

TASK ANALYSIS TEACHING IN VOCATIONAL SKILLS INSTRUCTION: A CASE STUDY OF SALTED EGG MAKING USING THE SOAKING TECHNIQUE FOR STUDENTS WITH INTELLECTUAL DISABILITIES

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Abstract

Students with intellectual disabilities need vocational skills instruction that is concrete, incremental, and meaningful to daily life in order to achieve functional independence. This study aims to describe the implementation of task analysis teaching in learning to make salted eggs using the soaking technique, a processing method that relies on measuring tools and standardized proportions and is therefore potentially easier for students to replicate than conventional techniques such as ash-coating or salt-paste application. This study used a descriptive qualitative approach with an instrumental case study design, involving 12 students with intellectual disabilities and their accompanying skills teacher. Data were collected through task analysis observation using a structured performance sheet, semi-structured interviews with the teacher, and process documentation, then analyzed using the interactive model of Miles and Huberman, with trustworthiness strengthened through source and method triangulation. The findings show that students with intellectual disabilities were able to independently master task-analysis steps standardized through measuring tools (such as sorting, cleaning, and dissolving the brine solution), while the step requiring high fine-motor coordination (shell sanding) required gradual scaffolding to improve precision and reduce the risk of failure.

Keywords: task analysis teaching; vocational skills; salted egg soaking technique; intellectual disabilities

INTRODUCTION

Education for students with intellectual disabilities does not stop at mastering academic material alone, but must lead them to a meaningful and independent adult life. In reality, individuals with intellectual disabilities, both in developed and developing countries, still face significant barriers in obtaining employment, participating in the economy, and living independently, despite inclusive education policies being in place for decades (Taconet et al., 2024). This condition is partly a reflection of the gap between the curriculum content and the skills that are truly needed to participate in society. The transition period from school to adulthood becomes a crucial point, as post-school success is more supported by practical skills that can be directly applied, rather than by abstract academic knowledge (Bouck, 2010; Clark et al., 1994). Vocational education designed functionally and relevant to real opportunities in the students' environment is believed to strengthen their independence, work readiness, and quality of life (Brolin & Loyd, 2004).

The production of salted eggs is one of the vocational skills relevant to that context, especially in areas familiar with duck eggs and home food processing businesses. As a traditional food product with a well-known market, salted eggs have several advantages as vocational learning material: the raw materials are easily obtainable, the process involves clearly observable stages, and the product can be directly linked to micro-business opportunities after students graduate. Among the various techniques for making salted eggs, the soaking technique has its own pedagogical advantages because the proportions of water and salt can be standardized using measuring tools, unlike the ash or clay coating techniques that heavily rely on qualitative estimates (Li et al., 2022). This standardization has the potential to lighten the decision-making burden for students at crucial stages in their learning.

Although it seems simple, the process of making salted eggs actually requires the ability to remember long procedures, follow a fixed sequence of steps, pay attention to soaking duration, and perform stages that demand fine motor skills, such as cleaning the shells. For students with intellectual disabilities, limitations in working memory, attention span, ability to sequence steps, and generalization of learning can affect their fluency in carrying out procedures like this (Benson et al., 2021). However, conventional teaching that relies solely on one-time demonstrations or general verbal instructions is often inadequate for students who require gradual and individually tailored guidance (Cannella-Malone & Schaefer, 2016). Task analysis, rooted in the principles of systematic instruction and applied behavior analysis (Alberto & Troutman, 2013), offers a solution to this issue by breaking down complex skills into small, observable steps that can be taught one at a time. This approach is usually combined with modeling, prompting, chaining, reinforcement, and systematic feedback, with assistance gradually reduced as the student's independence increases (McConomy et al., 2022), allowing teachers to monitor student progress at each step, rather than just assessing the final outcome.

A number of studies have examined the effectiveness of task analysis in the domains of daily living and vocational skills for individuals with intellectual disabilities, albeit with varying scopes. Taconet et al. (2024) found that independent living skills interventions, including those based on task analysis, are quite effective in helping adolescents with intellectual disabilities or autism achieve functional independence, although most of the studies they reviewed were still small-scale. In the domain of food preparation, Lappa and Mantzikos (2023) combined task analysis with visual recipes and modeling to teach basic cooking skills to adults with developmental disabilities, and found that the skills acquired could be maintained even after visual and verbal assistance was discontinued. Stefanko (2024), through a video prompting procedure structured based on task stages, also reported an improvement in culinary skills among adults with intellectual disabilities, although the sample was limited to three participants. In the context of Indonesia, Apriyanti (2023) examined the learning abilities of students with intellectual disabilities in making the traditional food "opak bakar" through a step-by-step experiment, and it has become one of the relevant local references for teaching traditional food production skills to this population. Riyani et al. (2016) themselves have documented the learning of salted egg-making skills for students with mild intellectual disabilities at a special school in Bandung City, but the

technique studied was ash/clay coating, not soaking, and it has not been organized within an explicit task analysis framework.

