

# A phenomenographic study of competence in baking: foundations for learning study

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## Abstract

**Purpose** – The study aims to identify a hierarchy of conceptions of competence in baking that can serve as a foundation for applying learning study and improving teachers’ professional development in teaching pastry and bakery modules. The study was guided by the question: Using phenomenography, what are the qualitatively different ways of experiencing competence at work among apprenticeship students, teachers and expert practitioners in baking?

**Design/methodology/approach** – Using the interpretivist perspective, this phenomenographic study draws on semi-structured interviews with 25 participants, including apprenticeship students, teachers, and bakers or pastry chefs in Brunei Darussalam. Participants were purposefully selected to represent varied experiences, with data collected over six months.

**Findings** – From a phenomenographic analysis of all the interview transcripts, an outcome space of four categories of competence in baking was revealed. From these, we can see that the categories represent four qualitatively different ways of experiencing competence in baking, which also reveal the students’ conceptions and misconceptions of baking. This approach provides a foundational framework for structuring a learning study within pastry and bakery modules.

**Originality/value** – By revealing how students understand baking, the study offers actionable insights for teachers. By applying variation theory and learning study, teachers can design targeted interventions to shift students’ conceptions. This supports more effective teaching and enhances competence development in technical and vocational education.

**Keywords** Competence, Phenomenography, Technical and vocational education and training, Culinary education, Learning study, Variation theory

**Paper type** Research article

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## 1. Introduction

If a classroom of aspiring chefs were asked about their experience of competence in baking, a diverse array of perspectives would emerge. One student might view competence as the ability to accurately replicate a teacher’s demonstration, while another may view it as experimenting with innovative techniques or flavours. This is the premise of [Dahlgren and Marton’s \(1978\)](#) study, which posits that analysing how students conceptualise a particular phenomenon is essential for effective learning. Variations in students’ conceptions and their practical applications are argued to profoundly influence learning outcomes and, consequently, students’ competence ([Marton, 2015](#); [Marton and Booth, 1997](#)).

There is no agreed-upon definition of competence ([McAleavey and McAleer, 1991](#)), although many definitions exist in the literature. Competence has been described as having “different meanings to different people” ([Debling and Hallmark, 1990](#), p. 9), a variability arising from its conceptualisation through multiple ontological and epistemological lenses. In general, competence is viewed from a behaviourist approach ([McClelland, 1973](#); [Skinner, 1953](#)). However, this approach has limitations (See [Hager and Gonzci, 1996](#)). Alternative approaches to competence, such as the holistic ([Mulder, 2014](#); [Sundberg, 2001](#)) and interpretivist approaches ([Sandberg, 2000](#)) have emerged in response to the limitations of behaviourism. These alternative approaches have implications for the way organisations or training institutions evaluate and develop competence in their workers and students.

Interpretivist approaches highlight the diverse and complex nature of competence, utilising the individual’s subjective understanding and practical application of their knowledge and skills in specific contexts. While the behaviourist approach focuses on measurable outcomes,



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the interpretivist approach focuses on how individuals make sense of their learning experiences, apply knowledge to real-world contexts, and adapt to new challenges. Several studies have used the interpretivist approach in the domains of nursing, automotive, and teacher training (e.g. Sandberg, 2000; Wan and Leung, 2022; Yu and Akerlind, 2024) to understand how individuals make sense of their learning experiences in particular contexts. However, there is, as yet, no study in the culinary sector, where a significant theoretical and methodological gap persists in the use of an interpretivist perspective in culinary education.

Phenomenography offers a methodological means of identifying the qualitatively different ways in which competence is experienced. Through this approach, variation is captured in the form of categories of description and an outcome space, representing both the range of meanings and the referential and structural relationships between them (Akerlind, 2005). Such variation reveals critical differences in how the phenomenon is accounted, pointing to the critical aspects of the phenomenon that must be discerned for more complex ways of understanding to emerge (Marton and Booth, 1997). In this way, phenomenography not only contributes to theoretical understanding but also to the identification of critical aspects of competence that are critical to learning and development. As an outlook, the findings are envisaged to inform subsequent learning study cycles, where the identified critical aspects can guide the design of targeted interventions to support students' discernment of these aspects and, in turn, the development of competence.

The purpose of this study is to address the varied ways students, teachers, and expert practitioners experience competence in baking within the framework of a dual-system apprenticeship programme, where this study aims to address the research question: Using phenomenography, what are the qualitatively different ways of experiencing competence at work among apprenticeship students, teachers, and expert practitioners in baking?

## 2. Competence

The concept of competence has been widely discussed in educational research, yet its meaning remains contested. Weinert (2001) describes competence as a system of cognitive abilities, motivational orientations, and social dispositions that enable individuals to successfully meet complex demands in particular contexts. This conceptualisation emphasises competence as an integrated capacity that combines knowledge, skills, strategies, and attitudes in action, and the term competency is used to refer to more discrete, observable elements of performance that can be specified and assessed individually (Weinert, 2001). In the literature, competence has been interpreted through several approaches, including behaviourist, holistic, and interpretivist.

