

# Exploring the Digital Shift: Teachers Information Communication Technology (ICT) Innovations in Culinary Education and their Challenges

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**Abstract.** The research aimed to explore Information and Communication Technology implementation within Technical-Vocational-Livelihood Culinary Education by examining teacher responses toward digital adaptation in their new learning environment. The research design followed a qualitative phenomenological approach to study ten (10) culinary educators at Tagum City National High School based on the Technology Acceptance Model (TAM) and Constructivist Learning Theory. Multiple in-depth interviews served as the data collection method, and the researchers analyzed information using the Colaizzi methodology. The research demonstrated that ICT delivers powerful benefits to accessibility to teaching methods and student engagement. Still, teachers confront obstacles from inadequate technological infrastructure, inadequate education opportunities, and reluctance toward educational shifts. Educators showcase their resilience by embracing self-learning opportunities, teaming up with others, and implementing creative approaches to their work. The research confirms the power of ICT in culinary education enhancement by recommending sustained professional development and institutional support to achieve maximum integration. The study delivers important recommendations that benefit TVL education through ICT enhancement for educators, administrators, and policymakers.

## KEY WORDS

1. ICT innovation   2. Home Economics   3. Digital Shift

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## 1. Introduction

Humans consume food as it is part of their being to survive, and food consumption has people behind every edible item. Culinary education significantly impacts the sustainability of culinary professionals and chefs in aspiring careers. At a time of globalization and technology in an ever-evolving world, the culinary arts have moved beyond traditional cooking techniques to adapting innovative methods that fuse all kinds of cuisines, sustainability practices, and modern dining trends. The food industry evolves rapidly, so schools have to evolve, too, to produce students ready for a new, different-day experience. Information and communication technology has been widely integrated into education, utilizing a wide range of tools and platforms, such as online learning environments and digital resources, to assist educational technologies in enhancing student performance by enabling an interactive approach. The ICT of-

fers a range of instructional opportunities in the culinary education system to students who can be trained with enhanced accessibility to varied and more extensive learning materials, collaborated activities where students work alongside peers and industry experts, and engaged learning through simulations. Nevertheless, the use of ICT in culinary education also presents not only opportunities but equally major challenges. This may include limited resources, insufficient training for instructors, and the resistance to change of faculty and students. Also, differences in digital literacy levels may hinder effective implementation, widening the gap between educational outcomes. In discussing the challenges of integrating technology into the culinary education curriculum, Kandel (2022) states that ICT creates opportunities and challenges in the education sector. Their study in Nepal revealed that the integration of ICT in education has been prioritized by many countries in the world, integrating ICT in education systems to replace the traditional pedagogy and offer relevant knowledge and skills to students and teachers to better survive in contemporary information society. Also, in Nigeria, students equipped with Home Economics knowledge and digital literacy skills will be prepared for the future, becoming informed consumers, responsible family members, and innovative contributors to society. Ultimately, ICT integration has the potential to transform Home Economics into a dynamic and engaging learning experience, empowering individuals and society to thrive in a technology-driven world (Oluwagbemileke, 2024). Thus, globally speaking, the educational competency of students is enhanced due to the integration of ICT in technical and livelihood education, specifically in culinary education. In the national context, Calanog et al. (2021) indicate that teachers in the Province of Batangas must strengthen their skills in apply-

ing various teaching strategies. They must also attend more TLE-focused training and improve their ICT skills for lesson integration. A competency management program was developed to enhance the level of competencies of TLE teachers. This would facilitate the integration of information communication technology and the conventional approach to home economics education. Hero, J. L. Obando Montessori, Inc. (2020) recommended that the school provide more training and professional development programs for their teachers to be more prepared and equipped for ICT integration in education and further unfold their ICT integration practices in teaching. In a Junior High School in the Division of General Santos City, ICT teachers taking prominent roles in implementing the program where learners were encouraged to participate in class. They maximize the teaching-learning process despite a gap in the facility maintenance and upgrading software and internet connection as hindering factors in delivering better educational services. While computers were provided, not all learners could use or access them. While ICT teachers were guided by the curriculum guide with the competencies required as their legal framework, they have not established standardized modules. They only relied on the available resources on the internet Brasileño Bidad (2021). The study of Bowman et al. (2020) demonstrated how important it is for school heads and master teachers to encourage a positive attitude and offer ongoing professional development and support to help teachers use ICT more effectively and improve students' learning. Educators today must adjust to both conventional and modern teaching and learning methods. Incorporating ICT into the classroom is a revolutionary step in upgrading the educational system. This measure would benefit teachers and pupils in their day-to-day school activities.

*1.1. Purpose of the Study*—This study explored the digital shift in culinary education by examining the effectiveness of current information and communication technology (ICT) innovations. Technology integration in educational settings has transformed traditional teaching methods, offering new opportunities for enhancing learning experiences. In the culinary field, these technological advancements can provide a dynamic approach to instruction, allowing students to engage with materials innovatively. However, alongside these advancements, educators face numerous challenges in adapting and incorporating new technologies into their curricula. This research seeks to identify these challenges and propose strategies to overcome them, ultimately contributing to the effectiveness of culinary educational programs. To achieve these objectives, the study focused on several key areas. First, it investigated the ICT innovations currently used within culinary education, such as online learning platforms, virtual simulations, and mobile applications. By evaluating the effectiveness of these tools, the research assessed how well they meet the needs of students and educators alike. Second, it identified educators' challenges in implementing these technologies, including resistance to change, lack of training, and infrastructural limitations. Finally, the study proposed strategies for overcoming these obstacles, aiming to provide practical recommendations for educators seeking to enhance their teaching methods through technology. This aims to answer the following question:

*1.2. Research Questions*—

- (1) What are the experiences of teachers in integrating ICT in TLE/TVL - culinary education?
- (2) How do they cope with the challenges of integrating ICT in TLE/TVL - culinary education?
- (3) What insights can be drawn from integrating ICT in TLE/TVL - culinary education?

*1.3. Significant of the Study*—The study entitled Exploring the Digital Shift: Teachers' Information and Communication Technology (ICT) Innovations in Culinary Education and Their Challenges highlights several meaningful benefits for educators in the culinary field. Teachers For teachers, this study sheds light on how ICT can play a powerful role in improving both teaching and learning. It shows that when digital tools are thoughtfully integrated into the curriculum, students can develop important practical skills in ways that feel more engaging and connected to real-world experiences. Teachers gain clearer insights into where students learn best, helping them make better decisions about how to design lessons and adjust their teaching approach. The findings also point to the importance of experiential learning—encouraging teachers to include more hands-on, activity-based strategies in the classroom. Technology doesn't just make lessons more dynamic; it can also make teaching easier, more flexible, and more enjoyable. In the end, ICT can help create a more interactive and inspiring classroom environment, where students are more involved and learning becomes more meaningful for everyone.

*1.4. Theoretical Lens*—This research anchored the Technology Acceptance Model (TAM) by Fred Davis in 1989. TAM is an influential information system model that explains how users accept and use technology. The model suggests that two key factors, perceived usefulness and perceived ease of use, influence a person's intention to use a technology, affecting their actual usage. In culinary education, understanding teachers' and students' acceptance of ICT tools can provide insights into their adoption and integration into the cur-

riculum. This model can help identify factors that enhance or inhibit the effective use of ICT in culinary training. In culinary education, understanding teachers' and students' acceptance of ICT tools can provide insights into their adoption and integration into the curriculum. This model can help identify factors that enhance or inhibit the effective use of ICT in culinary training. The Technology Acceptance Model (Davis, 1989), or TAM, posits that two factors determine whether a computer system will be accepted by its potential users: (1) perceived usefulness and (2) perceived ease of use. The key feature of this model is its emphasis on the perceptions of the potential user. That is, while the creator of a given technology product may believe it is functional and user-friendly, it will not be accepted by its potential users unless they share those beliefs. This study also anchored Constructivist Learning Theory by Jean Piaget in 1930, later developed by Lev Vygotsky; this theory posits that learners construct knowledge through their experiences and interactions with the world. According to ELM (2024), Constructivism in education is an approach that focuses on allowing students to construct their understanding of a subject by actively engaging with the material presented to them. This theory emphasizes learner-centric approaches where students take ownership of their knowledge and experiences as they progress through a course

or program. It encourages exploration, experimentation, collaboration, critical thinking, and reflection—all essential components of effective education systems today. In culinary education, ICT can facilitate constructivist learning by providing interactive simulations, online resources, and collaborative platforms. This allows students to engage in hands-on learning experiences while exploring digital tools. Figure 1 presents the conceptual framework of the study. It shows three interconnected working themes. The experiences of educators in integrating ICT into education, specifically in culinary, a qualitative inquiry that allows researchers and teachers as well as learners to provide the necessary skills, knowledge, and focus on engaging in meaningful inquiry about their professional practice would enhance this practice and effect positive changes concerning the educative goals of the learning in integrating ICT into education. There was a genuine concern, as could be viewed with the first circle, which interlinks to the second circle, which is about the coping mechanism of educators in integrating ICT into education, specifically in culinary. However, the center of the two circles determined that there was a way of Insights of educators to integrate ICT into education, specifically in culinary, a way of teaching and learning development that is very critical to students' success.

