COOKING UP CONFIDENCE: INTEGRATING CULTURAL RECIPES IN EXPERIENTIAL FOOD SCIENCE LABS

Amy Leman[1] and Sihui Ma[2]

[1]Agricultural Leadership, Education and Communications Program, University of Illinois
[2]Department of Food Science & Human Nutrition, University of Illinois

Author Note

Project funding source: This project was supported by the 2022 Faculty Retreat Grant from the University of Illinois at Urbana-Champaign and the 2022 College of Agricultural, Consumer and Environmental Sciences Teaching Enhancement Grant Program from the University of Illinois at Urbana-Champaign.
Acknowledgments: The authors want to thank Madeline G. Mertdogan for her assistance with data extraction and analysis as an undergraduate research assistant.
Correspondence concerning this article should be addressed to Sihui Ma, Department of Food Science & Human Nutrition, University of Illinois at Urbana-Champaign, 343 Bevier Hall, 905 S. Goodwin Ave., Urbana, IL 61801. Email: sihuima@illinois.edu.

Abstract

FSHN 232 Science of Food Preparation teaches the application of food science principles and techniques for preparing foods. Students unfamiliar with the food applications used in the course often lacked confidence when practicing their culinary skills and had difficulty applying the food science principles. Research continues to find that students with higher self-confidence are more likely to succeed in higher education. In our research, FSHN 232 was altered to support students more inclusively by implementing culturally diverse recipes. This research aims to determine the connection between teaching diverse recipes in a food science lab course that may match students' cultural or ethnic backgrounds and student confidence in learning. An explanatory sequential mixed methods design was used, collecting quantitative data and then qualitative data to further explain the quantitative results. The quantitative data showed that students' familiarity with the recipes and previous experience preparing them did not correlate with their confidence, except for one recipe (Cinnamon Rolls). The qualitative data showed that previous experience with cooking and recipes generally led to confidence. Learning is fundamentally a cultural process, and incorporating class contexts from diverse cultures and perspectives can engage students and help them learn.

Keywords: food science, experiential learning, student identity, inclusive education, culture

As the student body in higher education becomes more diverse, the needs of students vary, and student support expands beyond traditional academic support to address social and economic issues (Hurtado, 2007). It is critical for educators to adjust their teaching and learning practices to meet the contemporary needs of all students to better support their success.

Academic Behavioral Confidence

Research continues to find that students with higher self-confidence are more likely to succeed in higher education (Nicholson et al., 2011; Sander & Sanders, 2006; Stankov et al., 2012; Wang et al., 2018). Sander and Sanders (2006) define academic behavioral confidence as the extent to which students have a "strong belief, firm trust, or sure expectation" in their success in higher education (p. 33).

Cultural differences can influence confidence in academic settings. Lundeberg et al. (2000) found differences in self-assessments of confidence in academic settings among students from different countries. Jones and Kim (2020) reported that levels of thriving are related to academic confidence. For example, international college students were less likely to thrive than their domestic peers and had lower academic confidence. However, there is evidence that instructor practices can help build confidence. Talpade and Talpade (2020) found that course instruction

that included culturally relevant teaching practices and examples that students could identify with was related to increased academic confidence at a Historically Black University.

Cultural Identity

Identity is defined as the unique collection of someone's characteristics and qualities as a human being (Hoffman et al., 2018). Cultural identity is one of the attributes of identity, and similar to other aspects of identity, it shapes how students experience learning.

Food is located in the center of culture because it provides the essential nutrients for growth and keeping humans alive. Food can be a symbol of our cultural identities. For example, hamburgers, french fries, macaroni, and cheese are symbolic examples of American culture, while we often link burritos and tacos to Mexican culture (Klein, 2014). Our cultural identity in food relates to every aspect of how we consume food, as well as how food is chosen, obtained, distributed, prepared, served, and eaten. The affiliation of food to a particular culture usually starts to develop during childhood, and it is related to emotions and the settings in which we consume food (Kittler et al., 2016). Some settings happen in the family unit, such as food made by a family member or a child with memories of seeing family members making particular food, or the food consumed at family gatherings, holidays, and other special occasions representing family heritage.