### 2.1 Behaviourist approach

The behaviourist approach is predicated on the notion that competence can be developed through systematic training and reinforcement strategies, with an emphasis on the development of specific knowledge, skills, and attributes that can be objectively monitored and modified through operant conditioning (Skinner, 1953). McClelland (1973) highlighted the limitations of traditional intelligence and aptitude tests and advocated for competency-based testing using behaviourally relevant, observable criteria. Consequently, this then results in the adoption of clear, predefined performance standards and standardised testing to determine competence, such as checklists and product quality. Under this approach, an individual who can carry out a particular task more proficiently or competently is considered to possess attributes superior to those of others (Sandberg, 2000). Competence, therefore, is equated with the fulfilment of predefined tasks or criteria. While this approach remains prevalent, particularly in contexts such as TVET where precision and observable task performance are critical, it has been criticised for being fragmented, overlooking the complexity of cognitive processes in learning and performance, and for excluding higher-level

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competencies from its standards (Dall’Alba and Sandberg, 1996; Hager and Gonczi, 1996; Mulder, 2014).

### 2.2 Holistic approach

The holistic approach to competence considers multiple dimensions and their interactions, including cognitive, functional, and social competencies (Hager and Gonczi, 1996; Le Deist and Winterton, 2005). This approach adopts a comprehensive, systematic approach that considers the interconnectedness of capabilities and their interactions with environmental factors, encompassing the integrated skill sets of knowledge, skills, and attitudes required in occupational roles and situations (Mulder, 2014; Sundberg, 2001). Developed in response to the limitations of the behaviourist approach, this perspective extends beyond technical skills to emphasise the integration of various dimensions of competence within real-world professional practice. It uses diverse assessment methods, such as portfolios, simulations, and workplace-based assessments, to capture the full range of an individual’s abilities and to promote continuous development aimed at improving work quality. Under this approach, competence development recognises that it is not straightforward to develop another person’s competence; rather, it is only possible to provide the tools and catalysts that enable learning (Sundberg, 2001).

### 2.3 Interpretivist approach

The interpretivist approach, influenced by Marton’s (1981) study on lived experiences, positions competence not just a specific set of attributes such as the knowledge, skills and attitudes that people use when working but it is also preceded by and based upon individuals’ lived experience of the work or their conceptions of the work (Dall’Alba and Sandberg, 1996; Sandberg, 2000). From this perspective, the individual’s conceptions of work represent the structure of their understanding, while competence can be seen as the enactment of this understanding in practice. Developing competence would focus on enriching practice rather than just the attributes. Competence development in this case is seen as a change in the individual’s way of experiencing aspects of the practice and the practice as a whole. Assessment from this approach moves towards qualitative and developmental approaches, such as reflective accounts, narrative inquiry, and phenomenographic analysis, privileging variation in experience over uniform performance criteria. Several studies have used the interpretative approach to competence in the domains of automotive (Sandberg, 2000), health professions (Sjöström and Dahlgren, 2002; Yu and Åkerlind, 2024), accounting (Sin *et al.*, 2011), and education (Wan and Leung, 2022; Wood, 2000). These studies adopt a similar interpretivist approach because it allows for a deeper understanding of how competence is perceived and applied across different contexts among individuals with diverse experiences and backgrounds.

### 2.4 Competence and baking

Baking represents a distinct and specialised subset within the broader domain of culinary arts, one that requires its own unique knowledge, technical skills, and techniques. Mastery in baking involves an understanding of ingredient interactions, heat transfer, and process timing to successfully transform basic ingredients into a wide array of products, including breads, cakes, cookies, pastries, and custards (Fugoni, 2008). Contemporary perspectives extend competence beyond procedural accuracy toward adaptability and creativity. Bakers are increasingly expected to adapt recipes and techniques to consumer preferences, cultural influences, and market trends (Wright *et al.*, 2001). Innovation in bakery products is shaped by considerations of health, pleasure, and convenience, requiring responsiveness to evolving demands (Martínez-Monzó *et al.*, 2013). At a more advanced level, baking is conceptualised

as a creative process involving idea generation, experimentation, and evaluation (Hornig and Hu, 2008).

The development of competence in culinary arts has long been viewed within the confines of the acquisition of skills, knowledge, and attitudes through the master-apprentice model and social hierarchy (Woodhouse and Rodgers, 2024). The model began with the establishment of the medieval food Guilds in Europe, which oversaw the first examples of informal culinary education, where an apprentice would acquire the knowledge of their Master by working under their sponsorship for a period of time (Emms, 2005). Under this model, knowledge is primarily acquired by observation, and the apprentices would replicate tasks to demonstrate their competence. This pedagogy, which reflects a more behaviourist approach to measurable outcomes, is still widely practised today in both workplace training and formal culinary education.

The introduction of the brigade organisational system by Auguste Escoffier cemented the influence of social hierarchy on kitchen structure. Although it promotes an efficient system of food preparation and career advancement, it also outlines how knowledge can be accessed based on the rank of the kitchen staff. These power dynamics may limit students' ability to explore and develop their skills and hinder innovation and adaptation to the needs of contemporary culinary education. Therefore, there have been calls for a more critical and reflective approach to culinary education (Woodhouse and Rodgers, 2024).

