Examining the Effectiveness of Video-Based Learning in Cookery Education: A Quasi-Experimental Study

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Abstract

Live The rapid advancement of digital technology has transformed education, with video-based learning (VBL) emerging as a powerful instructional tool. This study examined the impact of VBL on student engagement and learning outcomes in Cookery among Grade 10 students, using a quasi-experimental design. Two groups participated: an experimental group utilizing VBL and a control group following traditional instruction. The study employed portfolio assessment to measure learning outcomes in six key areas—sources of learning, demonstration of learning, evidence of learning, mastery of knowledge and skills, reflection on learning, and presentation. Additionally, student engagement was assessed across affective, behavioral, and cognitive dimensions. The results indicated that students exposed to VBL significantly outperformed their non-VBL counterparts, achieving a higher mean portfolio assessment score compared to the non-VBL group, with proficiency levels classified as "Proficient" and "Developing," respectively. Statistical analysis revealed significant differences in learning outcomes between the two groups, particularly in demonstration of learning, evidence of learning, mastery of knowledge and skills, reflection, and presentation. However, no significant difference was found in sources of learning. Engagement analysis showed that VBL students exhibited higher levels of behavioral and cognitive engagement, reinforcing the effectiveness of VBL in fostering deeper learning and active participation.The study recommends integrating video-based instructional strategies to improve comprehension, retention, and overall learning experiences.

Introduction

The swift development of technology in the digital era has significantly reshaped the field of education. One notable advancement is video-based learning, a critical method for presenting educational content. This approach uses pre-recorded or live videos to enhance the learning experience and has gained considerable traction in diverse educational environments, including traditional classrooms and online platforms. Consequently, video-based learning is rapidly emerging as a leading standard in online education. Its advantages include enhanced learner retention, support for microlearning, widespread content accessibility, and the facilitation of on-demand learning. That is why video-based learning has become increasingly integrated into educational settings, offering new avenues for enhancing students' engagement and learning outcomes.

Student engagement is a multifaceted construct encompassing students' emotional, behavioral, and cognitive investment in their learning processes. According to Fredricks et al. (2004), student engagement involves three primary dimensions: Affective (Emotional), Behavioral, and Cognitive Engagement. Affective Engagement involves students' emotional reactions in the classroom and school, such as interest, boredom, happiness, anxiety, and a sense of belonging. Behavioral Engagement are students' participation in academic, social, and extracurricular activities. It includes attending classes, completing assignments, and participating in school-related activities. Cognitive engagement relates to the investment in learning, the willingness to exert the effort needed to comprehend complex ideas and master difficult skills, and the use of self-regulation strategies.

Sadly, the country's performance in domestic and international assessments is relatively low (PISA, 2022). The recent Division Achievement Test of the Division of Bukidnon recorded a 37.76% MPS in Grade 10 Technology and Livelihood Education (TLE) for the paper-pencil test and 69.5% in the Computer-Based Test, both below

the passing score of 75%. The low learning outcomes are due to several factors, including difficulties understanding complex concepts, retaining previous knowledge, developing critical thinking skills, and poor study habits and attitudes (Candilasa, 2024; Chen et al., 2023).

Despite the recognized benefits of video-based learning in enhancing student engagement and learning outcomes, there remains a gap in understanding its specific impact on students' performance in Technology and Livelihood Education (TLE). While existing studies highlight the effectiveness of video-based learning in improving retention and comprehension, limited research has explored its direct correlation with students' academic achievement in the local context, particularly in the Division of Bukidnon. Additionally, there is insufficient empirical evidence on how video-based learning influences the different dimensions of student engagement—affective, behavioral, and cognitive—within the TLE curriculum. Addressing this research gap is crucial in determining the potential of video-based learning as a strategic intervention to enhance student performance and engagement in TLE subjects.

Hence, this study aimed to address the following research problems:

1. What is the controlled and experimental groups' learning outcomes in Cookery using portfolio assessment in:

    1.1   Sources of Learning;
    1.2   Demonstration of Learning;
    1.3   Evidence of Learning;
    1.4   Mastering Knowledge & Skills;
    1.5   Reflection on Learning; and
    1.6   Presentation?

