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ADAPTIVE SKILL IN THE KITCHEN: UNPACKING INFLUENCE IN HIGH FUNCTIONING AUTISM SPECTRUM DISORDER (HFASD)

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Abstract:

The Department of Social Welfare (JKM) in Malaysia has shown a steady rise in the number of children diagnosed with autism during the last 10 years, from 2013 to 2023. In conjunction with this growth, both public and private authorities have launched a number of programs and initiatives to construct autism centres throughout the state. The Institute Latihan Kementerian Belia dan Sukan (ILKBS) inclusive program offered a practical environment for students with autism to develop vital skills in communication, daily living, socialization, and motor functions, thereby enhancing cognitive abilities and sensory experiences while promoting societal inclusion and independent living. This study aims to investigate the elements that influence adaptive behaviour in culinary training programs for individuals with high functioning autism spectrum disorders (HFASD). A qualitative approach was used, with a case study of IKTBN Bukit Mertajam. Three (3) participants with HFASD were observed for 18 weeks. Nvivo 14 software was then used to analyse the data using content analysis. The findings identified four (4) major themes on the elements that impact adaptive behaviour: (1) Observational Learning in Practices; (2) Peer influence (3) Positive Reinforcement and Behavioural Changes; (4) Self-regulation in Kitchen Based Task. This finding would

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provide substantial insight to the food service and education sectors, enabling culinary programs to better support students with special needs by identifying the motivating aspects that enhance performance in social, conceptual, and practical skills. This study also elucidates about culinary training, which holds A potential to be a mult0focus solution for not only diet quality movement but also can improve quality of life among individual HFASD.

Keywords:

Autism, Kitchen Skill, Adaptive Behaviour, Case Study

Introduction

In current years, educational paradigms have undergone significant transformations to better serve the diverse needs of learners, particularly those with Autism Spectrum Disorder (HASD) (Arias, Verdugo, Navas, & Gomez, 2013; Ministry of Education Malaysia, 2013). As the commitment to the growth of the global prevalence of ASD that was estimated to approximately 1 in 100 children to be diagnosed with autism, or about 1% of population (World Health Organization, 2023). Meanwhile the record of autistic people in Malaysia shown a growth of number from 6,991 cases in 2013 rise to 64,000 cases in 2024 (DayakDaily, 2024). With this rising trend of autism cases within the Malaysia context highlights the growing recognition, diagnosis, and report of awareness on autism emphasizing the requirement to provide a holistic assistance and opportunity to support the equality of rights towards those individuals who affected.

Autism spectrum disorder (ASD) is a neurodevelopmental disorder are diverse group of condition with degree of difficulties with communication, social interaction, activity transition, restricted and repetitive pattern of behaviour, and sensory processing differences (American Psychiatric Association, 2013; Casula et al., 2024). High functioning autism spectrum disorder (HFASD) reflects to the autism individual that have average intelligence and can perform daily basis with some challenges in communicative engagement and forming a relationship (Holland, 2021; Klein & Miserandino, 2021; Sabri, Salleh, & Biase, 2021). HFASD can have a substantial impact on many aspects of a person's life, particularly their well-being, engagement in society, and their capacity to complete daily chores (Caron, Badaracco, Petitpierre, & Yousefi, 2024). The ability to perform a daily task independently is a critical component of adaptive functioning, especially for individuals navigating neurodevelopmental differences. Individual with HFASD may encounter challenges in these domains such as communication skill, living skills, socialization, and physical development skill. There have been numbers of longitudinal studies involving adaptive behaviour that have reported individuals demonstrate a limitation in encounter new environments and adaptive functioning (Casula et al., 2024; Gustin et al., 2020; Jin et al., 2023; Tenerife et al., 2022).

As vocational education opinion to extend the inclusive education in direction of cooking as a component of an independent well-being, it is vital that those on the marginal ends of society and those group of individuals that exposed to greater risk of bullying, discrimination, and negative attitude (Hillier et al., 2021; Juvonen, Lessard, Rastogi, Schacter, & Smith, 2019; Turnock, Langley, & Jones, 2022). Individuals with HFASD are highly prone to this scenario upon entering adulthood, especially when subjected to the increased social, occupational, and psychological demands that relate to this phase of life development stage (Furuhashi, 2021;

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Hillier et al., 2021; Lee et al., 2023). There is increasing concern that some of HFASD youth who enrolled in the mainstream education are being disadvantaged through the traditional method approach which still currently used in general education can disadvantages autistic students in several ways (Graham, 2021; Jansen, Petry, Ceulemans, Noens, & Baeyens, 2017). A study such as conducted by Jansen et al. (2018) identified the main challenges faced by autistic students includes problem with cognitive and psychological resilience, communication processing, daily living skills and environmental factors. Due to these issues, most of students often to receive less support in traditional education setting due to their difficulties in managing their cognitive abilities. They may struggle with practical, realworld task such as cooking that require a combination of cognitive reasoning, sensory tolerance, and fine motor coordination (Jansen et al., 2018, 2017). Despite plenty research done focusing on specific approach for special need students, few study were conducted in context of kitchen-based skill approach that focusing on the development of adaptive skills among this group of individuals (Hariguna, Berlilana, & Wibowo, 2017; Klein & Miserandino, 2021; Morsanuto, Peluso Cassese, Tafuri, & Tafuri, 2023; Omar, Hussin, & Siraj, 2013).