The significant shift towards a more structured culinary education, with the introduction of schools such as Borough Polytechnic in London in 1894, introduced systematic instruction for bakers, marking a transition from informal apprenticeships to formalised technical and vocational education and training (Richardson, 1972). These institutions sought to modernise the profession by combining theoretical knowledge with practical skills. Despite these advancements, the approach towards competence and competence development in baking, including culinary arts, has remained largely behaviourist. For example, Birdir and Pearson (2000) attempt to outline essential competencies for research chefs; the methodology used was primarily quantitative, as it gathers measurable data, which is more behaviourist. Some more recent work adopts a holistic approach, assessing multiple dimensions of culinary competence such as innovation, culture, aesthetics, technology, management, and creativity (Hu, 2010; Ko, 2010; Shyr *et al.*, 2018). However, interpretivist approaches remain limited in culinary education, particularly in baking, underscoring a need for studies examining how competence is understood in this context.

### 3. Methodology

#### 3.1 Technical and vocational education and training in Brunei Darussalam

Technical and vocational education and training (TVET) programmes in Brunei Darussalam are regulated under the Ministry of Education (MOE). In the formal TVET setting in Brunei Darussalam, several programmes are offered, ranging from Level 1 to Level 5, based on the Brunei Darussalam Qualification Framework (BDQF) (See Goh and Paryono, 2024). The current approach in Brunei Darussalam's TVET system is Competency-Based Training, which emphasises developing practical skills aligned with industry needs, ensuring that the skills taught are relevant and applicable in real-world settings (Goh, 2023a; Ministry of Education Brunei Darussalam, 2020). Competency-Based Training is built upon a defined competence framework that identifies the core tasks of a vocation and specifies the essential competencies required, each comprising clusters of knowledge, skills, and attitudes, with the programme designed to develop such competencies in alignment with industry standards (Mulder, 2017).

Culinary education in TVET in Brunei Darussalam is currently offered at BDQF Level 3 and 4 in various formats, with a duration of two years. All programmes include an internship, during which students are attached to a relevant company in the hospitality industry for a minimum of six months and a maximum of one year to promote workplace learning (Goh, 2023b). For this study, we draw on data from a BDQF Level 3 dual-system apprenticeship

programme at a vocational college in Brunei Darussalam, which is a two-year programme divided into four semesters. The programme is structured so that students will be attached to a sponsoring establishment in Semesters 2 and 4, while they spend the remaining semesters at the college. There is a baking module under this programme, which students will learn only in Semester 3.

### 3.2 Phenomenography

Phenomenography focuses on the key aspects of the differences in the way the phenomenon is experienced by people to specify conceptions of the phenomenon and relations between them. The researcher presents the phenomenon's experiences and the relations among them, and presents the phenomenon's experience as described by others (a second-order approach) (Marton and Booth, 1997). Phenomenography allows for different sets of categories of conceptions to be developed in relation to a particular phenomenon (Marton and Booth, 1997). The researcher aims to constitute not just a set of different meanings, but a logically inclusive structure relating to the meanings (Åkerlind, 2005). A phenomenographic approach using interviews as a data source was selected to collaboratively develop a shared understanding of what would constitute competence in baking from the participants' point of view, following an interpretivist view thereof.

The study was based on semi-structured interviews with a sample of 25 individuals: 15 apprenticeship students in culinary education from one technical and vocational college in Brunei Darussalam, 5 pastry and bakery teachers at the same college, and 5 bakers or pastry chefs from the hospitality industry in Brunei Darussalam. Prior to data collection, participants were informed about the study's objectives and ethical considerations. This included a clear explanation of their rights as research participants, specifically, the voluntary nature of participation, the right to withdraw at any stage without penalty, and the safeguards in place to protect their confidentiality and anonymity. Written informed consent was obtained from all participants before their inclusion in the study.

In phenomenographic research, the aim is to explore variation in individuals' understandings of a given phenomenon. Accordingly, participant selection prioritises heterogeneity of experience over consensus on a view (Åkerlind, 2025). The sampling strategy for this study was therefore selective and purposive, targeting participants whose backgrounds and experiences were likely to yield diverse conceptions of competence in baking within the TVET context in Brunei Darussalam. For students, variation was achieved by selecting participants at different stages of the apprenticeship programme: 5 students in their first semester (Semester 1), with no formal baking instruction from the college, and 10 students in their third semester (Semester 3), who had completed a six-month industry attachment period. Students interviewed in Semester 3 would have either started the baking module or had the opportunity to bake during their attachment in Semester 2. Semester 1 students will not have had any formal baking training from the college. This contrast allows an opportunity to capture potential differences between students with minimal formal baking experience and those with both classroom instruction and practical industry exposure. The sample also included teachers and chefs. By purposively selecting participants occupying different positions within the baking vocation, the sample was constructed to reveal a range of qualitatively distinct ways of experiencing competence in professional practice, with participants representing differences in training pathways, vocational specialisations, and career stages. Gender diversity was also present in the sample (9 males and 16 females). The number of the sample was determined to ensure sufficient variation in the responses, where in practice the average sample would be 10–30 participants (Åkerlind, 2025; Bowden, 2005).