## 2. Methodology

This chapter described the research design, philosophical assumptions, research participants and sampling, the researcher's role, the study's trustworthiness and ethical considerations, research instruments, data collection, and data analysis. The three most common qualitative methods were participant observation, in-depth interviews, and focus groups. Each method was particularly suited for obtaining a specific type of data. Participant observation was appropriate for collecting data on naturally occurring behaviors in their usual contexts. In-depth Interviews (IDI) were optimal for collecting data on individuals' histories, perspectives, and experiences, particularly when exploring sensitive topics. Focus groups were influential in eliciting data on a group's cultural norms and generating broad overviews of issues of concern to the cultural groups or subgroups represented. Patton (2002) as cited by Oltmann (2016) defined phenomenology as an

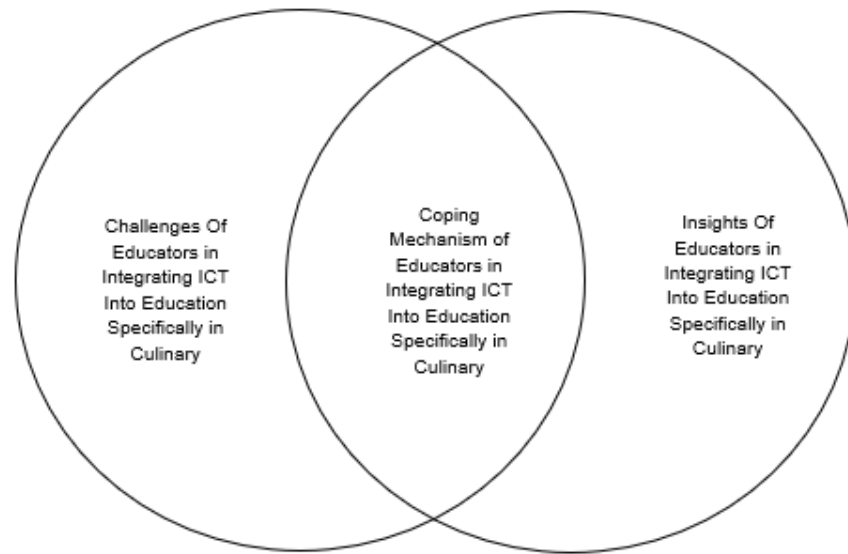


Fig. 1. The Conceptual Framework of the Study

inquiry that asks,” What is the structure and essence of the experience of his phenomenon for these people?” The goal of this research aligned well with this definition in trying to understand the challenges of the floating teachers. Giorgi, A. (2009) also cited by Englander (2025) cautioned researchers to be prepared for an investigation greater in depth and breadth than the offered description implied. He suggested that information be viewed as only the tip of the iceberg.

**2.1. Philosophical Assumptions**—The study’s philosophical assumption was a framework for gathering, analyzing, and interpreting data in a specific study area. It provided the context for decisions and conclusions that followed data interpretation. The standard philosophical assumption types were further elaborated below. Ontology pertained to how the issue being researched related to the nature of reality. Khalifa and Khalifa (2024) stated that qualitative research assumed multiple beliefs and realities ontologically. Moreover, the article also stated that researchers embraced the idea of multiple realities as they implemented qualitative research, intending to report these multiple realities. Also, the article asserted that researchers use the participants’ quotes and themes from their responses to provide evidence of different viewpoints and realities. In this study, the researcher utilized the participants’ voices and interpretations, drew from extensive quotes and

themes mirrored in their statements, and offered evidence of various viewpoints. Moreover, the participants’ answers underwent coding and analysis to determine the cohesion and discreteness of different responses. The researcher also ensured that the participants’ responses were carefully coded to ascertain the result’s reliability, that the responses were authentic, and that personal prejudices were avoided as the research study advanced. Epistemology referred to the nature of the relationship between the subject and the researcher. Additionally, it was essential to understand how knowledge claims were supported by maintaining close contact with study participants to get firsthand data. In Khalifa and Khalifa’s (2024) article, it is stated that a qualitative research’s epistemological assumption was that the acquisition of knowledge relies heavily on the quality of interaction with the research participants. It also asserted that knowledge is known through

people's subjective experiences. The study assumed that the researcher interacted closely with the participants to obtain firsthand information about the inquiry. Axiology Axiology dealt with the role of value in the research. Hence, it referred to what was considered correct (Khalifa Khalifa, 2024). Moreover, the article by Khalifa and Khalifa (2024) asserted that the axiological assumption of qualitative research was that the researcher's assumptions and values impacted the research study's design and questions. It also claimed that researchers acknowledged that research was value-laden and that biases were present in a research study. In line with this, the researcher ascertained to uphold the dignity and value of every participant's data gathered. Additionally, the researcher recognized and understood the personal and value-laden nature of the information collected in the study. Moreover, the researcher preserved the value of the participants' answers and carefully understood them in light of the participants' interpretation. Rhetorical Rhetoric is defined as reporting re-

ality in the research participants' eyes. Instead of internal and external validity and objectivity, the researcher employed personal voice and qualitative concepts like credibility, transferability, dependability, and conformability. The researchers utilized a qualitative research method using phenomenology to investigate the perceptions and challenges of culinary teachers in integrating ICT into culinary education. According to Badil et al. (2023), Phenomenology was an interpretive model inquiry method; it was also best recognized as the science of the essence of perception and consciousness, which explained the concepts and significance of individuals lived experiences. Moreover, Phenomenology was also defined as a research method that aimed to capture the essence of a phenomenon by investigating it from the viewpoint of those who experienced it. Describing the meaning of these experiences was the goal of phenomenology, considering what was experienced and how it was experienced (Neubauer et al. 2019).

**2.2. Qualitative Assumptions**—A qualitative phenomenological approach was used in the study. This study also utilized an in-depth interview research technique for data collection. An in-depth interview was a qualitative research technique used to acquire thorough information on an individual's experiences, perspectives, and feelings regarding a certain topic (Rutledge Hogg, 2020). Additionally, Osborne and Grant-Smith (2021) described in-depth interviews as a popular research technique in qualitative research that emphasized depth of un-

derstanding over factual or abstract data. Interviews in qualitative research were typically conducted by a researcher asking one or more participants general, open-ended questions and recording their answers. The phenomenological method emphasized examining how a phenomenon has affected a person. This method focused on the specifics and accurately identified a phenomenon that a person observed in a specific setting. It was also used to detect behavior patterns in a group of individuals (Srivastava, 2023).

**2.3. Design and Procedure**—The study implemented a qualitative research design through phenomenology. This type of research design generated interpretations that describe the participants' experiences. Depending on the

circumstances, the participants were requested to participate in a focus group discussion that will be done virtually or face-to-face. Afterward, themes and common patterns from the participants' responses were extracted and ana-

lyzed. The researcher chose this research design as she focused on teachers' experiences in integrating ICT in culinary education. The data that were gathered were recorded, transcribed, and validated to extract first-hand experiences on the effectiveness of integration, challenges in integration, and possible solutions in integrating ICT into culinary education. Moreover, the collected data were analyzed using the Colaizzi data analysis method in phenomenological research. Notably, the participants signed an informed consent form before the start of the data collection process, assuring them that there is no risk in this study. They also had the option to withdraw as a participant in the study if they deem it uncomfortable. Lastly, ethical considerations and safety health protocols were followed. Qualitative research was a method that seeks to understand human experiences, beliefs, and behaviors through non-numerical data (Singh, 2021). It is especially suited for researching complex issues and responding to 'why' questions. When using qualitative methods, the goal is not to obtain representative statistics but rather a more holistic understanding of each case (Tandon, 2021). Document studies, observation, interviews, and focus groups are standard qualitative data collection methods (Busetto et al., 2020). Moreover, according to Creswell (2019), the data were read repetitively and culled for common phrases and experiences after the data collection. These phrases were then grouped in clusters to form themes and meanings. In line with this, the researcher constructed universal meanings of the event, situation, and experience, hence arriving at an in-depth understanding of the

phenomenon. In this study, the researcher utilized a Semi-structured Interview Guide Question Tool with probing questions for a more in-depth interview. The tool was used as a guide while interviewing the qualified participants for this research. The interview process was audio-recorded for transcription and interpretation. The interview questions aimed at answering the research questions were used to provide additional inputs from the participants that will help generate meanings and themes for this study. The researcher sought help from research experts to address the validity issues of the researcher's design and methodology. Experts also checked and validated the interview guide research tool. The sampling used to select the research participants was based on the suggestions of the research panels. Moreover, the researcher used a referral system to identify qualified teachers to be participants based on set criteria. The sampling method used was purposive sampling. Nikolopoulou (2022) stated that "purposive sampling" was a set of non-probability sampling techniques that included selecting sample units depending on the possession of attributes. He explained that purposive sampling relied on the researcher's judgment in determining which individuals, circumstances, or events would produce the most valuable data for accomplishing the study's objectives. In other words, it involved choosing units "on purpose." Moreover, the identity of the participants was strictly valued and respected under the "ethics of research." Hence, the researcher's interaction with them remained strictly professional and upright.

*2.4. Research Participants*—The critical informants of this study were educators of technical-vocational livelihood education—culinary education. The researcher identified ten (10) Tagum City National High School

teachers as qualitative participants in an in-depth interview (IDI), who were purposely selected. The informants had been teaching TVL—culinary education for three or more years and have been integrating ICT tools and

strategies. The researcher utilized a purposive sampling design since the participants were chosen based on the criteria or purpose of the study. Purposive sampling is a technique in which par-

ticipants are selected based on specific characteristics relevant to the study's objectives (Andrade, 2020).

