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Effects of Authentic Assessment Practices on Students' Skill Acquisition in TVL-HE Bread and Pastry Production: A Quasi-Experimental Study

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Abstract

This study examined the effects of Authentic Assessment Practices on the psychomotor skill acquisition of Grade 12 Technical-Vocational-Livelihood Home Economics students specializing in Bread and Pastry Production at Dolores National High School during the 2025–2026 academic year. Anchored on Experiential Learning Theory and Situated Cognition, the study used a quasi-experimental pre-test–post-test non-equivalent control group design involving 46 students. The Control Group consisted of 21 students assessed through traditional written testing, while the Experimental Group consisted of 25 students assessed through performance-based tasks, industry-aligned analytical rubrics, and continuous formative feedback. Data were gathered using a Psychomotor Skill Acquisition Diagnostic Tool and an Industry-Aligned Analytical Rubric validated by Home Economics master teachers and TESDA-certified assessors. Results showed that both groups improved significantly from pre-test to post-test; however, the Experimental Group achieved a higher post-test mean score of 86.56 compared with the Control Group's mean score of 68.43. The independent-samples t-test revealed a significant difference between the groups, with an exceptionally large effect size, indicating that authentic assessment had a stronger effect on students' skill acquisition. The study concludes that authentic assessment strengthens technical competence, product quality, safety practices, operational pacing, and readiness for workplace immersion or national qualification assessment. The study supports SDG 4 on Quality Education, SDG 8 on Decent Work and Economic Growth, SDG 9 on Industry, Innovation and Infrastructure, and SDG 17 on Partnerships for the Goals. Its sustainability impact lies in improving educational quality, strengthening employability, reducing vocational grade inflation, and aligning school-based assessment with industry standards.

Keywords: Authentic Assessment Practices, Bread and Pastry Production, Industry-Aligned Rubrics, Psychomotor Skill Acquisition, Situated Cognition, Technical-Vocational-Livelihood Education, Workplace Readiness

1. Introduction

This study examines the effects of Authentic Assessment Practices on the psychomotor skill acquisition of Grade 12 Technical-Vocational-Livelihood Home Economics students specializing in Bread and Pastry Production. Specifically, it investigates how performance-based tasks, industry-aligned rubrics, and formative feedback may enhance students' practical competence compared with traditional written assessment. The study responds to the need for assessment models that more accurately reflect real workplace expectations in technical-vocational education.

Technical-Vocational-Livelihood education plays a significant role in preparing learners for employment, entrepreneurship, and economic participation by connecting classroom instruction with industry readiness (Ayon & Castro, 2021; Billett, 2020; Lucas et al., 2022; UNESCO, 2023). In the Philippine Basic Education system, the TVL-HE Bread and Pastry Production specialization requires both theoretical knowledge and psychomotor mastery (Department of Education [DepEd], 2019; Lagas & Torres, 2022). Students are expected to develop competencies in food chemistry, baking mathematics, dough handling, equipment operation, sanitation, and workplace safety (Delos Reyes, 2023; TESDA, 2020). As the hospitality and culinary sectors continue to modernize, schools are increasingly expected to produce graduates who possess practical skills and immediate operational competence (Alvarez, 2024; Baum, 2021; International Labour Organization [ILO], 2022).

Traditional assessment practices in vocational education often rely on written tests, multiple-choice examinations, and factual recall tasks (Black & Wiliam, 2018; Popham, 2020; Shepard, 2019). While these methods can measure cognitive understanding, they are limited in evaluating actual technical performance and physical skill execution (Gulikers et al., 2024; Palm, 2021; Wiggins, 1998). In Bread and Pastry Production, knowledge of baking concepts does not automatically translate into mastery of kneading, ingredient scaling, thermal control, sanitation, and time-bound kitchen operations (Boud & Falchikov, 2021; Santos & Reyes, 2023). This limitation highlights the need for assessment approaches that measure competence through actual performance rather than written recall alone (Dierick et al., 2022; Sluijsmans et al., 2023).

Authentic Assessment Practices address this concern by evaluating learners through meaningful and real-world tasks that reflect professional standards and workplace expectations (Darling-Hammond, 2020; Montgomery, 2022; Vallejo & Salva, 2024). In TVL-HE Bread and Pastry Production, authentic assessment may include performance-based tasks, industry-aligned rubrics, student portfolios, and continuous formative feedback (Macasieb, 2023; Raymond & Harrison, 2021). These practices allow students to demonstrate not only what they know, but also what they can perform under realistic culinary conditions.