Since it explores participants' conceptions of baking competence, the interviews centred on these two main questions:

- (1) In your view, what does it mean to be a good or competent professional baker or pastry chef?

- (2) In your view, how do you become a good or competent professional baker or pastry chef?

To ensure uniformity, the interviewer remained the same for all 25 interviews, and the interview times ranged from 12 to 43 min. Interviews ended when both parties felt they had revealed all that could be said. The interviews took place over a six-month period, from March to September 2024, and were audio-recorded and transcribed. It is important to note that the language used in the interviews was either completely in colloquial *Bahasa Melayu* or used both *Bahasa Melayu* and English. During this stage, none of the data was translated and was transcribed verbatim. This is to avoid losing the original meaning. This then becomes the first step in familiarising ourselves with the data.

In this study, the data analysis followed the steps highlighted by Åkerlind (2025). To begin the analysis of the data, it is important to familiarise oneself with the material by reading the transcripts thoroughly. As the interviews spanned over six months, all transcripts, especially the earlier ones, had to be re-read. Next, participants' responses to the two main questions mentioned earlier were compiled. At this stage, significant elements in the participants' answers were identified. These answers were then condensed to identify the central points of the dialogue. From here, it was then possible to create a preliminary grouping of answers. In developing the initial categories, the similarities and differences between participants' answers were examined. These categories were then compared and appropriately named. The analysis continued by re-examining the transcripts to ensure that the categories were sufficiently descriptive and indicative of the data collected. This second review of the data included modification and even deletion of some category descriptions. Repeated examination of the data is required to ensure internal consistency of the categories of description. This process of modification and data review continues until the modified categories appear consistent with the interview data.

#### 4. Findings

From the analysis of all interview transcripts, an outcome space comprising four categories of competence in baking was revealed, as shown in Table 1. From these, we can see that the categories represent four qualitatively distinct ways of experiencing competence in baking among the 25 participants, and they also reveal conceptions and misconceptions about baking. These categories are also expressed as components of a meaningful whole, where the hierarchy of logical relationships in the context of baking competence starts from Conception 1 to Conception 4.

##### 4.1 Conception 1: following a recipe, emulating a demonstration experience

Conception 1 explains that baking competence is simply the ability to follow and execute a recipe, or to emulate a demonstration by someone more experienced or knowledgeable, whether a teacher or an experienced chef. Here, the emphasis is on replicating the instructions

**Table 1.** Category of ways of experiencing competence in baking

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#### Category of ways of experiencing competence in baking

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Conception 1	Following a recipe, emulating a demonstration experience
Conception 2	Understanding the role and quality of equipment employed, the way you use it, and the importance of the quality of ingredients used
Conception 3	Modifying the recipe and the equipment used to meet consumer tastes and needs
Conception 4	Experiencing baking as a creative activity (involving all of the above) to achieve consumer satisfaction

**Source(s):** Authors' own work

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without considering other external factors that may affect the outcome of a baking product. To illustrate, these are some sample excerpts from participants categorised under this conception:

[It is important to] know the measurements of the ingredients; otherwise, if it is not . . . not accurate, the cake or pastry will not come out right. [Good chefs], as they learn from the bottom and they practice, practice, practice, they are able to estimate the amounts [in a recipe], and there is no need for them to actually measure due to their confidence (Student 3, Semester 3, April)

It must be measured, the ingredients, it must completely follow the recipe. If, if, there is too much of that, too much of this, in the end, the product won't come out right. [. . .] if one were to try, try, try again, the product will be a success (Student 7, Semester 3, April)

So, if the recipe is correct, then you will get the correct outcome. If one does not know how to read a recipe, one will not know how to measure in grams, [will not know to] add what is missing, and the product will not taste nice. It can turn out hard; the cake will not rise. Things like that (Student 10, Semester 1, April)

#### *4.2 Conception 2: understanding the role and quality of equipment employed, the way you use it, and the importance of the quality of the ingredients used*

In this category, the participants understand that, on top of being able to follow the recipe and being able to emulate a demonstration correctly, it is also critical to understand the role and the quality of the equipment used, how it is used, as well as the quality of the ingredients used in the recipe. For example, not all ovens are the same, and a baker or chef must be familiar with the tools and equipment required and adjust accordingly to achieve the desired results. This also applies to the ingredients, whose nutritional composition may vary depending on their origin. To illustrate:

Understand how the ingredients are used, the utensils. Our utensils are old, so that is a challenge. For example, the temperature control of our oven is not the same as that of a new oven. The fridge's thermostat is also not working properly. It is possible items may be frozen solid or not chilled enough. (Student 14, Semester 3, May)

Oh, when you're doing it yourself, there's also the factor of your own strength that you have to take into consideration, how long it's going to take you to roll out the dough. Take into consideration the temperature around you while you're working with the dough because, for lamination, especially for things like puff pastry, which uses lamination, butter is very important. So, you do not want the butter to leak out. You do not want the butter to be too hard. [Another example,] like how you need to put it in the fridge. You – some videos will say, okay, about 30 minutes in the fridge, but you cannot use the same time because their fridge might be colder than yours or might be warmer than yours. (Teacher 1, May)