Beyond family settings, the affiliation of food to a particular culture can also be nurtured in various social and professional environments. People learn to prepare food specific to certain cultures by working in restaurants or attending culinary training programs. Individuals often share the enjoyment and appreciation of food and its culture with friends during social interactions such as dining out. In addition, cooking shows on television and online platforms introduce the preparation techniques, history, and cultural significance of dishes to a broad audience (Brulotte & Di Giovine, 2016).

Our past experiences related to food contribute to our cultural identities in food, which impact students' experiences in learning the science of food. The Community Cultural Wealth model outlines six forms of capital that impact students' experience in college (Yosso, 2005). One is familial capital, which is developed and accumulated by students from their interactions with family and community before coming to college. Students' social experience of food is one aspect of the familial capital. Familial capital affects students' experience in two ways – it helps them learn and succeed, and influences their belongings and engagement in the college environment. Therefore, it is essential for educators to understand students' identities and design the instruction deliberately to cultivate a diverse, equitable, and inclusive learning environment in class. In food science education, incorporating context that students can relate to their cultural identities of food can be used to help students engage and learn.

Objectives

This research aims to determine if students who are familiar with recipes used in food labs are more confident in learning the associated food science principles. In order to accomplish this goal, the course food lab recipes were diversified to incorporate multiple cultural heritages. Our research objectives are to determine if (1) students who have *familiarity* with the food lab recipes have greater confidence in making the recipe and learning the food science principles, and (2) students who have *prior experience making or eating* the food lab recipes have greater confidence in making the recipe and learning the associated food science principles.

Theoretical Framework

How learning works is very complex, and numerous theories have been developed to describe the learning process. The current understanding centers learning in a holistic context with social interactions – Meaning-Centered Education (MCE). In this human-centered approach, learners create their personal meaning based on their own experiences and identities, including their cultural identity (Kovbasyuk & Blessinger, 2013).

Culturally Relevant Pedagogy (CRP) is a theoretical model that supports students' cultural identities and success. It encompasses three components: (1) student learning, (2) students' cultural competence, which means to help students develop skills to appreciate their cultural identities, and (3) students' critical consciousness, which means to help students develop skills to identify and solve societal inequalities (Paris & Alim, 2017).

Methods

Course Implementation

The FSHN 232 Science of Food Preparation course was offered as a 16-week hybrid course at the University of Illinois Urbana-Champaign in Fall 2022. This course covers the application of food preparation principles and techniques in preparing standard food products, as well as the principles of food management and their application in the planning and preparation of meals. Students receive three credit hours for the course. Most students enroll in this class during their sophomore year. The course is required for undergraduate students to graduate in Dietetics, Food Science, and Hospitality Management.

Below are the course learning objectives.

Following successful completion of this course, students will be able to:

1. Indicate the scientific principles of food preparation and selection.
2. Apply the principles in preparing high-quality standard products in a laboratory setting.
3. Understand the function of ingredients in food preparation.
4. Discuss and demonstrate proper food preparation techniques.
5. Apply safe food handling and sanitation practices.
6. Discuss sensory evaluation of foods and use to assess the standard and non-standard products.
7. Demonstrate proper measuring techniques and calculate measurement conversions within and between the Imperial and Metric Systems.
8. Identify and apply the principles of meal management to food production.
9. Explain the use of My Plate, Dietary Guidelines for Americans, and Nutrient labels in meal planning.
10. Explain and apply the steps involved in menu planning.
11. Demonstrate how to cost recipes and budget.
12. Work effectively with and be respectful of others.
13. Demonstrate good oral and written communication skills.

The course learning management system used was Canvas, and the course site included all assignments, video lectures, and instructions. Lectures were offered asynchronously online, including readings in the required textbook, Introductory Foods (14th Edition), the lab manual, recorded lectures by the instructor, and cooking technique demonstration videos from online sources. Students studied the lecture materials before attempting the weekly Pre-lab quizzes and before coming to the labs. In-person labs met twice per week for one hour and 50 minutes each in the food labs. Each lab usually consists of one experiment and one food application on the same food science principle. Students worked individually during the labs and collaborated to gather lab results for the experiments if there were multiple treatments. Students applied the food science principle in the application by preparing a meal. In Fall 2022, recipes from diverse cultural backgrounds were incorporated into the lab manual. After the conclusions of two labs each week, students also participated in a weekly discussion session, during which the instructor shared grading feedback, led the discussions of lab results, and reviewed the lab activities of the following week. After the discussions, students completed the weekly Lab Write-up quizzes. Table 1 includes the topics of the labs, the recipes from a diverse cultural background, and the food science principles involved.