Globally, technical-vocational education is recognized as an important pathway for workforce development and economic competitiveness (Billett, 2020; Lucas et al., 2022; UNESCO, 2023). Nationally, the Philippine TVL curriculum and TESDA standards emphasize skill-based training, competency development, and certification readiness, particularly in specialized tracks such as Bread and Pastry Production (Department of Education [DepEd], 2019; TESDA, 2020). However, at the local level, many public high schools continue to face constraints such as large class sizes, heavy teaching loads, limited budgets for laboratory ingredients, and restricted practical assessment resources (De Guzman, 2021; Javier, 2024). These conditions often lead teachers to rely on traditional written tests even in courses where hands-on performance is the central measure of competence.

This study is anchored on Experiential Learning Theory (Kolb, 1984) and Situated Cognition (Lave & Wenger, 1991). Experiential Learning Theory explains that skills are developed through direct experience, reflection, conceptual understanding, and repeated application. Situated Cognition emphasizes that learning is most meaningful when knowledge and skills are developed in contexts that resemble actual practice (Brown et al., 1989; Resnick, 1987). These theories support the use of authentic assessment in Bread and Pastry Production because students acquire and demonstrate competence more effectively when assessment tasks mirror real baking environments, industry standards, and operational demands.

Although authentic assessment is widely supported in educational literature, its measurable effect on psychomotor skill acquisition in local TVL classrooms remains limited (Aquino, 2022; Mendoza & Cruz, 2023). Many existing local studies focus on teachers' and students' perceptions rather than experimental evidence of actual skill progression (Dumandan & Pineda, 2024; Villanueva, 2021). There is also a specific gap in studies focusing on culinary and bread and pastry skills, where competence must be demonstrated through technical execution, product quality, sanitation, and time management (Gatchalian, 2023; Oliveros, 2022). This study addresses this gap by using a quasi-experimental design to compare students assessed through traditional testing with those assessed through authentic, industry-aligned assessment practices.

The study aligns with SDG 4 – Quality Education because it promotes a more relevant, competency-based, and skill-oriented approach to assessment in technical-vocational education. It also supports SDG 8 – Decent Work and Economic Growth by strengthening students' readiness for employment, workplace immersion, and national qualification assessment. The study further contributes to SDG 9 – Industry, Innovation and Infrastructure by encouraging assessment innovations that connect school-based training with industry standards. In addition, it supports SDG 17 – Partnerships for the Goals because effective TVL education benefits from stronger collaboration among schools, TESDA, industry assessors, and workforce development institutions.

This study contributes to educational sustainability by improving how student competence is measured in technical-vocational education. It also supports socio-economic sustainability by helping learners develop employable skills that may improve livelihood opportunities and workforce participation. From an institutional sustainability perspective, the study provides evidence that schools may use to strengthen assessment systems, reduce grade inflation, and align classroom evaluation with actual industry performance standards. Its findings are also relevant to policy and governance sustainability because they may guide school leaders and curriculum implementers in improving TVL assessment practices based on measurable learning outcomes.

2. Material and methods

2.1 Research Design

The study employed a quasi-experimental pre-test–post-test non-equivalent control group design to evaluate the influence of assessment practices on students' psychomotor skill development (Campbell & Stanley, 1963). This design was appropriate because the study involved intact classroom sections where random assignment of individual students was not logistically feasible or ethically advisable in an actual school setting (Cohen et al., 2018; Creswell & Creswell, 2018). The existing sections were assigned as the Control Group and Experimental Group to allow comparison of learning outcomes under two assessment conditions (Gay et al., 2012).

2.2 Locale of the Study

The study was conducted at Dolores National High School, a public secondary school in Dolores, Eastern Samar, Philippines. The school operates under the Department of Education Division of Eastern Samar and serves learners from urban-adjacent and rural coastal barangays (Philippine Statistics Authority [PSA], 2020). It was selected because it offers the Senior High School Technical-Vocational-Livelihood track under the Home Economics strand, specifically Bread and Pastry Production, in accordance with national curriculum standards (Department of Education [DepEd], 2019). The school has a TVL Home Economics laboratory kitchen with equipment such as ovens, mixers, proofers, weighing scales, and baking tools, making it suitable for observing practical culinary performance based on vocational standards (DepEd, 2016; TESDA, 2020).

2.3 Respondents of the Study

The respondents were forty-six Grade 12 Senior High School students enrolled in the TVL-HE Bread and Pastry Production specialization at Dolores National High School during the 2025–2026 academic year. The Control Group consisted of 21 students who received standard competency-based instruction and were assessed through traditional written testing. The Experimental Group consisted of 25 students who received the same curriculum content but were evaluated through authentic assessment practices, including performance-based tasks, real-time industry rubrics, and formative feedback loops.