I was given a recipe, but we cannot follow the recipe 100%. So first we try the recipe out, and then we assess the outcome. Why is it different? Why did it not rise? We know what a certain cake or pastry should look like. So why did it not turn out right? There must be something. Read the recipe and try to think what might be missing. Is it sugar, yeast, salt, or baking powder? From there, we can make adjustments (Chef 2, June)

#### *4.3 Conception 3: modifying the recipe and the equipment used to meet consumer tastes and needs*

A more complex way of understanding competence in baking is to not only focus on the product quality itself, but also to take into consideration the consumer who will consume the baking products. To illustrate:

With flavour, you can add, you can reduce. Like each person will be different, so there are some who would like it sweet, so you can add more sugar, or even vanilla essence (Student 9, Semester 3, April)

For a classic one, it is just plain cheesecake, vanilla extract. Sometimes I have made Thai tea [flavour], so I changed the flavour. I have also made chocolate ones. I think I have also made pandan and durian cheese. The same recipe, but I changed the flavour. You need to produce good bakes and be flexible in taste, and dare to challenge. Obviously, taste-wise, people love it (Teacher 5, April)

In Brunei, bread is not our main food. So, here, when we try to make it, we sometimes do not know how to make it authentic. We tried to make the bread's texture hard. Like hard rolls. However, the customers from Brunei do not like this type of bread. They would say, "What is this bread? Has it gone bad? It is too hard." The same applies to French baguettes. The people in Brunei do not like it. So, we have to understand the customers' tastes. Here, our customers prefer soft rolls; thus, we have to modify the French baguette to make it softer, so that it will satisfy our customers (Chef 3, August)

#### *4.4 Conception 4: experiencing baking as a creative activity (involving all of the above) to achieve consumer satisfaction*

A more complex way of experiencing competence in baking is to not only master the previous aspects but also to see baking as a creative pursuit, that is, to begin to manipulate and transform foundational techniques and knowledge. This category sees baking as an avenue for experimenting with new flavours, forms, and techniques to create novel products while achieving, or even surpassing, consumer satisfaction. To illustrate:

To be a competent baker, you should be open to new ideas. So, for cinnamon rolls, there were actually a lot of resting periods. So, I wanted to find a method that doesn't require as much kneading and doesn't require as much resting. So, from there, I did a lot of trial and error with temperatures, the volume of yeast to water, hydration, and how sugar levels, or different types of sugar, would affect how the yeast would actually ferment. So, there's a lot of science. How do I make it more efficient, let's say, if I want to sell it? So, from there I just modify, experiment, test (Teacher 4, March)

You have to be really vigilant with new techniques, you know, new recipes, improving yourself over time. So, you need the tongue for it as well, like you need to know how to explore different flavours and learn what flavours work well with different elements, you know, different ingredients, and all that. Don't be closed off to what you're used to. I do love creating new flavours. So, when I have something in my head, it bugs me for the longest time, and I think of ways to combine flavours together and how to make components work. Like, let's say a tart. I would think about all the different components, all the different layers and flavours that go into it, and whether it will work. You can apply that for every other thing, like for a cake, or for an éclair, or like what other things there are (Chef 5, September)

## **5. Discussion and implications**

### *5.1 Relationship between conceptions*

To explain the relationship between the conceptions, this study draws on [Marton and Booth \(1997\)](#), who argue that the experience of a phenomenon has both a referential aspect (what) and a structural aspect (how), and that these two aspects are interrelated. The referential aspect focuses on what meaning the phenomenon has, while the structural aspect focuses on how that meaning is organised in awareness ([Åkerlind, 2025](#)). [Table 2](#) illustrates how the categories of description of competence in baking were broken down. The findings show that the referential aspect of competence in baking can be categorised into three focuses, namely (1) the behaviour, (2) the product, and (3) the customer. The focus on behaviour emphasises the participant's actions, such as how a technique is executed and adherence to the recipe. A product-oriented focus centres on the quality and consistency of the baked goods, where

**Table 2.** Categories of description of competence in baking

Structural aspect (how)	Referential aspect (what)		
	Focus on the behaviour	Focus on the product	Focus on the customer
Replicating observed ways of producing a product	Conception 1		
Applying scientific understanding on the role of ingredients, equipment and environment		Conception 2	
Understanding the market trends			Conception 3
Exploring innovation and creativity			Conception 4

**Source(s):** Authors' own work

participants view competence in terms of producing a desirable outcome. Finally, a customer-oriented focus highlights the importance of meeting customer expectations, where competence is measured by customer satisfaction. For the structural aspect, the following four aspects emerged from the transcripts to how the phenomenon is accounted in terms of the structure and relationships between its parts, namely (1) replicating observed ways of producing a product, (2) applying scientific understanding on the role of ingredients, equipment and environment, (3) understanding market trends and (4) exploring innovation and creativity. These aspects demonstrate a progression in how baking is structurally understood. Together, the referential and structural aspects form a holistic picture of how competence is accounted for in the transcripts, and [Table 2](#) also shows how each category of conception fits within these aspects.