In addition to the weekly Pre-lab and Lab Write-up quizzes, there were three assignments at the beginning of the semester to help students understand course expectations (the Syllabus Scavenger Hunt Quiz and the Syllabus Agreement) and to obtain safe food handling and sanitation practices (Food Handler Certificate). All enrolled students earned the certificate before participating in the food preparation labs, which started in Week 3. Throughout the semester, participation in the labs was recorded. Students were also assigned three exercises on the summary outlines of food products, in which students described the steps in preparation and the associated food science principles in each step of the food product. In addition, students worked in pairs on a Menu Project, in which they designed a one-week (5 working days, Monday through Friday) USDA-reimbursable lunch menu for an elementary school (K-5 grade students), and it was due at the end of the instructional period. At the end of the semester, students attended the Final Exam – Lab Practical. During the Lab Practical, students were assigned a random recipe, and they were evaluated on the final product quality, their meal management skills, and their understanding of the food science principles in the recipe.

Table 1

Food Science Lab Topics and Description.

Lab Topic	Recipes	Cultural background of the recipes	Food Science principle
Starch	Macaroni and Cheese	American	Starch gelatinization
Cereal	Yellow Lentil Dal	Indian	Starch gelatinization
Egg white foam	Chocolate Souffle	French	Egg white foaming
Cheese	Cacio e Pepe	Italian	Protein denaturation and cogulation
Vegetable	Breakfast Burrito	Mexican	Osmosis
Plant protein	Black Bean and Spinich Enchiladas	Mexican	Complementary amno acids
Emulsion	Elote	Mexican	Emulsion
Poultry	Asian Chicken Noodles	Asian	Protein denaturation and cogulation
Pastry	Lemon Meringue Pie	American	Lamination
Yeast bread	Cinnamon Rolls	American	Fermentation and gluten development
Cake	Angel Food Cake	American	Leavening by egg white foam

Research Design

We used an explanatory sequential mixed methods design for this project (Creswell & Plano Clark, 2018), collecting quantitative data first and then qualitative data to further explain the quantitative results. Specifically, we began by collecting and analyzing quantitative data from course assignments to determine if students reported a connection between their familiarity with the recipes and their confidence in preparing the recipes and learning the related food science principles. We used the data to develop interview questions (qualitative data) to further explore and understand students' perceptions about the connection between familiarity with recipes and confidence in preparation skills.

Participants

A total of 23 students enrolled in FSHN 232 in Fall 2022, and 21 students consented to use their assignment submissions in this study. The other two students did not give us consent to use their assignment submissions in this study; their data were not included in the study. The use of human subjects in this study has been designated exempt by our institution's Office for the Protection of Research Subjects (Institutional Research Ethics Board Protocol Number 23283). Table 2 provides a breakdown of the participants by their major and year in college.

Table 2

Participants by Major and Year in College.

Year	Dietetics	Food Science	Hospitality Management	Total
Sophomore	0	7	5	12
Junior	1	5	1	7
Senior	0	1	1	2
Total	1	13	7	21

During the course of completing their reflection assignments, students referenced their heritage. We are reporting their self-reported heritage identities to acknowledge their identities in their own words. Table 3 lists the identities of students who described themselves.

Quantitative Data Collection

In every Pre-lab quiz completed prior to each of the eleven labs, students were asked to rate how familiar they were with preparing and eating or preparing the recipe for the upcoming lab, using a seven-point Likert scale with one meaning not familiar at all and seven meaning very familiar. In every Post-lab Write-up quiz completed after each lab, students were asked to (1) rate how confident they were in preparing the same recipe on their own, using a seven-point Likert scale with one meaning not confident at all and seven meaning very confident. In addition, students were asked to (2) rate how their previous experience with the recipe influenced their learning of the food science principle involved in that application, using a seven-point Likert scale

Table 3

Participants by their Self-Identified Heritage.