2.4 Sample and Sampling Procedure

The study used purposive sampling and maintained two intact, pre-existing classroom sections to preserve the actual school setting and avoid disrupting class schedules (Campbell & Stanley, 1963; Gay et al., 2012). This approach was appropriate for educational experiments where randomization may not be practical or ethical (Cohen et al., 2018; Creswell & Creswell, 2018). All respondents were officially registered Grade 12 students taking Bread and Pastry Production as a core specialization in the TVL track. Both groups had the same access to instructional hours, laboratory equipment, and basic baking ingredients, helping reduce possible threats related to unequal resources or learning conditions (Babbie, 2021; Shadish et al., 2002).

2.5 Research Instrument

The study used two main quantitative instruments: the Psychomotor Skill Acquisition Diagnostic Tool and the Industry-Aligned Analytical Rubric. The Psychomotor Skill Acquisition Diagnostic Tool served as the pre-test and post-test instrument and measured students' practical performance in baking mathematics and formulation, physical dough manipulation, and thermal and equipment management. These areas reflected essential competencies in Bread and Pastry Production based on curriculum and industry standards (Department of Education [DepEd], 2019; TESDA, 2020). The tasks included calculating baker's percentages, scaling ingredients, kneading, portioning, shaping dough, and operating baking equipment under timed conditions (Delos Reyes, 2023; Lagas & Torres, 2022). The Industry-Aligned Analytical Rubric was used for the Experimental Group and was adapted from the Technical Education and Skills Development Authority (TESDA, 2020) National Certification assessment guidelines and Mueller's (2018) authentic task framework. The rubric measured technical execution and process, product quality, safety, sanitation and hygiene, and time management and operational pacing. The use of an analytical rubric allowed specific assessment of observable psychomotor competencies and helped identify particular areas of student skill development (Macasieb, 2023; Popham, 2020). Product quality indicators included texture, volume, crust color, and flavor profile (Santos & Reyes, 2023), while operational pacing reflected students' ability to complete tasks within professional laboratory time limits (Raymond & Harrison, 2021). The instruments underwent validation and reliability procedures to strengthen the accuracy of the gathered data (Creswell & Creswell, 2018; Fraenkel et al., 2019). Content and face validity were established through expert evaluation using a modified Content Validity Index framework (Lawshe, 1975; Lynn, 1986). The expert panel consisted of two Master Teachers in Senior High School Home Economics and three TESDA-certified industry assessors and trainers specializing in Bread and Pastry Production NC II. They evaluated the tools based on curricular alignment, technical accuracy, clarity of language, and operational feasibility. Items with an Item Content Validity Index below 0.80 were revised or removed, resulting in a final Scale-Level Content Validity Index of 0.92, which exceeded the accepted standard (Lynn, 1986; Polit & Beck, 2006). The Psychomotor Skill Acquisition Diagnostic Tool was pilot-tested with a separate group of Grade 12 TVL-HE students who had completed the Bread and Pastry Production specialization but were not part of the main study. The pilot test helped refine instructions, determine time limits, and check reliability (Gay et al., 2012). Since performance assessment may be affected by evaluator subjectivity, inter-rater reliability was also established for the analytical rubric (Boud & Falchikov, 2021; Stemler, 2004). Student performances were scored independently by three assessors, and the resulting inter-rater reliability coefficient was 0.87, indicating excellent agreement among evaluators (Cicchetti, 1994; Landis & Koch, 1977).

2.6 Data Gathering Procedure

Data were gathered by administering the Psychomotor Skill Acquisition Diagnostic Tool to both the Control Group and Experimental Group before and after the instructional intervention. The pre-test measured the students' baseline

psychomotor competencies, while the post-test measured performance gains after the intervention period (Campbell & Stanley, 1963). The Control Group received standard instruction and was assessed through traditional written testing, while the Experimental Group received the same instructional content but was evaluated through authentic assessment practices using performance tasks, industry-aligned rubrics, and continuous formative feedback. Informed consent was obtained from parents or legal guardians, and student assent was secured because the participants were minors (American Educational Research Association [AERA], 2011).

2.7 Data Analysis Techniques

The study used quantitative statistical procedures to analyze the pre-test and post-test psychomotor skill acquisition scores. Normality of the data was checked using the Shapiro-Wilk test at the 0.05 level of significance. Since the scores were normally distributed, parametric tests were used. Paired-samples t-tests determined whether there were significant differences between the pre-test and post-test scores within each group. An independent-samples t-test was used to determine whether there was a significant difference between the post-test scores of the Control Group and the Experimental Group. Cohen's d was computed to determine the magnitude of the effect of authentic assessment practices on students' psychomotor skill acquisition.