Among these studies, it appears that task analysis is widely applied to short-duration tasks completed in one session, while production processes that span multiple days, such as the soaking of salted eggs which requires several days of curing, have not been extensively addressed. This gap underlies this research: examining how task analysis instructions are applied and how patterns of independence and support needs of students with intellectual disabilities emerge in learning the production of salted eggs using the soaking technique. This research is descriptive with an instrumental case study design, thus it is not intended to prove a cause-and-effect relationship between instructional approaches and learning outcomes, but rather to produce an in-depth and contextual picture that can serve as a reference for subsequent experimental research and classroom teaching practices

METHODE

This research uses a descriptive qualitative approach with an instrumental case study design, which is a design that utilizes a specific case as a means to understand a broader phenomenon or issue, in this case, the application of task analysis in traditional food vocational skills for students with intellectual disabilities (Kekeya, 2021; Yin, 2018). The research participants consisted of 12 students with mild to moderate intellectual disabilities, aged 16–20 years and enrolled in the Special Needs High School level, who are part of the vocational skills learning program at two Special Schools in Bandung City, as well as skills teachers who acted as supporting informants. Participants were selected using purposive sampling with the consideration that the students had been enrolled in the food processing vocational skills program for at least one semester. Before data collection, informed consent was obtained from the school, supervising teachers, and the students' parents/guardians, to ensure that the students' participation was voluntary and did not disrupt the regular learning process.

Data were collected through three complementary techniques. First, task analysis observation using a structured performance sheet containing the steps of making salted eggs using the soaking technique, from the preparation of tools and materials to the presentation of the eggs after boiling, with achievement scales of Independent (I), Verbal Assistance (VA), Physical Assistance (PA), and Unable (U) at each step. Second, semi-structured interviews with the supervising teacher to explore teaching strategies, observed obstacles, and adaptations made during the learning process. Third, documentation in the form of photos and field notes in each session to record events and contexts that are not fully captured by the observation sheets. The validity of the data is strengthened through source triangulation (comparing observation results with teacher statements) and technique triangulation (comparing performance sheets, interviews, and documentation), following the credibility criteria proposed by Lincoln and Guba (1985) for qualitative research.

Data were analyzed using the interactive analysis model by Miles, Huberman, and Saldaña (2014), which consists of three stages: (1) data reduction, which involves summarizing and focusing the observation and interview data on patterns relevant to the stages of task analysis; (2) data display, which is organized in the form of achievement matrices for each work stage for all students and thematic narratives; and (3) conclusion/verification, which is conducted repeatedly

throughout the data collection process to ensure that the interpretation aligns with field evidence.

Table 1 Research Subject

NO	NAME	STUDENT'S AGE	GENDER	CATEGORY
1	CR	20	Male	mild intellectual disability
2	NS	17	Male	moderate intellectual disability
3	YN	17	Female	moderate intellectual disability
4	VR	16	Male	mild intellectual disability
5	SK	17	Female	moderate intellectual disability
6	RS	18	Male	moderate intellectual disability
7	DW	17	Female	mild intellectual disability
8	TR	18	Male	mild intellectual disability
9	SB	17	Female	moderate intellectual disability
10	DV	20	Female	moderate intellectual disability
11	AR	18	Male	mild intellectual disability

RESULTS

The data presented in this section is an initial recap of the task analysis observations of twelve students during several sessions of learning the skill of making salted eggs using the immersion technique. The numbers and descriptions presented are descriptive in nature, intended to illustrate the general trends observed in the field, and will continue to be refined as the entire data collection cycle is completed. The findings are presented thematically, following the pattern of student achievement at each stage of task analysis, accompanied by a recap of the level of independence as presented in Table 2.

Tabel 2
Initial Recap of Student Independence Levels by Work Stage

Tahap Kerja	M	BV	BF	Insiden/Catatan
1. Preparing tools and materials	10	2	0	All students were able to identify the functions of the basic tools
2. Sorting good and unsuitable eggs	11	1	0	Almost all students were able to perform the task independently
3. Washing and cleaning the eggs	9	3	0	Some students still required guidance on the appropriate amount of scrubbing.