Heritage		Number of Students
Asian	Asian	1
	Chinese	3
	Southern Chinese	1
	Indonesian	1
	South Korean	2
	Total	8
South American	South American	2
	Guatemalan	1
	Mexican	1
	Total	4
European	European	1
	Italian and Italian/Caucasian	2
	Total	3
Mixed	American/Filipino	1
	Chinese/Greek	1
	Midwestern U.S.	1
	Total	2
Did not reveal		3

with one meaning not helpful at all and seven meaning very helpful. Students were given the opportunity to explain their choice in the above question. Finally, students were asked to (3) give an example of a recipe they were familiar with, and that applied the same food science principle learned in the lab. In this prompt, students needed to include the name of the food and the link to the recipe or a picture of the recipe, explain why they chose this recipe in the context of their culture and identity, and how the food science principle was applied.

Quantitative Data Analysis

Data from the Pre-lab quizzes and Post-lab Write-up quizzes were analyzed in SPSS to determine relationships between variables. Prior to analysis, the Post-lab Write-up quiz question asking students to describe a recipe from their culture or identity that also used the food science principle was coded using magnitude coding (Saldaña, 2021) into three categories. The first category was In the Family, which included recipes in the following subcategories: (1) made by a relative and made by students themselves, (2) students remembered family making it, either the recipes were typical of their culture or made during holidays, or students grew up on this type of food, and (3) students ate this type of food during family gatherings. The second category was Outside of the Family, which included recipes that students learned to make in a restaurant/job, enjoyed with a friend, ate at a restaurant, or watched on cooking shows. The third category was Neither, which included answers such as the recipes were the students' favorite food, but they had not made it themselves.

Qualitative Data Collection

The results of the quantitative analysis were used to develop a set of semi-structured interview questions to further understand the students' perceptions of recipe familiarity and confidence in preparing these recipes in the future. An email was sent to all students who enrolled in the course and asked if they would take part in a virtual interview over the Zoom platform about their course experience. Recruitment took place over the summer at a time when students may not regularly check their email. Therefore, students were emailed up to four times in an attempt to schedule interviews. A total of ten students completed interviews. Interviews lasted between twenty-five minutes and forty-five minutes. Each student received a $25 Amazon gift card for participating in the interview.

During the interview, students were given a list of the recipes made during the lab course and asked to think about (1) which recipes they had experience with before the class, (2) which recipes they did not have experience with before the class; (3) how specific recipes may or may not connect to their sense of ethnic and racial identity; and (4) if the connection to the recipes influenced their confidence in preparing the recipes in the future. In addition, students were asked about other aspects of the class that either increased or decreased their confidence.

During both the class assignments and the interviews, the term "confidence" was not defined for the student. Their answers were, therefore, based on their own definition of confidence as they interpreted the questions and the term itself.

Qualitative Data Analysis

Electronically generated transcripts downloaded from the Zoom platform were reviewed and edited for accuracy. Data was analyzed by the two authors in the Dedoose qualitative data analysis program using descriptive coding for the first round (Saldaña, 2021). In the second round, data within four codes related to confidence and connection to racial or ethnic identity were analyzed to determine specific themes.

Results

Quantitative Findings

Among these students, those with Asian-related heritage were the largest group. Mean responses for each of the quantitative questions related to each of the lab activities were tabulated and are included in Table 4. On average, students reported that they were most familiar with the Cinnamon Rolls recipe and least familiar with the Yellow Lentil Dal recipe. Most students expressed confidence in making the recipes on their own after the labs, with mean responses around 5 or 6. Previous experience was most likely to impact learning when making the Cinnamon Rolls and least likely with the Asian Chicken Noodles.

Students reported a recipe using the same food science principles as utilized during class in their lab report. Table 5 includes the number and percentage of responses that came from family recipes and other sources. The food science principle related to Macaroni and Cheese had the most students reporting a recipe from their family, with 100% of students reporting that the recipe came from their family. The Lemon Meringue Pie had the least number of responses, with less than half reporting a family-later recipe.

Next, Pearson's correlations were conducted between students' confidence and familiarity with a recipe prior to the course. A moderately positive correlation was found between confidence in making Cinnamon Rolls in the future and familiarity with Cinnamon Rolls, $r(17) = 0.62$, $p < 0.01$. None of the other recipes had significant correlations between familiarity with a recipe and confidence in making the recipe, using a threshold of $p < 0.05$ for significance.

In addition, Pearson's correlations were run between students' confidence in making the recipe in the future and the extent to which previous experience with the recipe influenced learning the food science principle. A moderately positive correlation was found between confidence and previous experience in making cinnamon rolls, $r(18) = 0.56$, $p < 0.05$. None of the other recipes had significant correlations between the variables.