Kitchen related skills such as food preparation, safe equipment appliance, and meal planning are found to play central role in fostering autonomy, health, and quality of life. (Goldschmidt & Song, 2015; Gustin et al., 2020; Hollywood et al., 2022; Wong et al., 2025). For individuals with HFASD, mastering these adaptive skills can be both empowering and challenging due to the unique cognitive, sensory, and social profiles often associated with this population. Developing adaptive behaviour in HFASD youth would help them integrated in with their surroundings while creating fewer struggles when encounter with others (Tenerife et al., 2022). In this context, adaptive skills extend beyond the technical act of cooking where they encompass the ability to follow instruction, cooperate with peers, organizing task, respond to the feedback, and learn to make independent decision. However, the specific factors that support or hinder the acquisition of these skills in HFASD learner remain underexplored. Additionally, there is limited localized research in Malaysia examining how students with HFASD develop adaptive skills through vocational or cooking programs, which highlights the need for this study. The purpose of this paper is to unpack the influence of factors contributing to the adaptive skill among HFASD students through observational study of their engagement in an inclusive cooking program at IKTBN Bukit Mertajam, Penang.

Objective of Study

1. To explore the contributing factors through lens of Social Cognitive Theory that influence adaptive skill development in high functioning autism spectrum disorder (HFASD) students through practical learning environment.

Research Question

1. How do Social Cognitive Theory construct help explain the adaptive skill development of high functioning autism spectrum disorder (HFASD) students through practical learning environment.

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Review Of Literature

Characteristic of Autism

High functioning autism spectrum disorder (HFASD) refers to individuals on the autism who possess average to above-average intelligence but still exhibit difficulties in performing independent living skill (American Psychiatric Association, 2013; Zainudin, 2018). A number of factors must be considered when designing an educational module for youth with autism, particularly in a course dealing with food preparation. These aspects involve educational learning preferences, food neophobia, motor skill impairments, cognitive capacities, task switching problem, attention processing, and interpersonal difficulties (Gustin et al., 2020; Jansen et al., 2018; Lee et al., 2023). Recognizing these characteristics is critical to minimizing the student's anxiety and excessive sensations of discomfort, which may lead to disruptive behaviours (de Almeida, Zandonadi, Nakano, Vasconcelos, & Botelho, 2022; Frake, Dean, Huynh, Iadarola, & Kasari, 2023; Gustin et al., 2020; Jin et al., 2023; Klein & Miserandino, 2021; Waugh & Peskin, 2015). One of the characteristics commonly associated with HFASD include difficulties with social interaction and pragmatic language. Even with verbal fluency, HFASD individuals may struggle with understanding social cues, initiating or sustaining conversations, and adapting behaviour in group settings (Jin et al., 2023). Moreover, the presence of strict preference in routine and resistance to change that also may influence how learner respond to the dynamic or unpredictable learning environment (Ghazali, Sakip, & Samsuddin, 2018; Staal, 2015). Furthermore, there are two conditions in which sensory experiences might arise: sensory malfunction and overstimulation. These factors could potentially have an impact on a learner's comfort and engagement in settings like kitchens, which frequently expose them to loud noises, different textures, and strong odours (Funk, 2016; Gustin et al., 2020). Deficits in executive functioning have an effect on fundamental cognitive abilities such as planning, organizing, sequencing, and task switching (Casula et al., 2024). These difficulties can provide significant barriers in carrying out multi-step tasks like cooking or managing daily routines, especially for people with HFASD, who frequently rely on regulated routines and clear schedules for optimal functioning (Graham, 2021).

Despite these challenges, many individuals with HFASD possess a unique strength such as excellent memory, attention detail, and intense focus when engaged in areas of interest (Dupuis et al., 2022; Liu et al., 2023). With right structure, support, and instructional strategies, these traits can be harnessed to facilitate the development of adaptive behaviour and functional independence in settings like vocational or life skills training programs (Graham, 2021).