**2.5. Ethical Considerations**—Ethical considerations were vital in the design of this research study. The researcher considered several ethical issues about the group of research participants addressed in this fieldwork. Moreover, Ethical considerations were identified as one of the critical parts of the research. Hence, the researcher adheres to these considerations to promote the aim of a research study of imparting factual knowledge and truth and being free from biases. Social Value Research had the potential to improve social living. In this study, the societal value was focused on the perceptions, beliefs, and challenges of culinary education teachers in integrating ICT. The teachers' perceptions and difficulties in integrating ICT into culinary education were the social issues that piqued the researcher's interest. The results of this study could be used as a foundation by higher authorities to develop more initiatives and policies that would assist students and improve learning. **Informed Consent** All participants received an informed consent form before the interviews were scheduled, and the phenomenological research procedure began. A signed personal acknowledgment, consent form, and declaration of interest in participating in the study were required from each participant. The informed consent letter served the following functions: introduced the research project, provided contact details, explained the study's goal, requested voluntary participation, and listed the expected information that informants would provide. Before a participant was involved in this study, they were required to sign the consent letter and return it to the researcher. **The Vulnerability of Research Participants** The participants in this study were considered capable of responding to the re-

search instrument, for they were regarded to be the primary source of information. Therefore, the researcher assured them that they can easily be contacted through their contact number and address if there were clarifications or questions about the study. **Risks, Benefits, and Safety** All respondent recruitment was conducted without coercion, undue influence, or inducement. In addition, if the respondents experienced any discomfort or inconvenience while answering the questions, they were not obligated to participate in any way. The researcher also ensured the respondents' safety during the survey and interview. Hence, the in-depth interviews were conducted in safe venues and administered at convenient times. The primary ethical concern of this research was the Treaty Principle of Protection, which was reflected in respecting participants' rights to privacy and confidentiality and minimizing risk. This was achieved by assigning each informant a pseudonym to ensure they were not identified. Any potential risks inherent in the study were minimized by taking all reasonable steps to guarantee participant confidentiality.

#### Privacy and Confidentiality of Information

This study adhered to the Data Privacy Act of 2012 to ensure that the data could not be traced back to their real sources, thereby protecting the participants' identities. Therefore, the utmost care was taken to maintain the anonymity of the data sources. Moreover, any printed output derived from this study was kept anonymous. All related issues were given due consideration to prevent any conflict of interest between the researcher and the respondents. Any misleading information and biased presentation of primary data findings were avoided. **Justice** The respon-

dents were informed about the researcher's role and their corresponding role during data gathering. They were briefed that they needed to respond honestly to the interview questions. All communication regarding the research was conducted with utmost honesty. Lastly, they were informed that they would be the first to benefit from the study's results. Transparency To ensure research transparency, the study's findings were made accessible to the respondents and school heads after the research publication. The results were placed in a flash drive or other storage devices upon the researcher's request. By learning from the study results, culinary education teachers became aware of the significance of the study and its contribution to their well-being. In addition, every participant was informed that they had the right to withdraw their participation at any time prior to the closure of the data collection period. They were also told they could request to inspect their interview transcript after the interview was conducted. Furthermore, participants were allowed to rectify or delete any data or information they deemed potentially identifying. The rights to use pseudonyms, change names, and modify nonsignificant dates in the interest of protecting the participants' identities during follow-up data analysis and reporting were reserved by the researcher. Qualification of the Researcher The researcher possessed the necessary qualifications to conduct the study. The researcher had completed all the academic requirements, had passed the comprehensive examination, and was in the process of completing a thesis to obtain a master's degree. The researcher was

deemed qualified to conduct the study physically, mentally, emotionally, and financially. Moreover, the advisee–adviser tandem ensured the study's successful completion. Adequacy of Facilities The researcher strove to complete the study within the specified time frame and had the necessary resources. In addition, the research panel could have improved the paper further by providing the needed suggestions and recommendations. Furthermore, the researcher had to ensure they had enough funds to continue and finish the research.

#### Community Involvement

The researcher respected the participants' local traditions, culture, and views in this study. Further, this study did not use deception at any stage of its conduct, particularly in recruiting the participants or data gathering techniques. The researcher also felt that it was necessary to mention his great pleasure in whole-hearted participation in this study. Plagiarism and Fabrication as the researcher The researcher respected other works by adequately citing the author and rewriting what someone else has said in their way. Moreover, the researcher understood the context of a study and avoided copying and pasting text verbatim from the reference paper. In addition, the researcher always used quotes to indicate that the text has been taken from another paper. Also, the researcher ensured that there is honesty in working on the manuscript and that there are no intentional misrepresentations in the study and fabrication of data and results nor purposefully putting forward conclusions that were not accurate.

*2.6. Role of the Researcher*—The researcher first created a letter asking permission from the Schools Division Superintendent. After this, another permission letter was secured and submitted to the participants. Upon approval, the forms were used in the data collec-

tion as prescribed in the qualitative design. This study recorded an in-depth interview via a focus group discussion. The researcher needed to obtain subjective interaction between the study participants. The researcher heavily relied on naturalistic methods such as interviewing and

audio recording, and the interpretive paradigm was used. Interpretive approaches extensively use naturalistic methods like interviewing and observation works that already exist in the form of texts, which ensured sufficient dialogue between the researcher and other people with whom the researcher interacted so that together, they could create a meaningful reality. Some primary data collection was done by observation, interview, questionnaire, and databases. On the other hand, secondary data sources included published materials that had already existed in some past literature (Mazhar, 2021). Primary data collection was time-consuming but still essential because, without it, one could not carry

out extensive research or answer specific research questions (Heap Waters, 2019; Mazhar, 2021). To obtain legitimate and trustworthy data on teachers' perceptions and challenges in integrating ICT into culinary education, the researcher conducted an in-depth interview and focus group discussion. This interview and focus group discussion explored teachers' perceptions and challenges in integrating ICT into culinary education. The participants were encouraged to express their answers in the most comfortable manner and language. The interviews with the teacher were transcribed word for word. Lastly, the researcher analyzed the data collected using discourse analysis and thematic analysis.

**2.7. Data Collection**—The methodical techniques used to gather the required qualitative data are described in this section. Every stage was carefully planned to guarantee the reliability, transferability, and credibility of the results. The study's goals of gathering deep, rich insights from the participants' actual experiences were in line with the methodologies employed.

Asking for the Endorsement Letter from the Dean

On December 14, 2024, the researcher asked for an endorsement letter since getting a letter of endorsement from a dean in the research process is very essential because it created the assurance that the research work done met the university's standards of academic conduct and ethical practices. This endorsement provided the researcher permission to gather data from participants and increased their credibility. All individuals and organizations involved in the research study were more willing to cooperate, knowing that the researcher's study had been approved, thus giving the study access to resources.

Asking Permission from the Schools Division Superintendent

The researcher asked permission from the Schools Division Superintendent to conduct the study in the identified school on December 26, 2024. The researcher sent a letter addressed to the Schools Division Superintendent with Chapters 1 and 2 attached, along with the research instrument explaining the study's objectives and identifying the participants. The researcher then waited until January 6, 2025, for the SDS's response before conducting the study.

Asking Permission from the School Heads

After securing the SDS's approval on January 6, 2025, the researcher sent a letter to the principal on January 22, 2025, explaining the study to be conducted in their school.

Asking Permission from the Graduate School

On December 9, 2024, the researcher obtained approval from the graduate school before conducting the research. This step was important, particularly in relation to institutional policies and ethical considerations, especially when dealing with people. It ensured compliance with institutional standards and provided access to essential resources such as libraries and funding. Additionally, requesting permission helped uphold academic integrity by promoting honest

conduct and accountability among researchers.

#### Obtaining Consent from the Participants

In the last week of January 2025, the researcher asked permission from the participants. They were formally oriented about the study and the process they would go through as participants. Conducting the Interview From February to March 2025, after obtaining informed consent from the participants, the researcher conducted a focus group discussion using a semi-structured interview guide. The participants' profiles were collected, notes were taken with their consent, and conversations were recorded using a cellular device for easy transcription.

**2.8. Data Analysis**—This study used thematic analysis to analyze the gathered data. The researcher analyzed the answers of the participants from the interviews that were conducted. According to Majumdar (2019), thematic analysis proved the most prominent among all the qualitative methods applied to data analysis for revealing patterns and themes. This methodol-

**2.9. Framework of Analysis**—The analytical framework adopted for this study was flexible enough to allow the researcher to gather all the data and then analyze it while undergoing collection. The collected data was then sifted, charted, and categorized in line with the key topics and themes during the analysis stage. The following stages characterized this procedure: familiarization, coding, searching for themes, reviewing themes, defining and naming themes, and producing a report (Naeem et al., 2023). Familiarization

Familiarization with the data was common to all forms of qualitative analysis. In this form, the researcher immersed themselves in and became intimately familiar with the data, reading and re-reading it and noting any initial analytic observations. Coding

The researcher listened carefully and responded actively during the session. Transcribing the Responses of the Interviewees From March to April 2025, the researcher precisely transcribed the interviewees' responses by listening to their answers from the cellular device's audio recordings. Since the participants were encouraged to use a language, they were comfortable in, the researcher translated non-English responses into English Data Coding and Thematic Analysis After the transcription, the data were categorized and coded. Then, themes were extracted, and individual data of the participants were compared to identify patterns and trends.

ogy, while very flexible and adaptable enough to be used under many research designs, also balanced flexibility towards transparency and rigor (Fuchs, 2023). The thematic analysis offered core skills applicable to other qualitative methods and was valued for its flexibility in being theoretically accessible and developing rich, detailed insights (Majumdar, 2019).

Coding, which entails giving succinct names to important aspects of the data that are pertinent to the main research question, is an essential part of many qualitative analytic techniques. Coding is an important step in the analytical process and goes beyond simply organizing or condensing data. Researchers can find trends, gain insights, and create significant interpretations based on the experiences of the participants because each code indicates both a semantic knowledge and a conceptual interpretation of the data.