2.8 Ethical Considerations

The study observed ethical standards in educational research. Since the respondents were minors, informed consent was secured from their parents or legal guardians, and both verbal and written assent were obtained from the students before the study began (American Educational Research Association [AERA], 2011). The use of intact classroom sections also helped avoid unnecessary disruption to the regular school schedule and learning environment.

3. Results and Discussion

3.1 Psychomotor Skill Acquisition of Students

3.1.1 Normality of the Data

The Shapiro-Wilk test showed that the pre-test and post-test scores of both groups were normally distributed. The Control Group obtained p-values of 0.321 for the pre-test and 0.374 for the post-test, while the Experimental Group obtained p-values of 0.441 for the pre-test and 0.153 for the post-test. Since all p-values were greater than the 0.05 level of significance, the data met the assumption of normality. This finding justified the use of parametric statistical tests, particularly the paired-samples t-test and independent-samples t-test. The normal distribution of scores strengthened the appropriateness of comparing the mean performance of the two groups and determining the effect of authentic assessment practices on students' psychomotor skill acquisition.

3.1.2 Pre-test Skill Acquisition Scores

The pre-test results showed that both groups had low baseline psychomotor skill levels before the intervention. The Control Group obtained a mean score of 42.14 with a standard deviation of 5.82, while the Experimental Group obtained a mean score of 40.88 with a standard deviation of 6.13. Both groups were classified as Novice or Needs Improvement, indicating limited initial mastery of baking mathematics, dough manipulation, and equipment management. These findings suggest that the two groups had comparable starting levels before the implementation of the assessment treatments. This supports the validity of the quasi-experimental comparison because both groups began with relatively similar psychomotor foundations. The low baseline scores also emphasize the need for structured instructional and assessment interventions in specialized culinary tracks, where students require guided practice to develop technical competence and industry-level readiness.

3.1.3 Post-test Skill Acquisition Scores

The post-test results showed that both groups improved after the instructional period. The Control Group obtained a mean score of 68.43 with a standard deviation of 7.24, which was described as Developing or Proficient. The Experimental Group obtained a higher mean score of 86.56 with a standard deviation of 4.98, which was described as Industry Ready. These results indicate that students exposed to authentic assessment practices achieved stronger psychomotor performance than those assessed through traditional testing. The higher post-test performance of the Experimental Group suggests that authentic assessment practices were more effective in supporting skill development in Bread and Pastry Production. Performance-based tasks, analytical rubrics, and formative feedback allowed students to apply their knowledge in realistic culinary conditions. This finding supports the view that assessment design can influence vocational skill acquisition by connecting classroom learning with actual workplace expectations.

3.2 Within-Group Improvements

3.2.1 Improvement of the Control Group

The Control Group showed a statistically significant improvement from pre-test to post-test. Its mean score increased from 42.14 to 68.43, producing a mean gain of 26.29 points. The paired-samples t-test result was significant, $t(20) = -15.24$, $p <$

0.001. This indicates that students who received standard competency-based instruction and traditional assessment still developed their psychomotor skills over time. This result shows that traditional instruction and written testing can contribute to basic skill development, especially in strengthening foundational knowledge and procedural understanding. However, although the Control Group improved, its post-test performance remained lower than that of the Experimental Group. This implies that standard instruction may help students progress from novice to developing or proficient levels, but it may not be sufficient to produce full industry readiness in practical vocational tasks.

3.2.2 Improvement of the Experimental Group

The Experimental Group also showed a statistically significant improvement from pre-test to post-test. Its mean score increased from 40.88 to 86.56, resulting in a mean gain of 45.68 points. The paired-samples t-test result was significant, $t(24) = -29.81$, $p < 0.001$. This indicates a stronger improvement among students assessed through authentic assessment practices. This finding supports Experiential Learning Theory because students developed competence through direct performance, reflection, feedback, and repeated practice. Authentic assessment tasks enabled students to apply baking mathematics, dough handling, equipment management, sanitation, and time management in practical settings. Through continuous feedback and industry-aligned rubrics, students were able to identify errors, refine their techniques, and improve their performance until they reached an Industry Ready level.