Previous Findings on Adaptive Behaviour

Understanding particular characteristics is critical when exploring how people with HFASD develop and practice adaptive behaviours in daily situations. While cognitive abilities may fall within the average or above-average range for individual with HFASD, adaptive functioning still seems too often lags behind (Casula et al., 2024; Duncan & Bishop, 2015; Liu et al., 2023; Miniarikova et al., 2023). This discrepancy affects daily living skills, communication, and social engagement which is a core domain measured by adaptive behaviours assessments such as the Vineland Adaptive Behaviour Scales (VABS) Adaptive Behaviour Assessment System (ABAS) (Tenerife et al., 2022). Previous studies consistently report that practical abilities, such as cleaning, cooking, and managing daily routine, are among the weakest area for individuals with HFASD (Duncan & Bishop, 2015). Adaptive behaviour refers to the meaning of personal independence where individual able to perform living task, self-care, community interaction,

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and communication skills (Kraper, Kenworthy, Popal, Martin, & Wallace, 2017). In real-life settings such as kitchens, these adaptive skills would express into the ability to prepare meals, handle food safety, follow commands, collaborate with peers, and adjust behaviour in response to changing situations. Individuals with HFASD may struggle with these functional skills due to difficulties in flexibility, planning, social awareness and parents restrictions (Gustin et al., 2020; Liu et al., 2023; Trinh, 2017).

Adaptive behaviours initially develop throughout early childhood at home, where children receive assistance by family members and parents. However, as they enter adulthood, schools are responsible for further developing and supporting these adaptive behaviours. Data from several sources have identified the importance role of educator as an active partner in promoting the integral development of adaptive behaviours among special needs students including HFASD (Bolourian, Losh, Hamsho, Eisenhower, & Blacher, 2022; Lima et al., 2023). Despite this, there is a need for expert manpower in education and improved training to build on the strength of special needs education. Teo, Lau, & Then (2022) carried out an interview with seven (7) educators in Sarawak, Malaysia confessed that educator faced challenges with inadequate resources, low public awareness, and lack of professional skills within the special needs education. Due to this insufficient training, education teacher frequently reports feeling unprepared leading to frustration and ineffective responses (Graham, 2021; Lima et al., 2023; Murray, 2015).

In order for better understand the contributing factors and their impact on the quality of life for people with High-Functioning Autism Spectrum Disorder (HFASD), it is essential to investigate the vocational training experiences of youth with HFASD, as well as particular factors that influence their adaptive functioning. Gaining this understanding is crucial towards responding to the differences in adaptation outcomes between those with HFASD and the demands of their surroundings. Youth with HFASD frequently experience significant academic problem within a variety of domains. The gap between intellectual ability and adaptive performance may be attributed to the core features of HFASD, such as challenges with social recognition, executive functioning, and behavioural flexibility (Casula et al., 2024; Jin et al., 2023; Tamm et al., 2020). For example, a study by Jin et al. (2023) identified significant impairments in executive functioning for both children with HFASD and developmental speech and language disorder. These impairments provide the difficulties in information processing speed and working memories despite HFASD people have ability to understand instructional intellectually. These issues are more visible in practical settings such as kitchens, where a well-functioning team conditions is critical to ensure the efficient flow of operations.

A considerable amount of literature has been published on people with autism that show a clinical feature such as cognitive capabilities, age, socioeconomic status, and intellectual quotient (IQ) and autism traits, which could serve as potential predictors of adaptive functioning (Casula et al., 2024; Miniarikova et al., 2023; Tamm et al., 2020). A longitudinal study by Casula et al. (2024) indicate a decline in adaptive behaviour of ASD features and adaptive functioning over one years with repetitive and restricted behaviours, and cognitive level identified as a major predictor. Nevertheless, this study was conducted among pre-schoolaged children with autism which these results may not be applicable for adult populations. While the study by Miniarikova et al. (2023) conducted within children and adolescents with ASD identified adaptive behaviour were lower to be compared with developing peers. In their report, authors discover four factors that correlates with better

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adaptive functioning which is clinical factors (IQ, ASD symptoms, behavioural problems, and motor and language skills); familial factors, and intervention and educational setting. The studies highlighted the adaptive behaviour may improve with age but adolescents with autism would face more challenges related to socialization and living skills due to the environmental demands or less access to the intervention. On the other hand, studies consistently report that improvement in sense of living among HFASD children when there were exposed to the hands-on training interventions. As example, the participants in Cooking with Confidence program by (Wong et al., 2025) demonstrated significant improvement in participants cooking self-efficacy and knowledge. Similar with a case study by Lappa & Mantzikos (2023) shown that the ability of young adult of autism and developmental disability to learn cooking skills in context of cognitive identification, numbering, and self-determination. Some analysis (E.g. Feige, Mattingly, Pitts, & Smith, 2021; Koegel, Abrams, Tran, & Koegel, 2024; Ruggeri, Dancel, Johnson, & Sargent, 2020; Tamm et al., 2020; Viezel, Freer, & Morgan, 2022) have provide a central focus on adaptive domain skill such as communication, living skills, socialization, and motor skills could be improved when a proper intervention are provided to HFASD at early stage of life. Nonetheless, each of them provides different result of findings.