#### Searching for Themes

Finding a consistent and significant pattern in the data that is pertinent to the research topic was called "searching for themes." In this phase, the researcher closely analyzed the coded data to identify recurrent concepts, ideas, or prob-

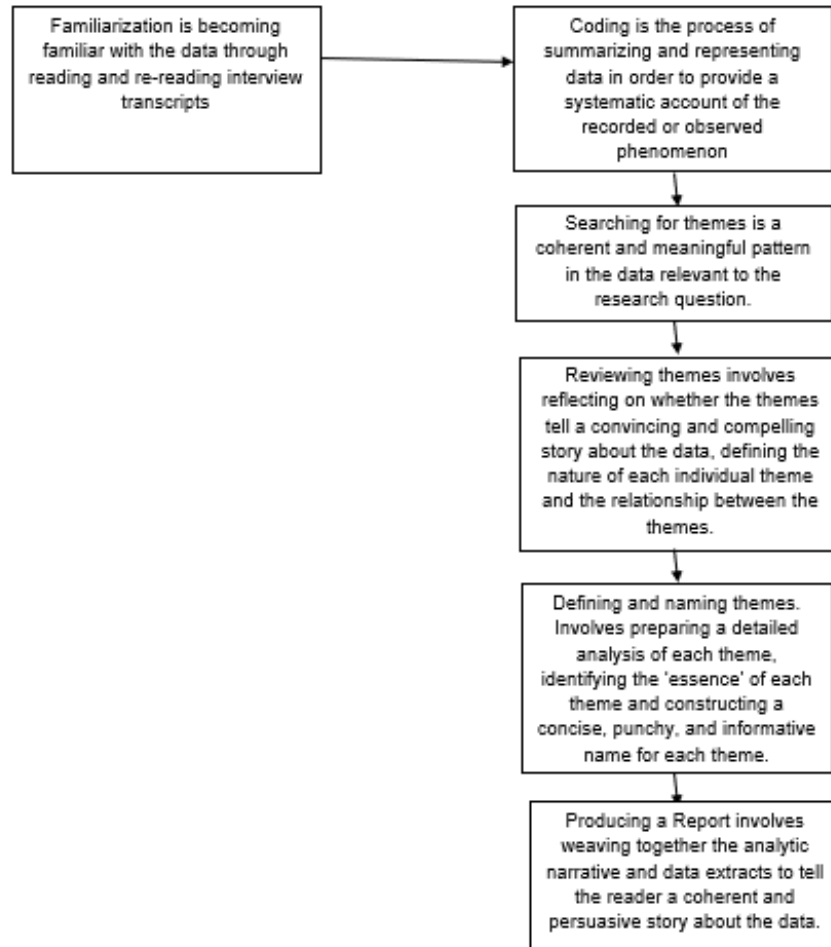


Fig. 2. Analytical Framework of the Study )

lems that encapsulated the essence of the experiences of the participants. In order to finish this step, the researcher collected and arranged all of the coded extracts linked to every possible topic, making sure that the information was representative and consistent with the developing thematic framework.

#### Reviewing Themes

Reviewing themes involved the researcher reflecting on whether the themes told a convincing and compelling story about the data and beginning to define the nature of each theme and the relationships between them.

#### Defining and Naming Themes

#### 2.10. Trustworthiness of the Study—

Defining and naming themes required the researcher to prepare a detailed analysis of each theme, identifying its ‘essence’ and constructing a concise, punchy, and informative name for each.

#### Producing a Report

The report was produced by combining pertinent data extracts with the analytical narrative to provide a compelling and cohesive summary of the results. For the reader to comprehend the importance of the themes and how they connect to the research questions, this phase sought to present a well-organized interpretation of the data.

The concepts of validity and reliability were relatively foreign to qualitative research. Instead of focusing on reliability and validity, qualitative researchers substituted data trustworthiness. Trustworthiness consisted of the following components: credibility, transferability, dependability, and conformability (Harts, 2019). Credibility Credibility was the extent to which a research account was believable and appropriate, particularly regarding the level of agreement between the participant and the researcher. The concept of credibility was most readily associated with the model developed by Yvonna Lincoln and Egon Guba. Transferability When reviewing themes, the researcher considered if the

themes provided a compelling and persuasive narrative about the data and started to characterize each theme's characteristics and connections. Dependability Dependability was the extent to which other researchers could have repeated the study and ensured consistent findings. In other words, if a person had wanted to replicate the study, they should have had enough information from the research report to do so and obtain similar findings. Conformability Conformability referred to the objectivity of research during data collection and analysis. Two or more independent persons had to agree on the data's accuracy, relevance, or meaning. Conformability also indicated a means to demonstrate quality.

### 3. Results and Discussion

This section presented the collected data wherein in responses of every participant were added. This study examined the how teachers of Home Economics subject dealing with experiences, challenges, and coping strategies. This chapter served as key study result. This research generated themes through thematic analysis of participant interview data which received interpretations from existing research frameworks.

*3.1. Experience of Teachers on ICT Integration in Culinary Education*—The experience of teachers using ICT (Information and Communication Technology) in culinary education highlight both the opportunities and challenges associated with integrating digital tools into the teaching and learning process. The Technology Acceptance Model (TAM) by Fred Davis is relevant in this context because it describes how teachers' willingness to embrace and successfully use the technology influenced by their perceived utility and usability. Understanding TAM encourages wider acceptance and continued use in culinary education by assisting organizations and educators in overcoming obstacles to ICT integration through an emphasis on user-friendly design and the demonstration of evident educational benefits. The educational experience of culinary instructors improves through their use of ICT tools including online platforms

and instructional videos and cooking simulators and digital recipe databases. The educational tools help instructors show cooking techniques by providing novel demonstration approaches to distribute classroom materials while creating interactive student learning (Monica et al, 2023). Through ICT students can access a wider selection of educational materials and complete virtual cooking demonstrations as well as online tasks which allows self-paced exploration of culinary concepts anywhere beyond the classroom (Wang et al, 2021). However, the integration of ICT also presents certain challenges. This highlights the study of Khadim and Al-sharif (2022) that teaching professionals specifically in Home Economics, experience several barriers which include insufficient technological abilities combined with insufficient internet access and equipment quality and problems with keeping students focused on digital platforms.

Teachers note difficulty when adjusting to using new technologies together with kitchen-based teaching methods. It also supported the study of Calanog (2021) that Educators identify potential benefits of ICT for culinary education but

admit that building proper digital infrastructure is crucial for maximizing the teaching potential. Below are the emerging themes that allow the reader to understand the whole idea of this indicator.

*3.1.1. Using ICT as Instructional Material*—Using ICT (Information and Communication Technology) as instructional material by Home Economics teachers enhances the teaching and learning process by integrating digital tools to support lessons and engage students in more dynamic and interactive ways, this finding is consistent with the study of Wang et al. (2021). For Home Economics educators, the presentation of lessons through ICT tools including educational software and virtual platforms and online videos and digital simulations serves Home Economics teachers. Various technological tools display practical abilities including culinary procedures along with sewing competence and money management skills to help students find multiple ways to grasp complicated subjects (Mandabach et al. 2013 as cited in Monica et al., 2023). ICT also allows teachers to create interactive lesson plans, quizzes, and assignments that students can access anytime, fostering independent learning. Digital educational resources including e-books and instructional websites increase student access to learning materials which provides them with expanded knowledge and practical examples. The implementation of ICT enables teachers to engage in online discussions and feedback systems and forums which establish a collaborative learning space. Danmaigoro and Dorth (2023) emphasized that ICT holds immense potential to revolutionize vocational and technical education, and it can greatly enhance learning. ICT is essential to improving the teaching and learning process in culinary education. Participant T1 claims that by using videos to acquire benchmark recipes from websites like YouTube

and learn from different food vloggers, educators and students may hone their talents while Participant T2 focused on utilizing ICT to provide interactive lessons and activities, including instructional videos and quizzes, as well as to communicate assignments via group chats. This demonstrates how ICT, particularly in integrated learning, can make classes more interesting and approachable. Participant T6 provided additional support for this by discussing how ICT is used to create lesson plans, provide instructions, assign assignments, and calculate grades to monitor student progress. This illustrates how ICT may enhance the way that teaching is delivered and evaluated. Reflecting on this, I see how ICT enables educators and students to transcend conventional approaches. It makes it possible for learning experiences to be more skill-based, flexible, and engaging. Incorporating multimedia content not only facilitates hands-on learning but also encourages students' independence and creativity. The integration of Information and Communication Technology (ICT) in Home Economics education has shown potential to enhance teaching and learning outcomes. Studies indicate that ICT can revolutionize Home Economics instruction by providing access to online resources and improving students' knowledge in various areas. However, challenges such as limited internet access, lack of ICT facilities, and inadequate teacher training hinder progress (Oluwagbemileke, 2024). Research has identified different ICT user profiles among Home Economics teachers, highlighting the need for support in using ICT for instructional purposes. The importance of ICT proficiency for Home Economics teachers has been emphasized, with

recommendations for continuous learning and skill development (James, 2019). To revitalize Home Economics education, suggestions include equipping laboratories with ICT facilities, ensuring ICT proficiency among teachers and students, and incorporating online assignments (Azonuche, 2020). Overcoming challenges requires collaboration between government, schools, communities, and the private sector. As Septimo and Cancio (2024) findings highlighted the close relationship between teacher competence and successful ICT integration, this research also demonstrates that incorporating ICT as instructional material im-

proves educational processes for multiple subjects. ICT tools enhance learning effectiveness while improving efficiency through their provision of tutorials and application tools and communication platforms. Research findings show that teachers mostly employ ICT for administrative work instead of instructional purposes. Research has targeted teacher needs for classroom ICT competency development to establish sharable online resources. The integration of ICT in education stands as essential to resolve educational problems while enhancing educational standards.