4. Sanding the eggshell surface	4	4	4	Two students broke eggs due to insufficient care; others worked slowly but carefully
5. Measuring and preparing the soaking solution	11	1	0	This step was relatively easy to master because standardized measuring tools and quantities were used.
6. Arranging and soaking the eggs	9	3	0	This step was relatively easy to master because standardized measuring tools and quantities were used.
7. Removing and washing the eggs after soaking	8	3	1	Some students required reminders about the monitoring schedule.
8. Removing and washing the eggs after soaking	10	2	0	Performance was good, following a pattern similar to the initial cleaning stage.
9. Boiling the eggs (under supervision)	7	3	2	More assistance was required due to safety considerations related to handling hot water and heat.
10. Serving the eggs	10	2	0	Performance was good, with high motivation because this was the final stage.

High Independence in the Sorting and Dissolving Stage of Soaking Liquid

Observation results show that almost all students (11 out of 12) are able to independently sort good and bad eggs by soaking them in a container of water and observing their position: eggs that sink perfectly to the bottom of the container are categorised as good quality and suitable for further processing, while eggs that float or hover on the surface of the water are set aside as they indicate a decline in quality. Similar high independence was also observed in the stage of measuring and dissolving the soaking liquid. The supervising teacher reported that the process of dissolving salt was relatively easy for the students to master because the water measurement was instructed using a measuring tool (measuring cup) and the salt composition using standard measurements (measuring spoon/scale), so the students did not need to make estimations or qualitative judgements about the exact measurements, just follow the markings on the measuring tool. This pattern is consistent with field notes indicating that students completed these two stages more quickly and confidently compared to other stages that required more subjective qualitative assessments, such as "how fine" or "how clean" the shell sanding results were.

Sanding Stage as a Critical Point of Motor Skills and Caution

Unlike the two previous stages, the process of cleaning and sanding the eggshell surface was identified as the most motorically challenging stage. Overall, almost all students were able to follow the basic instructions for cleaning the eggs well, but most took a relatively long time and exercised extra caution during the sanding process, as seen from their slow hand movements and repeated checks of the sanding results before proceeding to the next part of the shell. Out of 12 students,

two of them exhibited the opposite pattern, being less careful in pressing the shell surface while sanding, resulting in one egg breaking for each of them (a total of two eggs broken at this stage). The egg breakage incidents for both students occurred at the same transitional moment, namely when the students moved from sanding to flipping the egg to sand the other side, indicating that the vulnerable point was not in the sanding skill itself, but in the coordination when holding and rotating the oval and fragile object.

Teacher Scaffolding Strategy at the Risky Stage

The teacher reported that at the sanding stage, the assistance provided was gradual: starting with verbal reminders ("slowly," "hold in the middle"), then increasing to physical assistance by guiding the students' hand positions when they first held the egg, and gradually reducing (fading) as the students showed stability in their grip. For both students who experienced the egg-breaking incident, the teacher repeated the gripping exercise using cheaper chicken eggs as a training medium before returning to the duck eggs, which were the main material, as a form of instructional adjustment without halting the entire group session.

General Patterns in the Soaking, Monitoring, and Presentation Stages

At the stage of arranging and soaking the eggs, some students require verbal instructions to ensure the eggs are not placed too closely together, but generally, this stage can be completed smoothly. The incubation monitoring stage requires the ability to remember the schedule, so some students need reminders from the teacher about when to check the incubation containers. At the boiling stage, more assistance from the teacher is provided due to safety considerations related to heat and boiling water, not because of the students' limited motor skills. On the other hand, the presentation stage showed a high level of independence and enthusiasm, which the supervising teacher interpreted as the motivational impact of seeing the final results of their own work.

DISCUSSION

The finding that almost all students are able to master the sorting and dissolving stages of the soaking liquid independently aligns with the principles of task analysis teaching, which emphasises that complex skills will be easier for students with intellectual disabilities to master if broken down into small steps with clear and concrete success criteria (Benson et al., 2021; McConomy et al., 2022). The ease at the stage of dissolving the soaking liquid specifically strengthens the argument that the use of standardised tools, in this case measuring cups and salt spoons/scales, can serve as a form of instructional modification that simplifies the cognitive demands on students, in line with the concept of reasonable adjustment in vocational training for individuals with intellectual disabilities, one form of which is the use of measuring tools to reduce reliance on qualitative assessment (Cannella-Malone & Schaefer, 2016). From this perspective, the soaking technique that relies on measured quantities can be considered more pedagogically friendly compared to the conventional coating technique that requires an approximate assessment of texture, as used in the previous salted egg skill study (Riyani et al., 2016). These findings are also in line with the results of Lappa and Mantzikos (2023) and Apriyanti (2023), both of whom found that food processing skills are easier to maintain by individuals with intellectual disabilities when the success parameters are made concrete and can be objectively verified, rather than relying

on subjective qualitative assessments.