Theoretical Grounding

This study is based on Albert Bandura Social Cognitive Theory (1986) to better understand how individuals with high functioning autism spectrum disorder (HFASD) develop adaptive skills in real-life learning environment such as kitchen-based training program. According to Social Cognitive Theory (SCT), learning new skill or behaviour takes place within a social context through the reciprocal interaction of individual, environment, and their behaviour (Bandura, 1999; Widodo & Astuti, 2024). The main constructs of SCT including self-efficacy, outcome expectation, observational learning, reinforcement, and self-regulation (Bandura, 1999; Frans, 2017).

Observational learning is a fundamental concept of Social Cognitive Theory (SCT), which outlines how people learn new abilities and behaviours by watching others (Widodo & Astuti, 2024). Cooking classes may present as challenge for students with HFASD as the module emphasize on practical skills rather than theory. In order to assist students developing and adapting to their skills, educators can encourage students to watch their peers, or the instructor perform activities. This can boost students' confidence and motivation to try out the activities themselves (Frans, 2017; Widodo & Astuti, 2024). Incorporating step-by-step visual demonstrations and modelling can help HFASD students better understand specific tasks like measuring ingredients, handling culinary instruments, and sanitation. These modelled behaviours provide clear and visual examples, which are typically easier to understand than abstract explanations or direct verbal commands (McCorkle, 2012; Trinh, 2017). For individuals who may struggle with language comprehension or executive functioning, the opportunity learning by visual observation can significantly stimulate their communication and support their understanding and participation (Andarwulan, Ibrahim, Suparno, & Martutik, 2021).

Another key concept of SCT is self-efficacy, that referred to a person’s belief in their own ability to succeed in specific situation. For learner with HFASD , this belief system plays a crucial role in motivation and persistence. Bandura (1999) explained the source of selfefficacy are forming from one’s belief towards the success, vicarious experiences, competent model, and belief on their capabilities. Engaging in cooking activities that include cognitive reasoning,

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motivational, emotional support and choice of process, can gradually regulate their functioning and willingness to take initiative (Bandura, 1999). Once students believe they are capable to complete the task, they are more likely to show greater flexibility, and effectiveness in managing the challenges through learning process (Bandura, 1999).

Reinforcement is also an essential construct within SCT framework. Positive reinforcement, such as praise and token of rewards, can strengthen the likelihood that a student will repeat the desired behaviours (Andarwulan et al., 2021). In contrast, inconsistent or unclear feedback may lead to confusion or withdrawal. For student with HFASD, often to depend on predictable routine and structured feedback can significantly influence how effective they adopt and retain new skill. McCorkle (2012) suggest reinforcement such as vocal communication and visual schedule can help students to keep on track and assisting the transition from one activity to another.

In addition, SCT emphasizes the importance of self-regulation, which involves an individual's ability to monitor their behaviour, judgment, and adjust actions in response to feedback or changing situation (Bandura, 1999). Within kitchen setting, this might include following a recipe in sequence, managing the frustration of unmet needs, or adjusting behaviour after mistake. For example, when kitchen routine has changes (changes of menu), it would create a frustrated and triggered unusual behaviour of HFASD. However, for those who are highly reactive may develop internal regulatory mechanism such as body-rocking, hand flapping, help seeking, and self-mumbling (Bandura, 1999). These skills can be nurtured over time with appropriate scaffolding and repeated practices.

Recent research has applied SCT in special education to explain how structured environments, when paired with effective guidance and feedback, can support learning and behaviour change (Schunk & DiBenedetto, 2020). However, its application in the context of kitchen-based learning for HFA remains underexplored. Applying SCT as a theoretical lens allows for a deeper understanding of how adaptive skills are shaped not only by individual traits but also by the social and instructional context in which learning take place. In the case of kitchen-based programs, SCT helps illuminate how the interplay between personal motivation, observed behaviour, environmental design, and educator support would contribute to meaningful skill development for learner with HFAS. This framework is particularly useful in unpacking the multi-layered influences that impact the acquisition of adaptive behaviour in functional real-world setting.