*3.1.2. Accessibility and Convenience* — Supported by the findings of the study Wang et. al (2021), ICT integration in culinary Home Economics teaching enhances access to theoretical and practical instruction, allowing teachers to deliver lessons more efficiently and provide diverse materials. It creates flexible learning opportunities, allowing classes to take place at any time and location. ICT tools like mobile phones and tablets provide on-demand access to multimedia content that supports both skill development and conceptual understanding, making the learning experience more engaging and interactive. The integration of Information and Communication Technology (ICT) in Home Economics (HE) education offers significant benefits but faces challenges. ICT can enhance access to resources, improve knowledge in nutrition and home management, and prepare students for a technology-driven. However, obstacles such as limited internet access and inadequate teacher training hinder progress. Studies in Finland and Nigeria reveal varying levels of ICT adoption among HE teachers, with some using it frequently for diverse purposes while others remain infrequent users (James, 2019). Key factors influencing ICT use include teachers' digital competence, perceived usefulness of ICT in HE, and school-level support

(Sundqvist et al., 2020). To enhance ICT integration, recommendations include investing in teacher training, infrastructure development, and fostering partnerships with communities and the private sector. The integration of Information and Communication Technology (ICT) in Home Economics (HE) education produces several benefits which include both improved resource accessibility and stronger knowledge acquisition in nutrition along with home management competencies as well as more effective preparation for the technology advanced future. The complete potential of ICT adoption remains restricted because of inadequate internet connectivity and insufficient teacher training. Research conducted in other country demonstrates that HE teachers exhibit different patterns of ICT utilization since some teachers incorporate it regularly for educational purposes but others only use it occasionally. The adoption of ICT in higher education depends on three main factors: teachers' digital competence, their perception of ICT usefulness in education and the support they receive from school administrators. The integration of ICT requires three key recommendations which include improving teacher training programs and developing infrastructure and establishing partnerships between educational institutions and community members and

private sector organizations. In essence, the use of ICT promotes convenient and inclusive education, ensuring that culinary teachers can reach

more learners and students can maximize their learning experience regardless of physical or logistical limitations.

*3.1.3. Students are the Beneficiaries*—Students are the primary beneficiaries of the digital shift in culinary education, as Information and Communication Technology (ICT) innovations open new avenues for learning and skill development. By integrating ICT tools like online cooking tutorials, digital recipe databases, virtual cooking classes, and interactive simulations, culinary students gain access to a wealth of resources that traditional methods cannot provide. These digital platforms allow students to observe techniques, follow step-by-step instructions, and experiment with recipes in a virtual environment before attempting them in real life. The use of ICT in culinary education also encourages students to engage in self-paced learning, giving them the flexibility to revisit lessons, refine their skills, and deepen their understanding outside the classroom. Digital tools foster creativity, as students can explore diverse culinary traditions, access a global range of recipes, and experiment with new cooking methods using virtual platforms. However, while the benefits are substantial, there are challenges to navigating this digital shift. Limited access to reliable internet, expensive equipment, and insufficient training for both students and instructors can hinder the full integration of ICT in culinary programs. Despite these challenges, students who are exposed to ICT innovations in culinary education develop critical digital literacy skills, making them better equipped for the modern, tech-driven culinary industry. Ultimately, the integration of ICT transforms traditional culinary education, providing students with a more engaging, flexible, and comprehensive learning experience. In the perspectives shared by participants T 4,T5, T7, and T8, it is evident that integrating ICT into in culinary education, offers numerous advantages that go beyond basic instruc-

tion. Participant T4 highlighted that ICT improves concentration, creativity, flexibility, and collaboration, making the learning process more engaging. It is also emphasized that students today are more motivated and interested in lessons when technology is involved, as it reflects the current digital trend. Similarly, Participant T5 mentioned that using ICT daily helps capture students' interest and provides them with valuable knowledge that could be applied to future business ventures, encouraging entrepreneurial thinking. Participant T7 pointed out that ICT fosters interactive, collaborative, and practical experiences, leading to more personalized and effective learning outcomes in culinary education. Finally, Participant T8 affirmed that ICT encourages students to be more active participants in the learning process, making them more engaged and responsive. Based on these insights, I recognize that ICT does not only serve as a support tool, but as a transformative element that reshapes how students learn and interact in the culinary classroom. The digital shift in culinary education has opened new avenues for student learning and skill development through Information and Communication Technology (ICT) innovations. Online video platforms like YouTube offer visual repetition, flexible access, and enhanced engagement for cooking skills development (Aboc, 2024). ICT integration in education facilitates learner-targeted pedagogy, improving knowledge competencies and enabling collaborative, evaluative, creative, and integrative learning processes (Chuaungo et al., 2022). Digital education in higher education provides students with increased access to information and cooperative learning opportunities. ICT and digital media enhance student engagement and enable innovative teaching methods, as supported by theories such as Constructivism,

Connectivism, and Cognitive Multimedia (Wardana et al., 2024). However, challenges such as limited infrastructure and lack of digital competence need to be addressed to maximize the potential of ICT in education. Student learning experiences in culinary education have been completely reformed due to digital breakthroughs that enable improved skills development using Information and Communication Technology (ICT). Platforms like YouTube offer flexible access, visual repetition, and increased engagement, supporting cooking skills development. The implementation of ICT into classrooms allows for pedagogies which focus on students' needs while developing their knowledge capacities together with teamwork abilities and evaluation skills. Through digital education students can learn together in groups and obtain more information easily. The approaches of Constructivism alongside Connectivism and Cognitive Multimedia prove that ICT works well to keep students involved while pushing teachers to adopt modern teaching approaches. The complete exploitation of ICT potential in education requires solving the problems of inadequate digital competence and limited infrastructure. Figure 3 presents the emerging themes that encapsulate teachers' experiences in integrating Information and Communication Technology (ICT) into culinary education. Three significant themes were identified based on qualitative data: ICT as an Instructional Resource for Culinary Demonstrations, Students as the Beneficiaries, and Convenience and Accessibility. The main themes that describe how teach-

ers implement Information and Communication Technology (ICT) into culinary education. The analysis of qualitative data revealed three main themes, which included ICT as an Instructional Resource for Culinary Demonstrations, students as the Beneficiaries, and Convenience and Accessibility. Teachers employ ICT to boost their culinary instruction delivery by using videos, multimedia presentations, and online platforms. By using these technological instruments, students can understand complicated cooking procedures better because they become simpler and interesting. Students represent the main group that benefits from ICT integration according to the second theme. Students displayed higher levels of motivation along with better classroom engagement and achievement because of the interactive features which ICT-based teaching delivered. Student engagement with classroom activities increased along with their interest in exploring new culinary knowledge because they used digital instructive tools during lessons. The third finding under Convenience and Accessibility demonstrates how technology through ICT enables students together with faculty access educational resources whenever they want from any location. The theme demonstrates how technology creates bridges for transferring theory into practical uses especially within blended or distance learning platforms. Figure 3 demonstrates how ICT converts conventional culinary education into an interactive learning environment that benefits students, as well as teachers, through flexible accessibility.

*3.2. Challenges Encountered in Integrating ICT in Culinary Education*—Integrating Information and Communication Technology (ICT) in culinary education presents several challenges that hinder its full potential. The limited availability of dependable technology, together with internet access, handicaps the

instructor and student capability to maximize online resources, particularly among budget-constrained schools and rural communities. The integration process becomes more complex due to the insufficient digital expertise displayed by both teachers and students. The high expenses for equipment acquisition together with the time

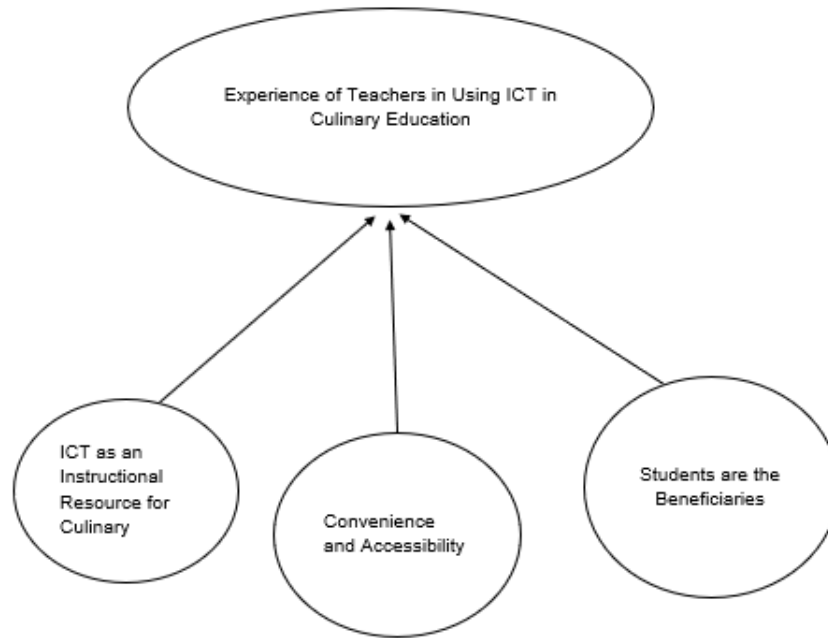


Fig. 3. Emerging Themes on the Experience of Teachers in Using ICT in Culinary Education

needed for ICT-based teaching method planning and implementation create additional obstacles. Resistance emerges because educators maintain their preference for hands-on teaching while institutions demonstrate reluctance to purchase digital enhancement tools for educational pur-

poses. Better infrastructure coupled with specialized training and financial backing will allow ICT to become a total solution for culinary education so it can reach its maximum capabilities.