Finally, we ran a multiple regression on students' experience with each recipe, using confidence as the dependent variable and familiarity with the recipe prior to the course and prior experience making the recipe as independent variables. The only significant model was for Cinnamon Rolls [$F(2,16) = 23.48$, $p < 0.001$], with the model explaining 74.5% of the variance in confidence ($R^2 = 0.745$). However, only the variable of previous experience making cinnamon rolls was significant in the equation ($ß = 0.72$, $t = 4.75$, $p < 0.001$) while familiarity with the recipe prior to the course did not ($ß = 0.23$, $t = 1.51$, $p = 0.15$).

Qualitative Findings

As the quantitative findings did not offer a strong connection between previous experience with recipes and the confidence of students, we used interviews to explore students' own thoughts about what led to confidence and perceptions of the culturally relevant recipes. The descriptive data coding led to codes of "confidence in food science skills", "decreased confidence in food science skills" and "connection to ethnic and racial identities". From these codes, the following themes emerged.

Confidence in Food Science Skills

Previous experience with cooking in general led to confidence

When discussing both their own confidence and the confidence of their classmates, interviewees were most likely to suggest that past experience with cooking or baking was the best indicator of confidence. A sophomore student of Caucasian/Italian heritage said "I feel like it was just like the people that were better in the kitchen in general maybe were just like better at things." Other students described their confidence and experience with cooking techniques as follows:

Table 4

Mean Responses to Familiarity and Confidence in Recipe.

Lab Topic/Recipe	Familiarity Prior to the Lab		Confidence Making the Recipe Again		Previous Experience Impact on Learning	
	M	*SD*	*M*	*SD*	*M*	*SD*
Starch/Macaroni and Cheese	5.80	1.85	6.14	1.42	5.62	2.11
Cereal/Yellow Lentil Dal	1.75	1.45	6.52	0.87	5.52	1.97
Egg white foam/ Chocolate Souffle	3.05	2.21	5.95	1.12	5.14	2.22
Cheese/Cacio e Pepe	3.15	2.41	6.33	0.80	5.00	2.21
Vegetable/Breakfast Burrito	3.00	2.24	6.33	1.16	4.76	2.12
Plant Protein/Black Bean and Spinach Enchiladas	3.00	2.28	6.62	0.59	5.76	2.10
Emulsion/Elote	4.05	2.52	6.75	0.55	5.45	2.26
Poultry/Asian Chicken Noodles	6.14	1.42	5.76	2.00	3.58	2.50
Pastry/Lemon Meringue Pie	3.62	2.40	5.76	1.41	5.55	2.14
Yeast Bread/Cinnamon Rolls	5.00	2.15	6.50	1.24	6.40	1.54
Cake/Angel Food Cake	3.86	2.10	6.43	0.75	6.05	1.60

Likert scale from 1 to 7, with 1 = low and 7 = high.

Table 5

Students' Examples of Recipes with Similar Food Science Skills.

Lab Topic/Recipe	Recipe from Family Source		Recipe from Non-Family Source		Other	
	n	*%*	*n*	*%*	*n*	*%*
Starch/Macaroni and Cheese	20	100%				
Cereal/Yellow Lentil Dal	19	95%			1	5%
Egg white foam/ Chocolate Souffle	14	66.7%	4	19.0%	3	14.3%
Cheese/Cacio e Pepe	16	76.2%	2	9.5%	3	14.3%
Vegetable/Breakfast Burrito	16	76.2%	1	4.8%	4	19.0%
Plant Protein/Black Bean and Spinach Enchiladas	19	90.5%	1	4.8%	1	4.8%
Emulsion/Elote	12	60%	1	10%	6	30%
Poultry/Asian Chicken Noodles	16	84.2%	1	5.3%	2	10.6%
Pastry/Lemon Meringue Pie	10	47.6%	4	19%	7	33.3%
Yeast Bread/Cinnamon Rolls	14	70%	3	15%	3	15%
Cake/Angel Food Cake	15	71.4%	3	14.3%	3	14.3%

I worked with another guy and he also like, he will cook on his own too. So he also knew like, what he's doing. So me and him…every time can finish really quick, because we all know like what we are doing and then we have like good teamwork. (Sophomore, Chinese Heritage)

I was confident during like this course, entirely. I had a really good lab partner who also had culinary experience and I had just culinary experience at home, and I had taken like a cooking course before. So I had experience with knives already and with various kitchen tools just from helping out at home. And it showed between my lab partner and I and it also was recognized by the TA and the professor. And because we were working just slightly quicker than the class, we were able to be more comfortable with holding a knife or holding different potentially dangerous kitchen utensils. (Sophomore, Mexican Heritage).