3.3 Comparison Between the Control Group and Experimental Group

The independent-samples t-test showed a statistically significant difference between the post-test scores of the two groups. The Experimental Group obtained a mean score of 86.56, while the Control Group obtained a mean score of 68.43, resulting in a mean difference of 18.13 points. The difference was significant, $t(44) = -9.94$, $p < 0.001$. The computed Cohen's d was 2.92, indicating an exceptionally large effect size. This finding confirms that authentic assessment practices had a stronger effect on students' psychomotor skill acquisition than traditional testing. The result is consistent with Situated Cognition, which emphasizes that learning becomes more meaningful when it occurs in contexts similar to actual practice. In Bread and Pastry Production, students perform better when assessment reflects real workplace standards, time pressure, product quality requirements, safety practices, and operational pacing. Traditional paper-and-pencil tests may measure cognitive recall, but they may not fully capture tactile, physical, and technical competence.

3.4 Implications for TVL-HE Pedagogy and Assessment Practice

The results show that authentic assessment practices can help bridge the gap between classroom instruction and industry readiness. Students assessed through performance-based tasks and industry-aligned rubrics demonstrated stronger technical execution, product quality, safety and sanitation practices, and time management. This suggests that assessment should not be treated only as a final measurement tool but as an active component of the learning process. The findings imply that TVL-HE programs may improve learner readiness by integrating authentic assessment into regular instruction. Although public schools may face constraints such as large class sizes, heavy teacher workloads, and limited laboratory budgets, the study shows that assessment design can significantly influence student competence. By using real-time rubrics, practical tasks, and formative feedback, schools can reduce the risk of grade inflation and ensure that student grades more accurately reflect actual technical capability.

3.5 Overall Interpretation of Findings

Overall, the findings show that both traditional and authentic assessment practices contributed to student improvement, but authentic assessment produced substantially higher gains. The Control Group improved from Novice to Developing or Proficient, while the Experimental Group improved from Novice to Industry Ready. The significant post-test difference and exceptionally large effect size demonstrate that authentic assessment practices were more effective in developing practical Bread and Pastry Production skills. These results support the conclusion that authentic assessment is a strong instructional and evaluative strategy for technical-vocational education. By placing students in realistic performance conditions and providing continuous feedback, authentic assessment helps transform theoretical knowledge into practical skill. In the context of TVL-HE Bread and Pastry Production, this approach strengthens students' preparation for workplace immersion, TESDA National Certification assessment, and immediate employment in culinary-related fields.

4. Conclusion & Recommendations

The study concluded that Authentic Assessment Practices significantly improved the psychomotor skill acquisition of Grade 12 TVL-HE Bread and Pastry Production students. While standard competency-based instruction and traditional testing helped develop foundational knowledge and basic skills, they were not sufficient to ensure full industry readiness. In contrast, real-world performance tasks, industry-aligned analytical rubrics, and continuous formative feedback effectively bridged classroom learning and practical execution. Guided by Experiential Learning Theory (Kolb, 1984) and Situated Cognition (Lave & Wenger, 1991 and Brown et al., 1989), the findings show that authentic assessment strengthens students' technical competence, safety practices, operational pacing, and readiness for workplace immersion or national qualification assessment.

It is recommended that TVL-HE Bread and Pastry Production teachers adopt Authentic Assessment Practices as part of regular instruction by using performance-based tasks, industry-aligned analytical rubrics, and continuous formative feedback. School administrators and curriculum implementers should support assessment systems that measure actual technical performance rather than relying mainly on written tests. The adoption of authentic assessment may help reduce vocational grade inflation, improve students' preparedness for TESDA National Certification, and strengthen their readiness for workplace immersion and employment.

The study was limited to Grade 12 TVL-HE Bread and Pastry Production students at Dolores National High School during the 2025–2026 academic year. Since the study used a quasi-experimental design with intact classroom sections, the respondents were not randomly assigned individually. Therefore, the findings are most applicable to similar public secondary school settings with comparable TVL-HE Bread and Pastry Production programs, laboratory conditions, and instructional resources.

Compliance with ethical standards

This study was conducted in accordance with institutional ethical standards and accepted principles for educational research involving student participants. Participation was voluntary, and informed consent was secured from the parents or legal guardians of the Grade 12 TVL-HE Bread and Pastry Production students, while student assent was also obtained before data gathering. The confidentiality and privacy of the respondents were protected, and the data were used solely for research purposes. Ethical approval and permission from the concerned school authorities were observed prior to the conduct of the study. The authors declare that there was no conflict of interest in the conduct, analysis, or reporting of the research. All authors contributed to the completion of the study and accept responsibility for the accuracy and integrity of the work. Copyright ownership and publication rights shall remain subject to the policies of the authors, institution, and publishing journal.

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