**3.2.1. Technical Issue**—The integration of ICT in culinary education faces a major challenge because technical problems often interrupt learning activities. Technical problems such as software malfunctions and connectivity issues along with system errors and glitches create major delays in delivering lessons. The inability of students to access materials creates additional barriers that prevent them from participating effectively in the lesson. The technical problems that occur in classrooms create major obstacles to successful ICT implementation because they disrupt instruction and degrade student learning quality. Though ICT has many benefits, Participants 1, 6, and 7 point out that it also presents several challenges, particularly in

the form of technical issues. Participant T1 emphasized that glitches, system errors, and other malfunctions can delay the delivery of lessons or prevent students from accessing important materials. These interruptions can disrupt the flow of instruction and create frustration for both teachers and learners. Similarly, Participant T6 reaffirmed that technical difficulties are the most common drawback encountered during the integration of ICT. Participant T7 elaborated further, stating that problems like poor internet connectivity or software glitches significantly interrupt the teaching and learning process. From this point, I understand that while digital platforms can enhance culinary education, their effectiveness heavily depends on reli-

able infrastructure and user accessibility. Therefore, it's important for educators and institutions to prepare contingency plans, ensure stable internet access, and provide technical support to minimize disruptions and maintain a smooth learning experience. The integration of ICT in education faces several challenges, particularly in rural and developing areas. Technical issues, including problems with smart boards, tablets, and internet connectivity, often disrupt learning activities. Limited access to reliable internet and outdated infrastructure contribute to a digital divide in rural settings (Kumari Srivastava, 2023). Age and technical proficiency of teachers also pose barriers to effective ICT integration (Miskiah et al., 2019). Additionally, the rapid obsolescence of technology and high costs associated with ICT resources present ongoing challenges. To address these issues, suggestions include improving infrastructure, providing financial assistance, implementing digital literacy programs, and developing customized curricula (Kumari Srivastava, 2023). Furthermore, enhancing teacher training in ICT usage and addressing the functionality of de-

vices are recommended solutions. Despite these challenges, ICT integration remains crucial for preparing students for the 21st-century workforce. Schools need to implement ICT across their education system to develop 21st-century student capabilities while dealing with multiple implementation obstacles especially in remote and underdeveloped areas. The main obstacles to ICT integration in education include unstable internet connections and outdated infrastructure together with regular technical problems affecting tablets and smart boards. The adoption of effective ICT practices remains limited because teachers either have an advanced age or insufficient digital skills. Additionally, the high cost and rapid obsolescence of technology pose significant constraints. The solution to these obstacles demands necessary infrastructure development together with financial backing and teacher training and digital literacy teaching programs and context-specific curriculum development. The implementation of such programs has the potential to decrease the digital gap while enabling superior ICT use in educational settings.

**3.2.2. Online Distractions**—Teachers observed that while ICT offers valuable learning opportunities, it also presents challenges related to student distraction. Many students tend to misuse access to the internet by browsing non-academic content or playing online games during class time. This misuse often results in reduced attention, diminished academic focus, and compromised learning outcomes. Teachers noted that the easy accessibility of mobile devices and the addictive nature of digital entertainment can interfere with class engagement. As a result, some educators prefer to limit gadget use in the classroom to prevent distractions and maintain student concentration. Several teachers have expressed concerns about its potential to distract students from their academic

responsibilities. As Participant T4 pointed out that some students misuse digital platforms by spending more time online for non-academic purposes the same sentiment echoed by Participant T7 who emphasized how easily students become tempted and even addicted to gadgets and online games, which significantly affects their focus and academic performance. Participant T8 further supported this by noting that the easy access to games through mobile phones often leads students to lose concentration during lessons. Similarly, Participant T9 shared that he discourages gadget use in class because students tend to use them for gaming instead of learning, which ultimately hinders productivity in the classroom. While ICT can be a powerful educational tool, it must be implemented with

caution and clear guidelines. Without proper monitoring and structure, it can shift from being a tool for engagement to a source of distraction. Educators must balance digital access with discipline, ensuring that technology supports learning rather than disrupts it. Information and Communication Technology (ICT) offers valuable opportunities in education, such as improving teaching quality, providing access to diverse learning resources, and increasing student motivation (Fitria, 2023). However, it also presents significant challenges, particularly related to student distraction. Teachers report that those online interactions, including conflicts and dysfunctional behavior in messaging groups, can disrupt school life. Common forms of distraction in-

clude multitasking, mind-wandering, and using digital devices for non-educational purposes, which can impair students' focused attention and learning performance (Wang, 2022). Additionally, ICT integration faces barriers such as lack of resources, time, access, and technical support (Kaur, 2023). Despite these challenges, teachers are developing strategies to address these issues, often involving collaboration with students and parents. As ICT becomes increasingly integral to education, there is a growing need for guidelines and practices to help educators navigate the complexities of students' online interactions and ICT use in learning environments.

*3.2.3. Loss of Authenticity*—Educators fear that culinary education loses its genuine character because students excessively depend on technology. Students heavily depend on YouTube platforms for cooking instructions and recipes but they tend to ignore the value of sensory evaluation and personal cooking instincts development. Students who heavily depend on digital content struggle to participate in hands-on learning and develop independent cooking skills and personal culinary ideas. Students develop reduced willingness to experiment with new recipes or create their own original dishes because of this dependency. The overdependence of students on technology is significantly concerned by teachers, which affects authenticity, creativity, and confidence in culinary learning. Here, Participant T1 emphasized that many students rely too much on platforms like YouTube for recipes and food preparation methods, leading to a loss of authenticity as they neglect the sensory experience and palatability of food while Participant T4 also noted that students are becoming more focused on technology rather than memorization or hands-on learning, resulting in diminished confidence to try out

their own ideas or explore new cooking methods. Participant T5 added that this dependence can hinder students from developing their practical skills, causing them to doubt their abilities and avoid independent practice. As an educator, I realize the importance of striking a balance between digital tools and traditional methods to ensure students develop both technical knowledge and the confidence to be innovative and authentic in their culinary practice. The integration of technology in culinary education has led to significant changes and concerns. While online platforms like YouTube offer benefits such as visual repetition, flexible access, and enhanced engagement for cooking skill development (Aboc, 2024), there are growing fears about the loss of authenticity in culinary education. Educators worry that students' excessive reliance on technology is replacing traditional teacher-student relationships. This shift challenges the concept of knowledge authenticity and blessing associated with direct teacher-student interactions. Additionally, students' addiction to digital devices has resulted in decreased focus and engagement in classrooms (Silva, 2020). However, the pandemic has necessitated a pivot to online

learning, prompting educators to reimagine culinary education and embrace new possibilities in a changing landscape. This transformation requires balancing students' motivational, social, and academic needs in a distance learning environment. Though technology is helpful and a way of innovation in culinary class, it is still much better to exert efforts without relying too much on technology or stuff that can be found in the internet. This is a reminder that technology is not the whole thing in class but a guide for every student.

*3.2.4. Reduced Human Interaction—*Teachers pointed out that one significant drawback of integrating ICT in culinary education is the reduction of human interaction, especially in blended learning setups. The execution of practical activities in culinary arts requires direct student-teacher interaction to achieve effective results because these subjects depend on hands-on learning. Teachers find it harder to confirm student competency achievement in classrooms that blend internet and in-person learning due to restricted opportunities for hands-on supervision and real-time educational feedback. The integration of ICT and blended learning in culinary education presents both opportunities and challenges. While culinary arts educators generally show positive perceptions towards implementing blended learning (Hashim et al., 2023), there are significant hurdles to overcome. These include the need for teacher training, addressing the digital divide, and ensuring effective integration of technological tools. The pandemic has accelerated the adoption of alternative teaching methods, such as modular learning, which has led to difficulties in preparing, distributing, and retrieving modules, as well as communicating with students (Pinatil et al., 2022). Despite these challenges, ICT integration can create powerful learning environments and promote active, self-directed learning to successfully implement blended learning in culinary education, institutions should focus on

providing support, resources, and professional development opportunities for educators.

*3.2.5. Availability of Resources—*Educational professionals indicated that the use of ICT tools with conventional teaching practices improves student learning but many persistent hurdles particularly affect internet access and fairness. The accessibility of technology devices together with dependable internet access stands as a primary obstacle because many students are blocked from achieving full participation in technology-driven classes. ICT integration proves less inclusive because exclusive groups of individuals do not have access to devices or data that would enable their participation. Older teachers face difficulties adapting to rapidly changing educational technologies which prevents them from effectively utilizing ICT tools in their teaching practice. Better infrastructure should be developed along with universal accessibility and ongoing teacher training to guarantee that ICT benefits can be fully attained by all learners. Below are stated by the participants in accordance with the availability of resources. Participant T2, T3, T7, and T8 shared that many students still lack access to necessary gadgets or stable internet connections, which hinders their ability to fully participate in ICT-based activities. Participants T2 and T3 pointed out that not all learners own digital devices or have reliable internet, a sentiment echoed by participant T7, who added that financial limitations prevent some students from affording these tools. Participant T8 shared a firsthand experience of how the absence of personal gadgets and poor connectivity within classrooms affected teaching. Additionally, Participant T5 raised a concern that some teachers, particularly from older generations, are not always equipped to use the latest technologies effectively, which can limit ICT integration. As an educator, this highlights the need for more inclusive strategies—such as providing alternative learning modalities or investing in teacher training and school resources—to

ensure that the benefits of ICT can reach all students, regardless of their socioeconomic background. There are research indicates that while ICT tools can enhance student learning when integrated with conventional teaching practices, several persistent challenges hinder their effective implementation. Insufficient electricity supply (Fidelis Onyango, 2021), lack of technical support, and teachers' limited ICT competence further impede effective ICT integration. The pandemic has exacerbated these challenges, particularly for remote learning, with students facing issues such as device incompatibility, shared devices, and inadequate learning platforms (Rahiem, 2020). To address these hurdles, recommendations include allocating funds for ICT procurement and maintenance (Fidelis Onyango, 2021) and organizing capacity-building workshops for teachers. The above context shows that applying technology in a traditional way of teaching is relevant nowadays, especially to students who are Gen Z and Gen Alpha. However, the generation gap between the teachers who has no background about technology will surely has difficulties in dealing it. To address this problem, the Government should have a policy that would let the teacher in every school have a seminar at least once a month and tackle the relevant issues, particularly in applying technology in every class. Figure 4 displays the thematic findings concerning the perception of teachers when integrating ICT in the culinary classroom. The themes

that emerged include Technical Issues, Online Distraction, Loss of authenticity, Reduced human interaction, and Availability of Resources. The initial theme highlights technical obstacles which include inadequate internet connections and outdated technology equipment and insufficient ICT resources in educational institutions and domestic settings. The restriction on seamless delivery of ICT-supported lessons occurs through these limitations while also resulting in both delays and interruptions. Digital content dependency by students poses the second theme as a significant concern because it potentially limits their chance to maintain authentic hands-on culinary practice. Professionals in teaching admitted students use online tutorials alongside recipes instead of creating their own skills for scent recognition and food preparation creativity a main focus in culinary arts education. The third theme focuses on digital distractions that students face. During classroom hours students commonly use ICT resources for gaming and social media activities so they no longer can focus on tasks or maintain good academic results according to teacher reports. The lack of supervision in device-bringing environments creates this challenge most acutely. The fourth theme is about reduced human interaction, which said to be one of the problems The barriers to implementing ICT in this hands-on subject are illustrated through Figure 4 which demonstrates the multiple challenges that arise from this approach.