2. Is there a significant difference between the controlled and experimental groups' learning outcomes using portfolio assessment in:

    2.1   Sources of Learning;
    2.2   Demonstration of Learning;
    2.3   Evidences of Learning;

2.4   Mastering Knowledge & Skills;
2.5   Reflection on Learning; and
2.6   Presentation?

3. Is there a significant difference between the controlled and experimental groups' engagement in Cookery in terms of:

3.1   Affective Engagement;
3.2   Behavioral Engagement; and
3.3   Cognitive Engagement?

Methodology

This study utilized a quasi-experimental design to determine the effectiveness of the method of teaching Cookery, with two sections also having been utilized in this study, serving as the participants, particularly the Grade 10 students of Bacusanon National High School in the academic year 2024-2025. This design used two groups to distinguish the effect of video-based learning (VBL) on students' learning outcomes in cookery during pre-tests, post-tests, and retention tests. The students who participated in VBL were the participants in the experimental group, while the students who were exposed to non-VBL were the participants in the control group. In addition, students' engagement has also been measured before and after exposure to VBL.

The Students' Engagement Survey Instrument for High School Students was a 34-item scale adapted from the work of Hart et al. (2021).To assess the learning outcomes, the study utilized a 50-item standardized exam in Cookery 10 from the Division of Bukidnon for the pre-test, and post-test.

Results and Discussions

Controlled and Experimental Groups' Learning Outcomes

Table 1 presents the student's overall mean learning outcome in the portfolio assessment for both VBL and non-VBL groups in terms of sources of learning, demonstration of learning, evidence of learning, mastering knowledge and skills, reflection on learning, and presentation.

Table 1. Student's Learning Outcomes Overall Mean in the Portfolio Assessment

Academic Performance Using Portfolio Assessment	VBL	NON-VBL
a. Sources of Learning	13.54	12.66
b. Demonstration of Learning	12.19	10.00
c. Evidences of Learning	17.78	17.16
d. Mastering Knowledge & Skills	11.56	9.36
e.Reflection on Learning	14.48	12.45
f. Presentation	17.78	15.89
Mean	87.33	77.52
QD	Proficient	Developing

Legend:

SCORE RANGE	QUALITATIVE DESCRIPTION
90-100	Advanced
85-89	Proficient
80-84	Approaching Proficiency
75-79	Developing
0-74	Beginning

The result shows that the VBL group of students had a higher rating on the portfolio assessment, with an overall mean score of 87.33%, which signifies that the learners were proficient. In contrast, the non-VBL group had a mean score of 77.72%, which indicates that the learners were on the developing level.

The learning outcome using portfolio assessment reveals differences between the VBL and non-VBL groups. Regarding Sources of Learning, the VBL group scored 13.54, compared to 12.66 for the NON-VBL group. The higher score of 0.88 points suggests that the VBL students may have had better access to or made more effective use of learning resources. For demonstration of learning, the VBL group achieved a score of 12.19, significantly higher than the 10.00 scored by the non-VBL group. The 2.19-point difference indicates that the VBL students exhibited more vital skills in demonstrating their learning outcomes.

In the category of evidence of learning, the scores were more comparable, with the VBL group scoring 17.78 and the non-VBL group scoring 17.16, a difference of only 0.62 points. This suggests that both groups performed similarly in providing evidence of their learning. When it came to mastering knowledge and skills, the VBL group excelled the non-VBL group by 2.2 points, scoring 11.56 compared to 9.36. This indicates that the VBL students had a better mastery of the knowledge and skills assessed.

In reflection on learning, the VBL group scored 14.48, 2.03 points higher than the NON-VBL group's score of 12.45. This suggests students engaged more deeply in reflection activities using the video-based approach. For presentation, the VBL group's score was 17.78, exceeding the non-VBL group's score of 15.89 by 1.89 points. This difference indicates that the VBL students demonstrated a stronger ability in presenting their work.