On the contrary, the challenges at the egg shell sanding stage can be understood through the lens of the zone of proximal development (ZPD) theory proposed by Vygotsky, which is the distance between the abilities that students can perform independently and the abilities that can be achieved with the help of more competent individuals. The sanding stage requires fine motor coordination and hand pressure sensitivity that are beyond the independence zone of some students, thus necessitating scaffolding as conceptualised by Wood, Bruner, and Ross (1976), which is structured support that is gradually reduced (fading) as the students' competence increases. The pattern of graduated assistance from verbal to physical reported by the accompanying teacher in this study reflects the natural application of the scaffolding principle in the field, although it seems to have not been done systematically and documented. These findings align with Stefanko (2024), who also noted that the stage involving high fine motor skills in cooking instructions for individuals with intellectual disabilities generally requires more intensive practice repetition and gradual support compared to other stages.

The incident of two eggs breaking due to two students' lack of caution also has important implications for the design of future task analysis. This incident is not merely an individual performance failure; this finding is better understood as an indication that the "sanding" step in the current task analysis is still too broad in scope for students with more vulnerable motor coordination and needs to be further broken down into more detailed sub-steps, such as the specific step of "turning the egg with both hands before switching sides," in line with the task analysis principle that suggests the degree of detail in steps should be adjusted to the individual characteristics of the students (McConomy et al., 2022). The use of substitute training media (chicken eggs as a transitional medium before the main material) by the teacher in this study is also in line with the practice of using graduated materials, which is commonly recommended in vocational skills teaching for students with intellectual disabilities (Cannella-Malone & Schaefer, 2016).

Overall, these findings reinforce the concept of life skills education proposed by Brolin and Loyd (2004), that the success of vocational skills learning for students with intellectual disabilities does not solely depend on the mastery of motor skills, but also on the extent to which the learning environment, including aids, the level of teacher support, and the level of instructional detail, is designed to match the individual ability profiles of the students. The production of salted eggs using the soaking technique, with process characteristics that can largely be standardised through measuring tools, shows potential as relatively accessible vocational skill material, with the note that stages requiring sensorimotor sensitivity, such as sanding, still require special instructional attention.

This research is not without a number of limitations. First, the limited number of participants, with only 12 students from two schools, means that these findings cannot be widely generalised, and should therefore be read as a contextual representation of the studied cases, rather than a general conclusion. Second, the data presented is still an initial recap of several learning sessions, so the achievement patterns of the students have the potential to change as the number of sessions and experiences increases. Third, this study has not measured skill retention over a longer period after teacher assistance has been completely withdrawn, an important aspect for assessing the sustainability of student

independence post-learning.

CONCLUSION

The application of task analysis teaching in the learning of salted egg-making skills using the soaking technique shows varied achievement patterns among 12 students with intellectual disabilities. The stages involving standardised measurements, such as dissolving the soaking solution, are relatively easy for students to master independently because the use of measuring tools reduces the demand for qualitative assessment. On the other hand, the stage that requires fine motor coordination and hand pressure sensitivity, namely sanding the eggshell, becomes the most challenging point, marked by the incident of two careless students breaking the eggs and the tendency of most other students to perform this stage slowly but carefully.

These findings have practical implications that the design of task analysis for traditional food-based vocational skills needs to consider the use of measuring tools to simplify measurement-based stages, as well as the provision of gradual scaffolding from verbal assistance to physical assistance that is systematically faded at motorically high-risk stages, accompanied by the use of substitute training media before students work with the main materials. Theoretically, these findings reinforce the relevance of integrating the life skills education framework, task analysis, and scaffolding in designing vocational skills learning that is responsive to the individual ability profiles of students with intellectual disabilities.

Further research is recommended to expand the participant scope to more than two educational units, as well as to consider experimental designs with single subjects (single subject research) or groups to quantitatively measure the effectiveness of task analysis modifications, particularly the breakdown of the sanding step into more detailed sub-steps, on the improvement of independence and reduction of error rates among students with intellectual disabilities in traditional food-based vocational skills.

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