Methodology

Research Approach

This research to explore the potential factors that influence the adaptability of high functioning autism disorder (HFASD) students through autism cooking project. This study is focused on the interaction, living skill practices, socialization, and motor skills of HFASD students by using structured observational list and field notes based on SCT constructs. The study intends to demonstrate the emerging factors can influence HFASD students' learning experiences, involvement, and social acceptance when they are given the opportunity to utilize real cooking utensils and ingredients within a six-month cooking program. Non-participant observation techniques were used to capture students' behaviours and interactions in realistic classroom settings, eliminating the researcher influence via direct engagement or interference. This

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technique preserved the natural flow of activities while providing a better representation of the students' adaptive responses in a real-world situation (Yin, 2009, 2018).

Participants

This study was conducted at the Inclusive Youth Skills Training Program (Program Latihan Kemahiran Inklusiviti Belia) at IKTBN Bukit Mertajam in Penang. The site was chosen given that it actively operates café management training, including hands-on kitchenbased product preparation. IKTBN Bukit Mertajam is the Ministry of Youth and Sports Malaysia's (Kementerian Belia dan Sukan, KBS) second institution to provide the Café Management program as part of the Inclusive Youth Skills Training project, following the first program launched at Café Rimau in Sepang. The autistic cooking program observed in this study was completely developed and executed by IKTBN instructors. The researcher did not participate in the training's planning or delivery, but instead served as an external observer, focusing purely on the students' behaviours and interactions during the program. The total of students in program were five students with two of them was diagnosed with learning disability.

Since this program were under Ministry of Youth and Sport Malaysia (Kementerian Belia dan Sukan, KBS), the provided number of participants was originally limited to 6 students per intakes. Three adult aged 22-23 years with high functioning autism spectrum disorder from Pulau Pinang, Malaysia were selected to participate in this study. The criteria for selecting the subject were as follows: 1) Diagnosed as high functioning autism spectrum disorder; 2) Age 18 to 30 years old; 3) Have ability to understand what they listen and verbally interact. The total participant for this study is three HFASD adult with two male and one female. Two of them age 22 and one of them age 23 years old. All three participants are Malaysian Chinese. Following the demographic information of HFASD students presented in the **Table 1:**

Table 1: HFASD Students Demographic Profile

Student	Gender	Age	Ethnic
Student 1	Female	23 years old	Chinese
Student 2	Male	23 years old	Chinese
Student 3	Male	22 years old	Chinese

Data Collection

The study was conducted over an 18-week period at IKTBN Bukit Mertajam in Penang, with observations taking place from 9:00 AM to 12:00 PM. The goal was to examine student behaviour and analysed the program's efficiency in promoting adaptive functioning in students with HFASD. Throughout the observation procedure, social cognitive theory guided the researcher's priority and interpretation on identifying contributor of the factors that shape certain behaviour. the observational approach is not always overt and direct towards individual behaviour, rather it also can appear through several indicators such as expression and environmental cue (Bentley, Boot, Gittelsohn, & Stallings, 1994). Sign of behaviour such as preparing food from basic ingredients, decorative presence, and food packaging will reflect to the presence of self-efficacy and organizing skill among HFASD students. During observation, researcher will indirectly observe the students at the back of classroom by following observation protocol and note takings techniques (Andarwulan et al., 2021; Ciesielska,

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Boström, & Öhlander, 2017; Creswell, 2009). To maintain the authenticity of the data, the researcher recorded the activity via phone and observed the whole learning process from preparation to cleaning process. Prior to commencing the study, ethical clearance was sought from Research Ethic Committee (REC) of University Teknologi Mara (UiTM). Since the observation involved video recording, all parents' of participants has been informed and gained verbal consent for researcher to conduct this study on their child at the beginning of the program. Additionally, consents from IKTBN program educators also gained.

Data Analysis

All data that has been collected and recorded were transcribed using thematic content analysis guided by Social Cognitive Theory constructs. Field notes from non-participatory observation were coded deductively based on SCT while allowing for inductive subthemes emerged from HFASD student behaviour in context. Coding was conducted using Nvivo 12, where each student was treated as an individual case. Field notes were read thoroughly and transferred into one file for raw data. The data then described and categorised according to the codes focusing on the factors influenced adaptive behaviour during 18 weeks of class sessions. By using categorical aggregation, recurring patterns were identified and grouped under themes aligned with SCT constructs. Researcher then interpreted the data based on the observable behaviour, allowing the development of naturalistic generalization of how HFASD students adapted within a structured learning environment. The findings are presented through in-depth narrative description supported by example derived from field notes observations (Creswell, 2013)

Result And Analysis

The study aims to investigate how the autism cooking program at IKTBN Bukit Mertajam, Penang support the development of adaptive behaviour and what contributing factors influence that adaptiveness of HFASD students. The observation data yielded a comprehensive understanding of the influence of environment, social, and self-behaviour towards the adaptive functioning. Three themes were identified throughout the data analysis which is: **1) Observational Learning in Practices; 2) Peer influence; 3) Positive Reinforcement and Behavioural Changes; 4) Self-regulation in Kitchen Based Task.** Figure 1 shown the frequency of words coded from the field notes during the 18 weeks of observation. The orange colour shown the most coded word in the documents indicates that the actions or behaviour frequently to present throughout the class activities.