*3.3. Coping Strategies and Insights of Teachers in ICT integration*—Educators who integrate ICT into culinary education use different methods to handle obstacles and improve student achievement. Teaching staff should plan everything in detail and create alternative approaches together with strategies to prevent technology setbacks in delivering lessons effectively. The theme of integrating ICT aims to enhance

learning through teachers who select multimedia tools and educational platforms along with engaging digital content to maintain classroom engagement. Training must continue with urgency since professionals understand training is an ongoing necessity for professional development. Teachers understand the importance of digital skill development through workshops and webinars and self-directed learning to teach

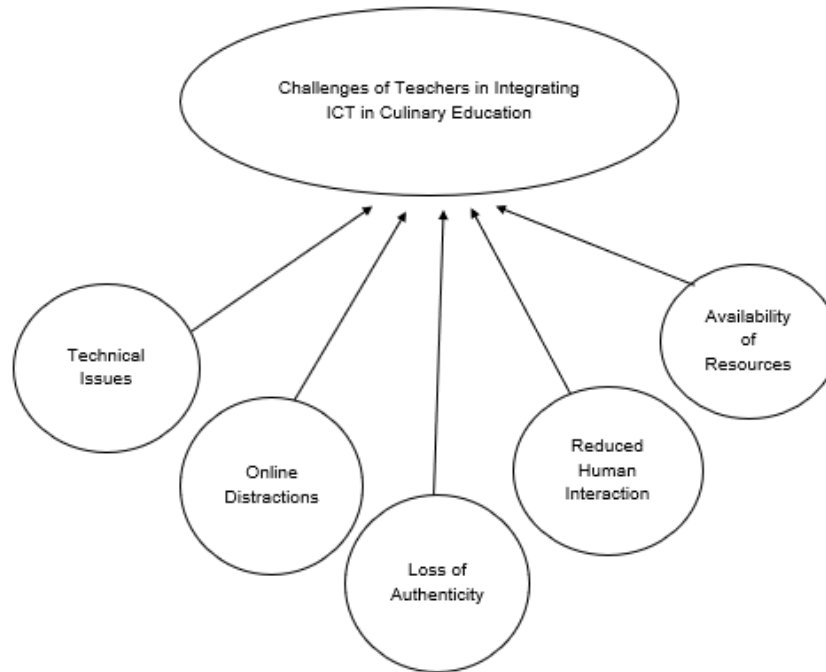


Fig. 4. Emerging Themes on Challenges Encountered in Integrating ICT in Culinary Education

with confidence using ICT in their classrooms. Educators employ these coping strategies to show their dedication toward enhancing their teaching methods while embracing technologi-

cal progress in educational practices. Below are the emerging themes that would best suit the main theme for Coping Strategies and Insights of Teachers in ICT Integration.

**3.3.1. Careful Planning**—Teachers emphasized the importance of being intentional and strategic when integrating ICT into culinary education. The process of overcoming challenges starts by preparing carefully and choosing resources which match lesson objectives and the learners' learning environment. The proper integration of digital tools should improve the learning process without causing disturbances. Educators mention that they dedicate time to master fundamental applications as well as search for suitable educational videos while choosing captivating visual content to maintain student interest. The methodical preparation enables both student interest maintenance and solution prevention for forthcoming problems. The integration of digital tools depends on schools having sufficient funding for ICT

resources because teaching staff from various institutions revealed insufficient access to essential technological equipment. Teachers acknowledged that incorporating ICT into culinary education presented several difficulties, but they also offered proactive solutions. Participant T1 emphasized the importance of thorough planning and selecting appropriate resources that align with the lesson's goals and context to effectively manage these challenges. Similarly, participants T4 and T5 highlighted their efforts to learn basic digital tools and applications, such as downloading engaging videos and using relevant images to maintain student interest and curiosity. These educators demonstrated adaptability by embracing continuous learning to navigate technological demands. Additionally, participant T5 stressed the need for both training

and investment in ICT equipment, pointing out that many schools still lack adequate technological resources. These responses reveal that overcoming ICT-related barriers requires not just individual initiative but also institutional support to provide teachers with both the skills and tools necessary for effective integration. Research highlights the importance of strategic ICT integration in education, emphasizing the need for careful planning and teacher readiness. Studies reveal challenges such as inadequate infrastructure, limited ICT skills, and insufficient training. Teachers often struggle with integrating ICT into lesson plans, citing issues like poorly stated instructional goals and lack of

equipment (Sebullen, 2023). Despite these obstacles, ICT integration offers benefits such as easy access to information, interactive learning, and collaboration (Haji et al., 2023). To overcome challenges, continuous professional development and support for teachers are crucial (Champa et al., 2019; Haji et al., 2023). Recommendations include improving technological infrastructure, supervising learners during ICT use, and creating collaborative communities of practice (Haji et al., 2023). Overall, successful ICT integration requires intentional planning, addressing infrastructure needs, and enhancing teacher competencies through targeted training and support.

*3.3.2. Integrating ICT to make classes enjoyable*—Teachers shared how they use digital tools not just to inform but to engage and excite students in culinary education. By incorporating videos, interactive apps, and visual materials, they create dynamic lessons that capture students' attention and curiosity. These innovations help make learning more relatable and fun, especially in a subject that thrives on creativity and demonstration. Teachers noted that when students are visually stimulated and actively involved through ICT, they become more motivated and responsive in class. This approach not only enhances understanding but also fosters a positive and enjoyable learning environment. Teachers discussed different ways to make integrating ICT into the culinary classroom interesting and fun. Participant T2 emphasized the use of interactive and student-centered approaches, it is crucial to integrate ICT in diverse ways—ranging from simple presentations to more interactive tasks such as gamified formative assessments. Participant T3 echoed this, stating that students today are highly engaged with technology, which makes it effective to begin with basic tools and gradually introduce more dynamic digital activities. Participant T4

highlighted the use of gamification and platforms like Kahoot and Quizizz, which capture student interest through game-like elements and provide instant feedback and leaderboards that help maintain motivation. Similarly, Participant 5 shared that she enhances her lessons by incorporating gamified tasks and using online images in her presentations, supporting students' understanding through visual learning. These responses collectively show that engaging students through ICT involves creativity, gradual integration, and leveraging the tools students already enjoy in their digital environments. The integration of Information and Communication Technology (ICT) in education has shown significant benefits for both teachers and students. ICT tools can enhance engagement, motivation, and active learning in various subjects, including writing and mathematics. These technologies facilitate higher-order thinking, self-learning, and student-teacher interactions, creating a more student-friendly learning environment (Gyawali et al., 2022). Teachers who strategically incorporate ICT into their lessons can provide meaningful and engaging experiences, improving the quality of education, particularly in challenging subject areas

(Modi, 2022). The use of ICT in classrooms allows students and teachers to develop essential technological skills and understand their advantages. As technology becomes increasingly integral to education, teachers are evolving into "Teaching Technicians," adapting their methods to incorporate these innovative tools effectively (Shaikh et al., 2022). Information and Communication Technology (ICT) integration in education leads to major advantages through its ability to boost student involvement and drive and their active classroom participation. ICT

enables better thinking processes through autonomous learning and teacher-student connections which creates a modern student-focused learning environment. A strategic implementation of ICT enhances educational quality particularly in difficult subjects and teaches essential technological abilities to educators and their students. Teaching Technicians represent the modern educational workforce because digital tools have become indispensable for instruction which requires educators to constantly adjust their teaching techniques.

