gluten intolerance and can also be used in a 1:1 ratio in place of plain flour.	Gluten Free flour has more of a grainy texture and is a lot more fibre than plain flour. Gluten Free flour is good for baking noodles and thickening sauce as its high scratch content has high in protein and low in carbs.	Link

The relationship between the ingredients of the designed outcome expected and the relationship between the performance properties of materials selected for product specification:

Different types of flours	Flour is served as a basis for baked goods, giving flexibility and structure. When its proteins and water combine to create gluten, the gluten can expand to hold the growing leavening gases as the food rises. The nutritional value, texture, and protein content of various flour types change. Almond flour provides more protein than regular flour, for example, which may have nutritional advantages.
Chocolate	The chocolate is used to give sweetness and flavour, making chocolate chip cookies. Having chocolate chips in a cookie appeals to the consumers and gives it a tasteful flavour.
Vanilla Essence	When cooking baked good vanilla essence is used to enhance flavour and moisture, giving the finished product a soft texture.

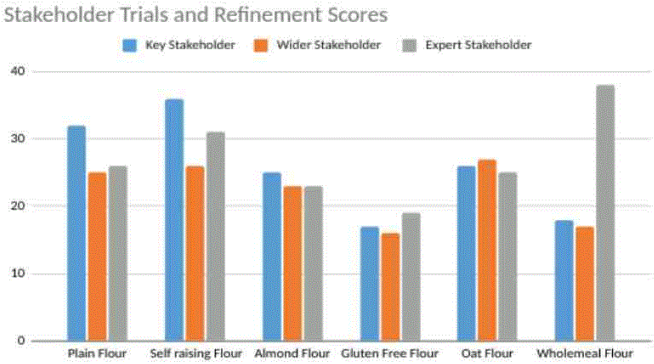
Butter	In baking, butter is used to hold dry ingredients together and help give cookies structure. Which provides a rich and tender cookie. Butter can be used depending on its temperature; In the recipe it is used to soften.
Eggs	Most chocolate chip cookies have a thick or crispy texture which eggs are often used in cookie baking to make a light, chewy texture that has a soft dough that spreads and holds together.
Baking Powder	Baking powder is a raising agent used in baking to produce air bubbles, which causes the baking to rise and give cookies a soft texture rather than being compact and flat.
Brown Sugar	Brown sugar is used to give cookies structure and sweetness. When making anything containing sugar there are fewer air pockets during the process of mixing, there is less gas trapped, which allows cookies to spread more and rise less as intended, but due to it being brown sugar the white sugar has a lower density compared to the brown sugar.

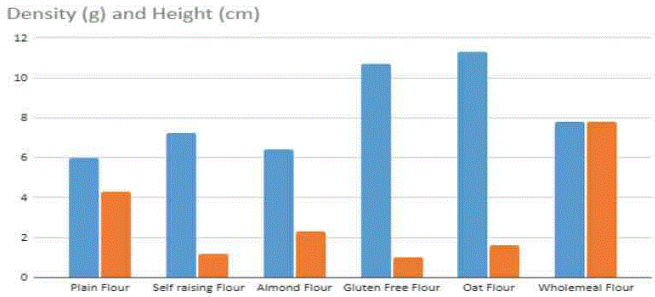
Sustainability; Reduce, Reuse, Recycle
I made sustainability priority during six chocolate chip cookie baking attempts by using recyclable and reused materials, reducing waste and using eco-friendly tools. I weighed ingredients accurately using measuring cups and transported my food scraps to the recyclable bag. For sustainability, I used chocolate and sugar that were approved.

Knowledge and techniques underpinning material evaluation procedures to support material decisions/social and cultural associated with where the product is to be situated: Ruth Wakefield, a well-known chef at the Toll House restaurant in Massachusetts, created the first recipe for chocolate chip cookies in the late 1930s. These cookies had gained popularity all over the world since she published her 1938 cookbook “Tried and True”, especiallyin New Zealand where they are typically served with hot drinks. By using recyclable materials and fair trade ingredients, they can be made sustainably and changed to fit religious beliefs, and allergies.

Justification and Analysis:
Bar graphs

Subjective **Objective**





Decision to accept / reject the prototype:

Compared to other flours, the first batch of cookies I made with plain flour had a better flavour and texture , because alternative flours had somewhat strange flavours and textures. Stakeholders preferred the chocolate chip cookies made with plain flour. The look and size of the cookies were affected differently by wholemeal flour, oat flour, gluten-free flour, and almond flour. Me and the stakeholders agreed that the plain flour chocolate chip cookies were the most appealing and best suited to the brief after viewing the input and comment given by the stakeholders on the graph and it was fit for purpose.

Achievement

Subject: Technology

Standard: 91359

Total score: 04

Q	Grade score	Marker commentary
One	A4	The candidate starts the report by defining the design problem to set the scene. As a result of this they present some performance criteria for the outcome. As the report progresses there is a description of the testing of different ingredients for the cookies. Later in the report the candidate describes the properties of a variety of different types of flour. The report concludes with a decision to use plain flour in the final product.