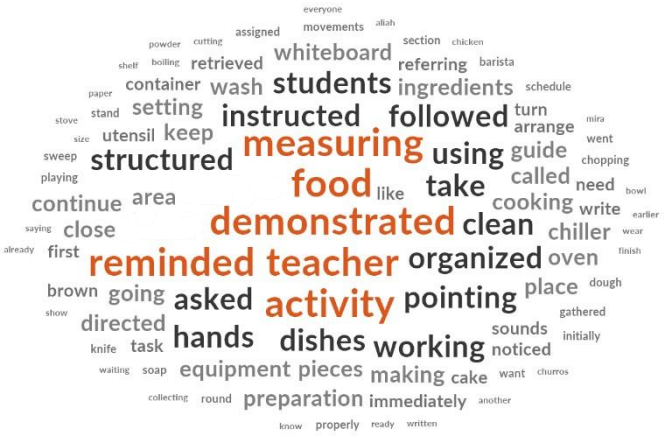

Figure 1: Word Cloud of Frequency Factors Coded (extract from Nvivo).

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Theme 1: Observational Learning and Modelling

From the observation, students consistently demonstrated reliance on peer and teacher modelling before engaging. For example, during week 3 (menu: onde-onde), teacher demonstrated how to make a small ball shape of green dough, then fill it with palm sugar. Since it was new menu for them, Student 1 excitedly attempt to do it before teacher finished demonstration, but teacher remind her to wait. She then stood besides teacher and watch it carefully. While Student 2 who easily to imitate teacher and cut the palm sugar accordingly to small chunks as per request. Similarly, Student 3 are given opportunities to try cook simple fried noodles menu after teacher demonstrated step-by-step procedure of cooking from boiling to sauteing.

This pattern suggests that visual, repetitive words, and social modelling served as key triggers for action, particularly when task involved risk, familiarity, or multiple steps. Students often waited for a cue such as 'wait after teacher finished', 'no', 'come do this', and 'look at this'. Overall, students show improvement in instructional comprehension and emotional expression through communication between teachers and peers.

Theme 2: Peer Influence on Engagement and Task Initiation

Peer presence and interaction emerged as a significant influence on student engagement, particularly in task initiation and persistence. Although cooking session were not structured as group collaboration, observational data indicate that students often monitored their peers' action and appeared motivated or hesitant based on what others were doing around them. In several sessions, Student 1 was observed to influence her peers progress the most from middle of the session. She often to encourage her peers to actively participate in the class activity or initiate the task for them. Nevertheless, her action becomes over controlling which restrict her peers interested towards certain tasks and sometimes there were conflict between her classmates. In contrast, Student 3 observed frequently watching his classmate' work first before mimicking the task himself. During doughnut making activity, he paused in the mid-of kneading and watch his peer rounding the dough with both hands. After intensely observed, he resumes his task and mirrored the same technique used by his peer, suggesting that he applied his peer action as a benchmark or cue for action. Interestingly, peer influence was not limited to imitation. Student 2 was noted to subtly compete the task with Student 1, often to stay protecting his workstation with greater focus when Student 1 wanted to invade his task. These observations highlight the social dimension of learning in kitchen environment. Although HFASD student may face challenges with direct communication, their behavioural suggest they are aware of and respond to their peer performance and feedback. Peer modelling appears to reinforce task adaptation and indirectly promote participation.

Theme 3: Positive Reinforcement and Behavioural Changes

The following extracts from the observation filed notes illustrate how verbal praise or visible outcomes resulted in clear behavioural shift. During Week 10, teacher requested Student 3 to wipe table by calling out his name while adding gesture tapping on the table surface to reinforce the clarification of the instruction. Meanwhile, teacher also sometimes applied negative reinforcement when students refuse to listen to the command. For example, Student 1 shown improper kitchen practices while peeling the vegetable. Teacher reminded her to do work while standing and properly, "Look at everyone else, they all are standing". Within a second, she put the chair back under table and stood beside her peer, continuing the previous task. This shift

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suggest that peer comparison played a role in student's change of behaviour either negative or positive way.