*3.3.3. Further Training is a Must*—The teachers emphasized that ongoing professional development for ICT integration remains vital. The teachers demanded that the Department of Education should provide ICT training to both TLE culinary teachers and all educational subjects teachers. The Department of Education recognizes digital skill training as a fundamental requirement for teachers to deliver effective lessons and implement contemporary teaching approaches. The use of interactive applications makes lessons more interesting according to teachers while students show less interest when traditional teaching methods are used. Public school teachers emphasized that their institutions require adequate ICT resources to properly support educational processes after receiving training. Teachers shared various strategies for making ICT integration engaging and enjoyable in the culinary classroom. Participant T2 emphasized the use of interactive and student-centered approaches, noting that since students are deeply connected to technology in their daily lives, it is crucial to integrate ICT in diverse ways—ranging from simple presentations to more interactive tasks such as gamified formative assessments. Participant T3 echoed this, stating that students today are highly engaged with technology, which makes it effective to begin with basic tools and gradu-

ally introduce more dynamic digital activities. Participant T4 highlighted the use of gamification platforms, which capture student interest through game-like elements that help maintain motivation. Similarly, Participant T5 shared that she enhances her lessons by incorporating gamified tasks and using online images in her presentations, supporting students' understanding through visual learning. These responses collectively show that engaging students through ICT involves creativity, gradual integration, and leveraging the tools students already enjoy in their digital environments. The integration of Information and Communication Technologies (ICT) in education is crucial for modern teaching and learning, but it presents challenges for educators. Teachers emphasize the need for ongoing professional development to effectively incorporate ICT. While ICT integration offers benefits like improved access to information and interactive learning, obstacles such as inadequate infrastructure, lack of resources, and insufficient training hinder implementation (Haji et al., 2023). Teachers who embrace ICT cite intrinsic motivations, while those resistant often blame external factors (Ballesta Pagán et al., 2023). Effective professional development models include collaborative communities of practice, job-embedded learning, and blended formats. Successful ICT integration requires a

multifaceted approach involving technological resources, administrative support, and policy frameworks. Ultimately, enhancing teachers' ICT skills through tailored professional development can positively impact student learning outcomes (Umar et al., 2023). Information and Communication Technologies integration for education purposes facilitates teaching enhancement and learning advancement but teachers face multiple obstacles. The implementation of ICT faces challenges because most educational institutions lack appropriate infrastructure, have limited funding and struggle with inadequate teacher preparation for digital learning methods. Knowledgeable educational instructors understand that qualified teachers need ongoing professional development sessions to connect classroom skills with new educational technologies. The willingness of teachers to use ICT stems from their personal motivation but external barriers stop other educators from adopting this technology. Strong ICT integration depends on supportive systems which develop collaborative learning communities through on-the-job training and blend different levels of professional development programs. Improved educational results in digital times need the combination of targeted teacher training with enough resources alongside supportive policies to enhance competence. Figure 5 summarizes the coping strategies and reflective insights of teachers in response to the challenges associated with ICT in-

tegration in culinary education. The three main themes include Strategic Instructional Planning and Resource Allocation, Promoting Interactive and Enjoyable Learning Environments, and Advocating for Continuous Professional Development and Institutional Support. The initial theme emphasizes the significance of designing effective lessons along with quality ICT tool selection to meet educational objectives. Educators prepare alternative approaches and choose pedagogical material that supports student attention when technology issues arise. The second theme shows teachers who employ gamification elements with interactive quizzes to produce visually attractive content for improving lesson enjoyment. The teaching methods create student engagement and active participation especially among digital-format inclined students. The final theme points to the need for ongoing training and institutional investment. Educational authorities should supply hardware and software while providing structured training programs to help teachers develop their ICT skills according to teachers' recommendations. Educational authorities must provide essential resources and knowledge to teachers because this will help maximize the advantages of ICT. Figure 5 encapsulates how teachers actively respond to integration challenges and strive to enhance both their teaching practices and their students' learning experiences through continuous improvement and innovation.

## 4. Implications and Future Directions

This study explored the digital innovations of teachers in Home Economic particularly in Culinary. The findings reflect the pivotal role of ICT in enhancing instructional delivery, addressing resource limitations, and enriching students' learning experiences. These insights carry profound implications for educational practice, management, and future pedagogical development.

*4.1. Findings*—The findings highlight the transformative role of technology in modernizing culinary instruction, enhancing skill acquisition, and expanding access to culinary knowl-

edge. The research findings generate essential implications which direct practices in developing curricula and training teachers and planning strategies to build an inclusive educational struc-

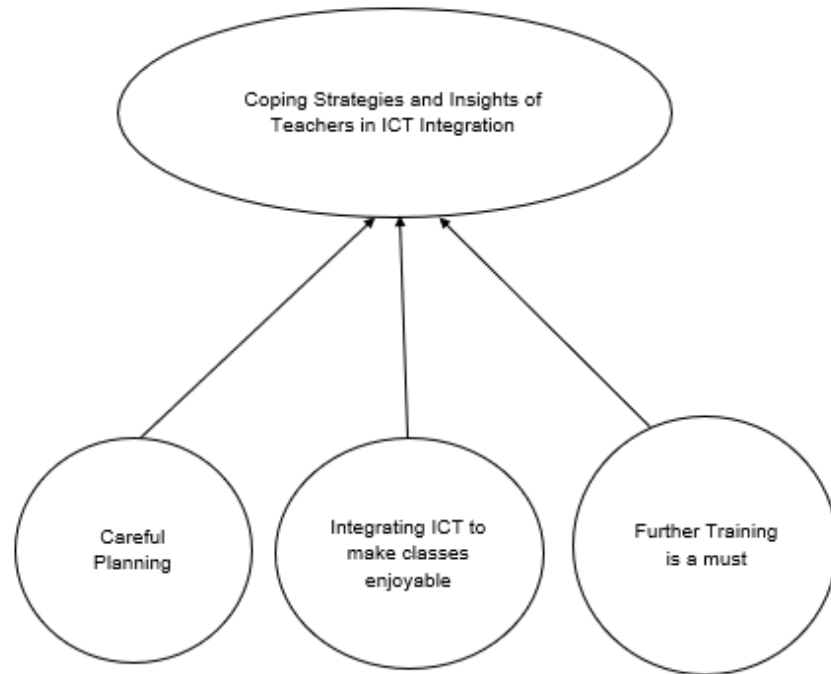


Fig. 5. Emerging Themes on Coping Strategies and Insights of Teachers in ICT Integration

ture that incorporates technological responsive- ness for culinary education.

**4.2. Implications**—The experiences of teachers integrating Information and Communication Technology (ICT) innovations in culinary education highlight both the transformative potential and the difficulties of digital adaptation. Educators experience better teaching methods through digital tools because these tools create interactive learning environments for their students. ICT tools enhance assessment procedures and student performance tracking which provides culinary education professionals with data-based instruction methods. The need for proper training and institutional backing emerges from these experiences to achieve maximum benefits from digital integration within culinary education. Despite these advancements, teachers face numerous challenges in implementing ICT in culinary education. Many struggles with limited access to technology, inconsistent internet connectivity, and the need for specialized digital resources tailored to hands-on learning. The lack of standardized guidelines and policies on ICT use in culinary education adds another layer of difficulty, making it harder for teachers to maintain consistency in their approach. These challenges underscore the need for educational institutions and policymakers to provide stronger support mechanisms, including professional development programs and adequate technological infrastructure. One of the key challenges that emerged is the loss of authenticity in culinary training. Traditional culinary education relies heavily on sensory experiences—touch, taste, aroma, and hands-on techniques—which digital tools struggle to replicate. Virtual cooking simulations and pre-recorded demonstrations, while useful, cannot fully replace the real-world nuances of working with ingredients, handling kitchen equipment, and adjusting techniques based on sensory feedback.

As a result, students may face gaps in their practical skills, leading to concerns about their readiness for industry demands. Additionally, the over-reliance on ICT tools can diminish the rich cultural and traditional aspects of culinary arts, as digital platforms often standardize recipes and techniques, leaving little room for creativity and cultural expression. To address these challenges, educators have adopted various coping strategies to balance technology with authenticity. Many have implemented hybrid learning approaches, blending digital instruction with in-person kitchen training to ensure students de-

velop both theoretical knowledge and hands-on expertise. Others have incorporated immersive technologies, such as virtual reality (VR) cooking labs, to simulate real-world kitchen experiences more effectively. Furthermore, educators emphasize interactive peer learning, where students collaborate physically and virtually to refine their culinary skills. These strategies highlight the need for educational institutions to develop frameworks that preserve the authenticity of culinary education while embracing the benefits of ICT innovations.

**4.3. Future Directions**—As culinary education continues to evolve in the digital age, future research and practice must focus on deepening the integration of ICT tools while addressing the persistent challenges identified in this study. Key directions include: Teachers A future perspective may look at ways in which comprehensive teaching modules ICT-based modules specific for culinary education can be prepared. Further studies can be pursued to unravel how trainers can normally engage hands-on practices with the various tools of virtual simulation and digital resources for a more dynamic and flexible class. This ICT medium of communication itself could be further examined in its ability to accommodate the various instructional needs of students with diverse learning styles. Such professional development programs should warrant further study, too, to discover the best practical methods to increase teacher capacity in digital pedagogy. Students Future research may concern the long-term effects of ICT innovations on student assessments and retention in culinary courses. How do students adapt to virtual learning environments in skill-intensive subjects, such as culinary arts, is another area for investigation and research. Further, research on gamification and augmented reality that would motivate learning engagement and skill acqui-

sition would be constructive. It should also be relevant to understand students' attitudes and perceptions concerning digital instruments for further student platform user-friendliness. Administrators Policy-making and strategic plans for sustainable ICT integration in culinary education centers might also be a realm for future research. Studies may adopt models of successful ICT integration in institutions and establish frameworks for replication by other schools. Another crucial path could be to study the trade-offs in cost-effectiveness of various ICT opportunities and what impact monitoring and evaluation administrators do on the effectiveness of the teaching outcomes of such digital innovations.

Curriculum Developers There is an increasing demand for a national or institutional-level curriculum in culinary arts that can be ICT-integrated in practice and in scalability. Future directions may deal with the development of standard-based guidelines for integrating digital tools into culinary lessons for quality and consistency during implementations across different teaching contexts. Working in collaboration on joint research with chefs, tech developers, and educators could yield highly innovative solutions. Technology Designers A different path could include collaborating with educational technology designers on bespoke plat-

forms and tools for culinary education, including virtual kitchens, interactive recipe builders, and live cooking assessments. Research into usability, engagement, and effectiveness of such tools could contribute to an iterative process of refining existing resources and creating better ones. Future Researchers Future studies could continue from this work by employing mixed-method or longitudinal designs for evaluating ICT's impact on readiness for work, creativity, and long-term skill development. There is also a gap to explore the integration of ICT in other strands of Technical-Vocational-Livelihood (TVL) tracks aside from culinary arts, and the effectiveness of these differing technological approaches in various settings of skill-based teaching and learning would deserve comparison.

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