In Conception 1, participants view competence in baking as following a recipe, emulating a demonstration experience. When the referential aspect of competence is behaviour-focused, it implies that participants frame their understanding in terms of the actions they perform during the baking process. This includes following recipe instructions and adhering to step-by-step procedures as demonstrated by a teacher or more experienced chef, as suggested by the structural aspect identified in this conception. This way of experiencing competence is shaped by procedural logic, where success is based on the accuracy of one's performance, and the underlying assumption is that mastery is achieved through consistent repetition and imitation, without fully understanding the concepts of baking. This reflects surface-level engagement with the practice, where learning is situated within the bounds of behavioural conformity and procedural accuracy. This aligns with the implications of the master-apprentice model, in which, due to social hierarchy, the apprentice is generally compelled to follow the master's instructions without questioning why the task needs to be done a particular way.

Conception 2 involves understanding the role and quality of the equipment employed, how it is used, and the importance of ingredient quality. Here, the referential focus shifts towards the product, with emphasis on its specific sensory and aesthetic standards, such as texture, flavour, and appearance. Therefore, within this frame of reference, the structural aspect characterised involves applying scientific understanding of the roles played by ingredients, equipment, and environmental factors. As [Christensen and Stuart \(2019\)](#) note, deeper knowledge of food science enhances understanding of why certain steps are taken, increasing precision in culinary practice. In this instance, the participants may articulate their experience of competence in terms of their understanding of the chemical reactions that occur during baking. For example, how ingredient quality affects product outcomes, and even environmental factors during the baking process, such as humidity and temperature. This goes beyond mere imitation, with a more integrated, analytical engagement with the baking

process, where competence requires the ability to make informed adjustments to achieve a desired product within the given circumstances.

In Conception 3 and 4, competence is assumed through a customer-focused referential aspect, in which participants emphasise the needs, preferences, and satisfaction of the product's end-users. For Conception 3, being competent is tied to the ability to meet customer expectations, whether in terms of flavour profiles, dietary requirements, cultural preferences, or presentation aesthetics. This reflects a shift of focus from the product itself to an outward-looking perspective, taking into consideration the significant role of culture in food taste preferences (Wright *et al.*, 2001), as well as market trends which determine what foods are considered desirable by the target consumer. The understanding is structurally shaped by an awareness of market demands, while competence is structured by awareness of consumer preferences, industry standards, and emerging demands in the baking industry. This form of understanding reflects a more outward-looking orientation, where technical expertise is continually shaped and refined in response to evolving market contexts.

A more complex way of structurally understanding is represented in Conception 4, which develops on the notion of innovation and creativity. This conception involves the ability to generate new ideas and experiment with flavours and forms. Creativity in the culinary field can be described as a dynamic process that involves generating new ideas that combine knowledge and imagination, in which chefs leverage their experience, skills, and inspirations from various sources, which may incorporate cultures and customer feedback (Hornig and Hu, 2008). It involves exploring flavours and techniques to create a higher-quality product, pushing the boundaries of conventional baking (Martínez-Monzó *et al.*, 2013).

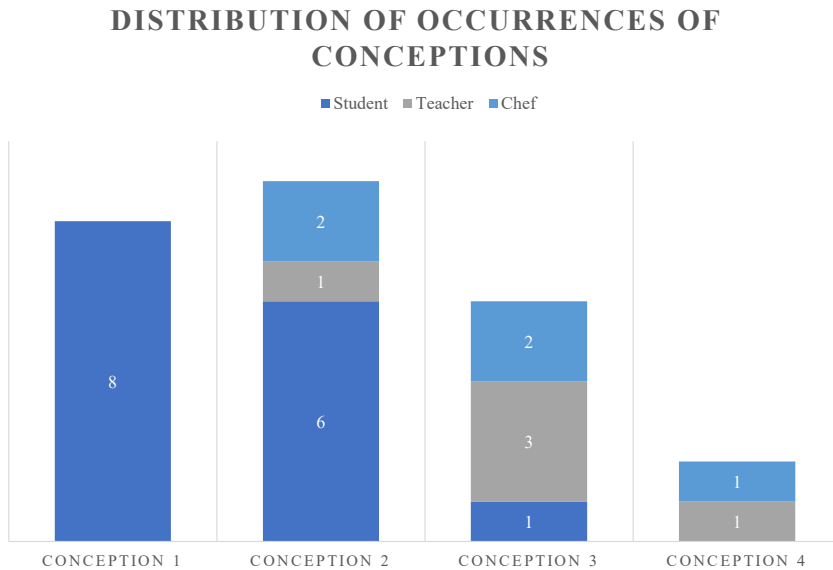
Unlike Conception 3, where competence is demonstrated through responsiveness to articulated customer needs, modifications to recipes, presentation, or flavour combinations remain guided by existing consumer expectations. Innovation at this level is largely incremental and adaptive, operating within established market parameters rather than extending beyond them. In contrast, Conception 4 reflects a generative orientation. Here, competence is expressed through the capacity to envision and create products that may precede, shape, or redefine consumer expectations. Rather than responding to demand alone, chefs anticipate possibilities. They may draw inspiration from global cuisines, seasonal narratives, or emerging trends, transforming familiar recipes into novel creations that extend the boundaries of what is expected.