Previous experience with the recipes led to confidence

In addition to general experience with cooking, experience with specific recipes or similar recipes increased student confidence. A Junior of Chinese heritage said "When I first make a food I'm not confident at all because I don't know what the products look like, I don't know if my product is like perfect or if it tastes authentic." Another interviewee talked about the recipes and the techniques in the recipes as leading to confidence:

If it was a recipe that like was really familiar to me: I was more confident. I had to make a soup and then I had to poach chicken. It was something that I knew how to make. You had to make a roux. So I was like, okay, I know how to do this, so I should be okay. (Junior, Guatamalan Heritage).

Watching video instructions prior to the lab was an impactful way for students to build confidence and come prepared to the lab

Students reported that having an opportunity to watch videos of skills that would be used in the upcoming lab was helpful going into the lab. The video provided information in a different form from the printed material and helped the students know what a well-cooked product looked like. This was especially helpful for students who had not made the recipes in the past.

There were like additional videos added…not necessarily like somebody making the food but it would just be like…basic preparation of maybe certain vegetables or like meats or whatnot. So at least like although there wasn't a video of like, the exact recipe being like, made, there were like videos where maybe for example, the Asian Chicken Noodles there will be at least like a video of how to prepare and cook the chicken. (Sophomore, South Korean Heritage)

The instructor actually posted like a YouTube video… how to make some of the dishes, or like tips to make some of the dishes…I would watch that so that at least like when I start working in the kitchen, I already know a little bit about it and I will be more confident when making it. So I guess that also helps, especially when I'm making dishes I've never heard of before. (Sophomore, Indonesian Heritage).

Cultural Aspect of Recipes

Very few students connected the class recipes to their own ethnic or racial identities

While the names of recipes may have seemed relevant at first, when the students reviewed the recipe, it was not as similar to their own experience as they may have thought. One student explained that as part of a mixed Mexican and Puerto Rican household, the filling they were familiar with in Enchiladas and Burritos was different. Another student explained:

There were other students that had like, they talked about how they made the recipe at home versus how they like, how they were supposed to make it in class. So it was interesting to see how they would make it and how they had to make it in class… They just like did a few things differently or they use like different types of ingredients or materials for the recipes and they said that they prefer the one they make at home obviously than the one they made in class just because it was different. (Junior, Guatamalan Heritage).

The limited connection was especially true of the Asian Chicken Noodles recipe. As a sophomore student of Indonesian heritage explained, "For the Asian Chicken Noodles, like my mom would like to use some Indonesian spices in it, I guess. We have like an Indonesian sweet soy sauce, we would use that in our noodles." Another student described their reaction to the Asian Chicken Noodles as follows:

The words Asian Chicken Noodles, I could identify, I think, but just because of the way we made them was not at all something I could relate to that, that kind of takes it away. But the words make me think, oh, I'm, you know, I could identify with that. (Junior, Chinese Heritage).

Cinnamon rolls were the recipe most familiar and most liked by students, regardless of racial or ethnic identity

Of the ten interviewees, six reported that they were familiar with making Cinnamon Rolls before the class. One of the four students who were not familiar with Cinnamon Rolls prior to class said that at the end of class, the Cinnamon Rolls were their favorite recipe. The second student who said they were not familiar with making Cinnamon Rolls stated, "I hadn't ever made Cinnamon Rolls. I've eaten them plenty." Of the four students who were not familiar with Cinnamon Rolls, two identified as having Chinese heritage, one as Indonesian, and another as a Midwesterner.

While students of multiple ethnic identities discussed their familiarity with Cinnamon Rolls, students did recognize that for many, Cinnamon Rolls were related to past memories. As one student who was not previously familiar with making Cinnamon Rolls stated:

I think there were a lot of people who, you know, had good memories, making pie, Mac and Cheese, Cinnamon Rolls, these are all things that a lot of the class had grown up with and so there was a lot of excitement there. (Junior, Chinese heritage).