In another session, Student 3 shown disengagement in the class activity as he arrived late to class and lost his attention as teacher and his classmate had start measuring the ingredients. After a while teacher invite him to help fold the spiring rolls. Teacher started with demonstration, and he followed afterwards. He managed to fold the spring roll in perfect shape and teacher impressed with his skills, " wow, you done it very well, it's perfect !". Despite his lack of expressing his emotions, it was clear that the praise inspired him to continue and stay focused on the task. Evenly he enjoyed getting engaged with small talks with teachers while folding the spring roll. Meanwhile Student 3 usually require emotional validation from teacher. In every class session he would ask "Am I a good boy? This one is yes?" when referring to the task he on doing it. Teacher will respond with some positive encouragement to overcome his hesitation, " (nods) good boy must first make them round" / " okay good".

Overall teachers handle students by reinforcing the instructional support such as hand gesture, supporting tools, simple short praise, corrective action, constant reinforcement and teacher involvement in activity to support students and reduce anxious behavioural performance such as echolalia, rocking body, or mumbling. It was shown that HFASD students become more responsive and engaged when their effort was acknowledged. The lesson delivered thoroughly from teacher verbal assistance starting from collecting items to measuring. Most of the times teachers applied visual directions (get the round big bowl, find the measuring spoon with red color, etc.), colour-coded ingredients, and auditory cues (e.g. timers, sound signals) to guide the students through the cooking process.

Theme 4: Self-Regulation and Self-Efficacy in Kitchen-Based Task

While HFASD students initially depended heavily on prompt and instructions, the later session revealed emerging signs of self-efficacy and self-regulation. One of clearest example came from Student 1 during Fried Noodle making activity. She independently decides to add additional tom yum paste in her fried noodle to enhance the taste. She confidently transfers the fried noodle onto the plate and excitedly present it to teacher, "teacher look, I'm done !". She also seemed excited when it comes to sale day where they need to sell the doughnut product to other customers. She confidently jots down the order and provide a QR scanner to the buyers. Although she is having challenges to communicate appropriately and writing, she still manages to do it herself with minimal assistance by teachers. Likewise, when teacher assigned to cut the chocolate bar, Student 2 already know tools needed (e.g. chopping board and knife). He carried the knife with the tip pointed downward demonstrating awareness of the knife handling safety. He also holds the handle and applies the pressure carefully on knife when cutting the hard chocolate bar. No verbal prompt was given, indicating that he had internalized this step from previous session and was now managing the task independently.

HFASD students daily life often driven by routine and ritual, consistent and accurate sequence of cooking procedure being critical in maintaining calm environment. This extract from observation notes demonstrates unexpressed need or want in particular class setting. As example, Student 3 began to scream, jumping, and running between the kitchen and barista area. The teacher reminded him with assertive tone, " Student 3, behave... behave". He then slowly to calm down, sat quietly, and kept repeat the words, "behave, good boy". His action to repeat 'behave, good boy' as a tool to calm himself down demonstrated an awareness of his

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action to environment. However, the routine still appeared in the classroom such as hand washing, table cleaning, and menu writing on whiteboard to help students able to adapt with daily living practices.

Discussion

This study aims to explore the contributing factors through lens of Social Cognitive Theory that influence adaptive skill development in high functioning autism spectrum disorder (HFASD) students through practical learning environment. Cooking might be viewed as an unpopular or routine work in special education, particularly in cooking intervention programs for autistic kids. Instead, it represents a complex learning experience that addresses a variety of critical developmental domains. These include fine and gross motor abilities, thinking abilities, sensory processing, and social communication. Through controlled and guided cooking activities, students on the autism spectrum can improve their functional independence, build meaningful social relationships, and acquire relevant life skills that contribute to their overall quality of life and long-term educational results (Lappa & Mantzikos, 2023). Drawing on Social Cognitive Theory (SCT), the findings highlight how modelling, reinforcement, selfregulation, self-efficacy, and peer influence interact to support skill adaptation and development in real-life vocational setting.

The findings revealed that observational learning played critical role in how students engaged with new task. Students frequently relied on teachers or peers to model a behaviour before attempting it themselves. As being mentioned by Frans (2017), observational learning can be presented through cooking demonstrations and class discussions by encourage to cook a simple healthy food. Teachers play most important role as a model in SCT by provide a positive example through visual, repetitive words, and social modelling as practical influence on the adaptive learning particularly when task involved risk, familiarity, or multiple steps. For example, teacher teach students how to shred cabbage by implied repetitive sentence and visual assist “slice it, thinly... thinly... like this”. By modelling the action through slow pace and repeated guide can help HFASD students who facing challenge in cognitive functioning to able generate the information fully by observing and mimicking the action after that (Casula et al., 2024). This study also supports the previous statement by Murray (2015) highlighted the peer models and tutor is one of effective strategies in encouraging imitative behaviour from students. Teacher involvement along the activity can result in students to copy teacher’s behaviour towards the desired actions (Bolourian et al., 2022; Lima et al., 2023).