The categories of description follow a logical hierarchical structure of inclusively increasing awareness, with each successive category building upon and extending the ones below it. That is, in order to have a scientific understanding of the elements required in baking represented by Conception 2, one must first be aware of the act of baking that is present in Conception 1. Moreover, Conception 3 then develops, with an added emphasis on the consumer, while also integrating scientific understanding from Conception 2, which is necessary to make adjustments to meet consumer expectations and preferences. Finally, with Conception 4, it will encompass all the features of the previous Conception, emphasising that successful outcomes from creativity and innovation in baking depend on the foundational aspects established in the previous Conceptions. Thus, Conception 4 represents the most advanced way of experiencing competence in baking, while Conception 1 represents the fundamental or foundational understanding of the phenomenon.

### 5.2 Relationship between students', teachers', and chefs' conceptions

Based on the analysis of the interview transcripts, the participants hold distinct conceptions of competence, as shown in Figure 1.

Participants' accounts were classified into categories of description derived from the data. Consistent with the hierarchical and inclusive structure of phenomenography, multiple conceptions could appear within a single transcript. However, for distributional purposes, each transcript was assigned the highest conception expressed. This finding aligns with the



**Figure 1.** Distribution of occurrences of conceptions between students, teachers, and chefs. Source: Authors' own work

objectives outlined in the baking module guide used at the college from which the student participants were drawn. The module is designed to provide a foundational understanding of pastry and bakery principles, develop the technical skills necessary to produce a variety of pastry and bakery products, and foster a basic understanding of recipe components and processes. Ultimately, the goal is to equip students to produce baked goods that meet industry standards and expectations.

It is unsurprising that the majority of students were categorised within Conceptions 1 and 2, given their limited exposure to professional baking practice. Several participants had not yet undertaken the bakery and pastry module. Differences in understanding may also reflect variation in prior experience. While some students had no industry exposure, others had working experience or had completed their industry placement. Despite these differences, students' conceptions of competence remained primarily focused on replicating techniques and achieving consistent product quality, which are characteristic of early-stage vocational learners. The only student categorised within Conception 3 demonstrated a clearer awareness of customer tastes and preferences. This participant also operated a part-time baking business, and the account presented differed from those of the other students.

Among the chefs and teachers, most were categorised between Conception 2 and 3. Chefs included in Conception 2 emphasised technical correctness and consistent achievement of acceptable product outcomes. They described a large-scale context in which uniformity and standardisation were central (e.g. large catering businesses or hotels). In contrast, chefs associated with Conception 3 articulated competence in relation to a more specialised practice, emphasising responsiveness to customer expectations and engagement in product development within smaller or independently managed contexts. A similar pattern was observed among teachers. The teacher, categorised within Conception 2, articulated competence primarily in terms of technical execution and instructional expectations. Teachers categorised within Conception 3, by contrast, foregrounded competence in relation to producing and selling baked products, drawing on their own experiences beyond routine instructional practice, such as involvement in their own business activities. What was

evident in their transcripts was a focus on being attuned to customers' feedback, not just on the product. They had control over the design of their own baked products. These differences reflect variation in how participants account for competence, shaped by their roles and practice context.

Conception 4 was the least commonly accounted for perspective among the participants. This conception was identified in only one teacher and one chef, both of whom had significant exposure beyond the local context. Their advanced training and international experience appear to have contributed to their broader, more innovative view of competence in baking. Additionally, both participants run their own businesses and are actively pioneering new trends in the local baking industry. Their entrepreneurial ventures require them to anticipate and shape customer expectations, placing them in a unique position to innovate with purpose. This suggests that such a conception of competence may be shaped by the intersection of advanced culinary education, international exposure, and real-world entrepreneurial experience, factors not typically accessible within the scope of basic TVET programmes.

*5.3 Towards a preliminary construct of baking competence*

While the categories of description reveal qualitatively different ways in which competence in baking is accounted, it also suggests a progression in how competence is constituted in practice. These conceptions allow the articulation of a preliminary construct of competence in baking derived from participants' accounts, as illustrated in Table 3. This construct does not represent directly observed competence but rather assumed competence inferred from interview data, which may require validation through assessment in subsequent learning study interventions.

The findings suggest that competence in baking involves integrating practical skills, conceptual knowledge, and professional judgement. Practical skills relate to the ability to execute the baking procedure accurately and consistently. At a foundational level, competence is accounted for as the ability to follow recipes and replicate demonstrated techniques. Structurally, this dimension is characterised by the replication of observed ways of producing a product, with participants focussing on reproducing established procedures and adhering closely to instructions.

The second component involves conceptual knowledge, referring to an understanding of baking processes and the roles of ingredients, equipment, and environmental conditions. Participants emphasise the importance of understanding how ingredient quality, equipment

**Table 3.** Preliminary construct of competence in baking derived from the categories of description of competence in baking

Preliminary construct of competence in baking derived from the categories of description of competence in baking		
Competence Component	Structural Aspect	Indicators
Practical Skills	Replicating observed ways of producing a product	Following recipes accurately; demonstrated techniques; maintaining consistency in product preparation
Conceptual Knowledge	Applying scientific understanding on the role of ingredients, equipment and environment	Explaining ingredient interactions; interpreting the function of equipment adjusting ingredients, techniques or baking conditions based on process understanding
Professional Judgement	Understanding the market trends and exploring innovation and creativity	Modifying recipes to suit consumer needs; adapting techniques; developing innovative baking products

**Source(s):** Authors' own work

usage, and environmental factors influence baking outcomes. Structurally, this dimension is expressed through applying scientific understanding to the role of ingredients, equipment, and the baking environment. Importantly, this understanding is not limited to theoretical knowledge but also involves applying it in practice, such as adjusting ratios, modifying baking conditions, or selecting appropriate equipment based on how these elements affect baking results.