Discussion

Confidence did not seem related to the cultural connection of the recipes used in the course, however, there are too many cultural variations of each dish to connect to every specific culture. Although it may not be possible for instructors to include all of the cultures worldwide in courses, it is an inclusive pedagogy practice to survey students and try to incorporate various cultures that students represent in course materials (Mensah & Larson, 2017). It is also important to communicate the broad breadth of cultures with students to embrace and acknowledge that not all cultures are represented in the courses (Green et al., 2023).

In our study, confidence came from previous cooking experience in general. Many students major in food science because of their passion for food and cooking growing up. They are more likely to have food preparation experience than non-food science students. Often the food preparation experience came from their family, as linked to the familial wealth of the Community Cultural Wealth model (Yosso, 2005). However, in some cases the experience came from previous jobs.

To help students increase their confidence, instructors can harvest their previous cooking experience and facilitate the connection between their previous cooking experience and learning in the course. Open-ended questions, such as "What do you know about…" are inviting and low-stakes for students to gather their previous experience (Boud, 1993). Another approach is to ask students to come up with an example of the recipe in which the same food science principle was applied in the Pre-Lab quiz. These questions will encourage students to find something they are familiar with after being introduced to the food science principle and the recipe they will make in the lab. Implementing the experiential learning cycle will help students learn the principles of food science (Bohn and Schmidt, 2008).

In addition, we can add students' experience prior to them preparing the food applications by demonstrating. When time and resources allow, instructors and teaching assistants can prepare food in class to show what the standard high-quality food should look like and the proper cooking techniques. Alternatively, using online resources, such as videos from professional chefs, is also helpful. Instructors should be aware of the anxiety of perfectionism that can arise in students with little to no cooking experience after watching the culinary skills of professional chefs. To help students ease the stress of learning, instructors can clarify the learning objectives and expectations, introduce a growth mindset, and emphasize the value of learning from mistakes (Schmidt, 2019).

Students in the course were very likely to respond that they were familiar with cuisine considered American, such as macaroni and cheese, mentioned by Klein (2014), even if they did not identify as part of American heritage. While the authors hypothesized that the American cuisine may not be as familiar, the course participants proved the hypothesis wrong. Their experience in the United States had given them access to these traditional foods, so they were not new when introduced in class.

There are several limitations to our study. The class enrollment contributed to the small sample size. Further studies can be conducted in the same class over several semesters to capture the experience of more students. Also, the recipes of diverse cultural backgrounds did not capture all cultural variations. In the future, instructors can start building a pool of recipes from various cultural backgrounds, survey students about their cultural backgrounds before the course starts, and try to include recipes that match the students' cultural backgrounds for a specific cohort/semester. Another limitation is that this study only explored students' confidence in one course instead of a longitudinal monitoring of students' confidence after graduation. Continual studies on students' confidence in their professional careers could bring us insights into the impact of pedagogical practices on students' career success.

Despite the limitations, this research adds to the knowledge of the connection between confidence in cooking skills and cultural identities. Even though the attempt to add more diverse recipes to the food science course did not seem to increase the confidence of students, it was a way to create a more inclusive environment. Learning is fundamentally a cultural process, and incorporating class contexts from diverse cultures and perspectives can engage students and help them learn. As one student in their senior year with a Guatemalan family said, "It's just nice knowing, like going into the class and knowing like, oh, I've made this before, so you know you have an idea of how to do it."

Summary

Confidence did not seem to be related to the cultural connection of the recipes; however, there are too many cultural variations to connect to every specific culture. Very few students connected the class recipes to their ethnic or racial identities. While the names of recipes may seem relevant at first, when the students reviewed the recipe, it was not as similar to their own experience as they may have thought. While one course cannot include all potential cultures in the recipes, offering a variety increases the likelihood that students will connect. Previous experience with cooking and with the recipes in general led to confidence. Watching video instructions prior to the lab was an impactful way for students to build confidence and come prepared for the lab.

References

Bohn, D.M. and Schmidt, S.J. (2008). Implementing experiential learning activities in a large enrollment introductory food science and human nutrition course. *Journal of Food Science Education*, 7: 5-13. https://doi.org/10.1111/j.1541-4329.2007.00042.x

Boud, D. (1993). Experience as the base for learning. *Higher education research and development, 12*(1), 33-44.