Besides teachers, students can influence each other’s behaviour either negative or positive ways. By creating opportunities for students to observe and interact with each other through sharing task can strengthen the social aspect of learning. In this study, student with HFASD frequently struggled to engage with classmates, initiate communication, responding to others, and maintain mutual conversation. Peer relationship in classroom appeared to be affected by these social communication issues. For instance, during task sharing activity, Student 2 frequently lost patience with Student 1, as she failed to comprehend his task preference which results in task disengagement. This kind of misunderstanding demonstrate how lack of social adaptability and considering other perspective can exacerbate peer conflict. Nonetheless, students also show positive social interaction in terms of non-communicable style, as example they perform certain skill when they saw other classmate done it. Nonetheless, students displayed better social relationships through non-communicative actions. For example, they frequently attempted new tasks or skills after observing their peers, showing the importance of

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peer modelling on their learning and engagement. The current findings shown a slight contradiction from past studies (Chang & Locke, 2016; Widodo & Astuti, 2024), possibly due to lack of group-based learning approach throughout the class activity, which may have limited their exposure to positive peer interaction.

The data highlighted the positive of reinforcement such as such as hand gesture, supporting tools, simple short praise, corrective action, constant reinforcement and teacher involvement in activity, to encourage HFASD enjoying learning new menu of products and learning new cooking skills after the program has ended (Gustin et al., 2020; Lappa & Mantzikos, 2023). Based on the field notes, HFASD students appeared to react positively to compliment and were observed adapting their behaviour in order to impress the teacher. was observed adjusting their own behaviour to impress the teacher. Prompt and consistent feedback helps to maintain participation and minimize task avoidance, which contributes to students' overall adaptive progress. Overall Theme 3 support the previous literature (Chang & Locke, 2016; Gustin et al., 2020; Schunk & DiBenedetto, 2020). Gustin et al. (2020) considered to involve a video series or blog for HFASD students to follow up once they finish the program.

Over the time, students demonstrated a positive adaptive behaviour in terms of how they regulate their emotions, numbers of time they initiate the action, and confidence in ingredient preparation. With the open opportunity given to the students at the end of session (around week 13-18), it would give some more motivation to HFASD students to prepare their own foods following the theme of menu which also contribute to confidence and self-efficacy improvement. By exposing HFASD students to independently prepare their own meal, may decrease the current burden and concern of caregivers experience when providing continuous support as they grow older or shifting to new living environment (Trinh, 2017).

Limitation and Future Study

The findings of current study are subject to at least three limitations. First, the limitation of this study was probably the number of participants which effect the generalizability of overall HFASD learners. Future studies are suggested to conduct within more larger group of HFASD students with equal gender, parents and cross-cases can also be applied within two or more IKTBN in Malaysia (Koegel et al., 2024; Trinh, 2017). Second, the research was limited to access of teaching materials. The teaching materials presented are identified to not properly address the needs of HFASD students since the booklet menu were presented in short wording only. This limits the students who struggle with reading comprehension and also researcher to evaluate HFASD students' progress and identified indicators that influence their task selections. Instead by including illustrated pictures, example of product name labels, and sequential photograph, could assist students with HFASD a better comprehension on what they learned during the session and help to minimize sensory overload (Lappa & Mantzikos, 2023). A further investigation can involve developing and implementing a new instructional module featuring the recommended learning preferences of students with HFASD, adapted specifically to the practical setting of food services and hospitality education. The third potential limitation of this study was absence of control group which constrains the ability to draw casual conclusion (Hollywood et al., 2022). Additionally, while non-participatory observation allowed for unobtrusive data collection the potential for observer bias remains as a minor concern, particularly in interpreting subjective aspects of participant behaviours. Future work needs to account for varying the adaptive behaviours among participants by conducting a control group within them. For example, one group apply the original module while control

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group applied the new developed module to see the extent of adaptation of HAFSD students towards the context of study.

Conclusion

The purpose of current study was to unpack the influence of factors contributing to the adaptive skill among HFASD students through observational study of their engagement in an inclusive cooking program at IKTBN Bukit Mertajam, Penang. The findings of the current study suggest that adaptive learning can be achieved through cooking program specialised for high functioning autistic learners. Factors such as observational learning and modelling, peer influence, positive reinforcement, and students' internal motivation have been found to help students with high-functioning autism spectrum disorder (HFASD) adjust more quickly to new learning environments. These factors support their independence and contribute to improving their overall quality of life. This finding would provide substantial insight to the food service and education sectors, enabling culinary programs to better support students with special needs by identifying the motivating aspects that enhance performance in social, conceptual, and practical skills. This study also elucidates about culinary training, which holds a potential to be a multi-focus solution for not only diet quality movement but also can improve quality of life among individual HFASD.

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