The third component concerns professional judgement, which involves interpreting baking situations and making informed decisions in response to contextual demands. Participants described competent bakers as those who can modify recipes, adjust techniques, and respond to consumer preferences. Structurally, this dimension is reflected in understanding market trends and exploring innovation and creativity in baking practice.

#### 5.4 Implications for future learning study

The transition from phenomenographic research to learning study represents a methodologically coherent approach to teachers' professional development. In pedagogical practice, learning study interventions can begin by using a preceding phenomenographic analysis of the relevant object of learning from a student perspective to identify the critical aspects to focus on during the intervention (Åkerlind, 2025). The findings of this phenomenographic study can serve as a foundational step in identifying the object of learning, a core first stage in the learning study process (Kullberg *et al.*, 2024). Research in vocational education has similarly employed phenomenography to articulate the object of learning before learning study interventions (Ahlstrand, 2018; Ahlstrand and Andersson, 2021, 2024). Building on this and informed by the phenomenographic analysis, the critical aspects of the object of learning can then be identified (Thorsten and Tväråna, 2023). These critical aspects can inform the design of pre- and post-tests, which are constructed to elicit students' ways of discerning key features of baking competence before and after the intervention. During the research lessons, these aspects are deliberately varied to support movement from less integrated to more comprehensive ways of understanding (Åkerlind, 2018).

While this study does not implement a learning study, the phenomenographic outcome space offers a starting point for identifying potential objects of learning. The variation between the categories of description highlights critical differences in how competence in baking is understood. The variation between the categories of description may indicate what is critical for learning (Ahlstrand and Andersson, 2021). In this study, the outcome space also informed the development of a preliminary construct of competence in baking, expressed through the dimensions of practical skills, conceptual knowledge, and professional judgement. Together, these dimensions reflect progressively more complex ways of engaging with baking practice and provide a conceptual basis for considering what learners need to discern in order to develop competence.

Within a learning study framework, the dimensions of the preliminary competence construct identified earlier in Table 3 may inform the identification of the object of learning and its critical aspects. The present study relies on the assumed competence of baking drawing on interview accounts of participants. Given the different conceptions of competence in baking emerging from these accounts, we drew up a preliminary competence construct with its dimensions, which can be verified through a learning study. This construct provides the observable indicators to analyse interviews, which can be triangulated with other evidence, such as practical performance tasks, observational rubrics, or portfolios. Such a defined construct will enable rigorous pre-testing and post-testing, and strengthen the basis of learning study.

Diagnostic pre-tests may examine students' initial understanding of these aspects, while post-tests, using similar tasks, may indicate whether students have a more developed understanding of competent baking practice (Lo, 2012). Pre-testing and post-testing could involve performance tasks aligned to the identified dimensions of competence, such as diagnostic practical tasks, structured reflection interviews, or observational rubrics. Although

the present study does not implement such measures, it provides a conceptual foundation for future learning study interventions. Identifying and leveraging these critical aspects is therefore essential in advancing a learning study, offering both practical guidance for instructional design and a promising direction for future research that links phenomenographic analysis with learning study in culinary education.

## 6. Conclusion

We begin this paper with our research question: Using phenomenography, what are the qualitatively different ways of experiencing competence at work among apprenticeship students, teachers, and expert practitioners in baking? Drawing on Sandberg's (2000) interpretivist view of competence, the study revealed four distinct conceptions of competence in baking, such as (1) following a recipe, emulating a demonstration experience, (2) understanding the role and quality of equipment employed, the way you use it, and the importance of the quality of ingredients used, (3) modifying the recipe and the equipment used to meet consumer tastes and needs, and (4) experiencing baking as a creative activity (involving all of the above) to achieve consumer satisfaction. These conceptions of competence are used to draw up a construct that differentiates among and makes explicit components such as practical skills, conceptual knowledge, and professional judgement, which can be used in future learning studies.

From a pedagogical perspective, insights into how students conceptualise competence can help teachers design learning experiences that support progression towards more sophisticated understandings of baking practice. Approaches informed by phenomenography, variation theory, and learning study may enable teachers to identify critical aspects of the object of learning and structure instruction in ways that help students discern these aspects more effectively.

Future research may build on this work in several ways, that is by combining phenomenographic analysis with performance-based assessment methods to examine how the identified dimensions of competence are enacted in practice, by exploring how the proposed construct of baking competence can inform the design of learning study interventions, and by exploring how these dimensions can be used to develop aligned assessment approaches in culinary education. Such a defined construct will enable rigorous pre-testing and post-testing, and strengthen the basis of learning study, which provides the opportunity for assessment based on a validated framework.

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