Brulotte, R. L., & Di Giovine, M. A. (Eds.). (2016). *Edible identities: Food as cultural heritage.* Routledge.

Creswell, J. W., & Plaon Clark, V. L. (2018). *Designing and conducting mixed methods research*, (3rd ed.) Sage Publishing.

Green, B., Bruce, J., McKee, K., Morgan, J., & Edwards, H. (2023). Strategies for diversity & inclusion: A case study of faculty decision making. *NACTA Journal, 66*(1). https://doi.org/10.56103/nactaj.v66i1.32

Hoffman, J., Blessinger, P., & Makhanya, M. (Eds.). (2018). *Perspectives on diverse student identities in higher education: International perspectives on equity and inclusion.* Emerald Group Publishing.

Hurtado, S. (2007). Linking diversity with the educational and civic missions of higher education. *The Review of Higher Education 30*(2), 185-196. https://doi.org/10.1353/rhe.2006.0070

Jones, A. H., & Kim, Y. K. (2020). The role of academic self-confidence on thriving among international college students in the U. S. and Canada. *Journal of Underrepresented and Minority Progress, 4*(2), 165-191. https://doi.org/10.32674/jump.v4i2.2196

Kittler, P. G., Sucher, K. P., & Nelms, M. (2016). *Food and culture.* Cengage Learning.

Klein, J.A. (2014). Introduction: Cooking, cuisine and class and the anthropology of Food. In J. A. Klein & A. Murcott (Eds.), *Food Consumption in Global Perspective.* (pp. 1-24). Palgrave Macmillan. https://doi.org/10.1057/9781137326416_1

Kovbasyuk, O., & Blessinger, P. (2013). The nature and origins of meaning-centered education. In O. Kovbasyuk & P. Blessinger (Eds.), *Meaning-centered education* (pp. 3-23). Routledge Publishing.

Lundeberg, M. A., Fox, P. W., Brown, A. C., & Elbedour, S. (2020). Cultural influences on confidence: Country and gender. *Journal of Educational Psychology, 92*(1), 152-159. https://doi.org/10.1037//0022-0663.92.1.152

Mensah, F. M., & Larson, K. (2017). A summary of inclusive pedagogies for science education. *The National Academies of Sciences, Engineering, Medicine.*

Nicholson, L., Putwain, D., Connors, L., & Hornby-Atkinson, P. (2013). The key to successful achievement as an undergraduate student: Confidence and realistic expectations? *Studies in Higher Education, 38*(2), 285-298. https://doi.org/10.1080/03075079.2011.585710

Paris, D., & Alim, H. S. (Eds.). (2017). *Culturally sustaining pedagogies: Teaching and learning for justice in a changing world.* Teachers College Press.

Saldaña, J. (2021). *The coding manual for qualitative researchers* (4th ed.). Sage Publishing.

Sander, P., & Sanders, L. (2006). Understanding academic confidence. *Psychology Teaching Review, 12*(1), 29-42. https://doi.org/10.53841/bpsptr.2006.12.1.29

Schmidt, S.J. (2019). Rethinking our approach to mistakes. *Journal of Food Science Education, 18*, 76-77. https://doi.org/10.1111/1541-4329.12172

Stankov, L., Lee, J., Luo, W., & Hogan, D. J. (2012). Confidence: A better predictor of academic achievement than self-efficacy, self-concept, and anxiety? *Learning and Individual Differences, 22*(6), 747–758. https://doi.org/10.1016/j.lindif.2012.05.013

Talpade, M., & Talpade, S. (2020). Sankofa scale validation: Culturally relevant pedagogy, racial identity, academic confidence, and success. *Journal of Instructional Pedagogies, 23*, 1-12. https://files.eric.ed.gov/fulltext/EJ1241943.pdf

Wang, C., Harrison, J., Cardullo, V., & Lin, X. (2018). Exploring the relationship among international students' English self-efficacy, using English to learn self-efficacy and academic self-efficacy. *Journal of International Students, 8*(1), 233–250. https://doi.org/10.32674/jis.v8i1.163

Yosso, T. J. (2005). Whose culture has capital? A critical race theory discussion of community cultural wealth. *Race ethnicity and education, 8*(1), 69–91. https://doi.org/10.1080/1361332052000341006