The mean scores for the two groups showed that the VBL group achieved 87.33, while the non-VBL group scored 77.52. The higher overall mean of 9.81 points for the VBL group indicates a more proficient level of performance in the academic assessment. In terms of qualitative description (QD), the VBL group's performance was classified as "Proficient," while the non-VBL group was labeled as "Developing." This suggests that students who used the video-based learning approach generally achieved a higher level of proficiency, while those who used the non-video-based approach were still in the development phase.

The data suggests that portfolio assessment within a Video-Based Learning framework leads to better learning outcomes across various indicators compared to a Non-Video-Based approach. The VBL group showed stronger performance, particularly in demonstrating learning, mastery of skills, reflection, and presentation. This implies that integrating video-based learning strategies may foster a more holistic and profound learning experience for students.

The result supports the study of Jeremias and Carretero (2022), who found that video-based learning is effective across various aspects of the classroom, allowing educators to create more time and space for active learning. This suggests that teaching and learning can reach higher learning outcomes, leading to greater student achievement and teacher satisfaction. Specifically, video-based learning can be developed and utilized to enhance student learning outcomes.

Sablic et al. (2021) also revealed that videos used in learning have demonstrated various positive effects, gaining acceptance among successful students and educators. In addition to supporting students in learning, video-based learning has proven to be a powerful reflection tool for students and teachers.

Furthermore, Mendoza et al. (2015) also found that video-based materials enhance students' creativity and collaboration while serving as a motivational tool and creating a unique context for learning experiences.

Test of Difference Between the Controlled and Experimental Groups' Learning Outcomes

Table 2 shows the students' portfolio assessment differences when exposed to the VBL and those exposed to non-VBL. It further illustrates the values comparing the students' portfolio assessment for students exposed to VBL and those exposed to non-VBL in terms of sources of learning, demonstration of learning, evidence of learning, mastering knowledge and skills, reflection on learning, and presentation.

Table 2. Comparison in the Learning Outcomes Using Students' Portfolio Assessment Per Indicator

Portfolio Assessment	Mean		SD		t-value	Sig.
	VBL	Non-VBL	VBL	Non-VBL		
a. Sources of Learning	13.54	12.66	2.30	2.29	-1.783	.078[ns]
b. Demonstration of Learning	12.19	10.00	2.90	3.13	-3.533	.001*
c. Evidence of Learning	17.77	17.16	3.46	3.33	-0.882	.038*
d. Mastering Knowledge & Skills	11.56	9.36	2.95	3.23	-3.469	.001*
e. Reflection on Learning	14.48	12.45	0.22	0.40	-4.475	.000*
f. Presentation	19.49	15.89	3.18	4.52	-2.365	.001*

$p<0.05$ ns= not significant

The data in Table 11 compare Video-Based Learning (VBL) and non-VBL methods of portfolio assessment in a cookery course, analyzing various aspects of students' learning outcomes. The results highlight significant differences in several dimensions, indicating how VBL may affect learning in distinct ways.

The data showed that the students exposed to VBL acquired an overall mean score of 85.24, higher than the mean score obtained by the non-VBL group of 76.05. The data further shows that for the overall portfolio assessment rating, the t-value was -3.614 with a probability value of 0.000, indicating a significance of 0.05. Thus, the null hypothesis of no significant difference between the learning outcomes of students exposed to VBL and those not exposed to VBL I Cookery using portfolio assessment is rejected.

Regarding sources of learning, the mean difference between VBL (13.54) and non-VBL (12.66) was not statistically significant (t-value: -1.783, Sig: .078). This implies that both groups had similar access to diverse learning materials, possibly because the resources provided in both VBL and traditional settings were comparable, resulting in minimal variation.

In the demonstration of learning, there was a significant difference between the two groups, with VBL scoring higher (12.19) than non-VBL (10.00) and the t-value of -3.533 being significant at .001. This indicates that VBL students were better able to showcase their learning. Using interactive and engaging tools in VBL, such as multimedia projects or digital presentations, could have enhanced students' ability to demonstrate their skills and understanding, which may not be as prominent in traditional methods.

The evidence of learning also showed a statistically significant difference, although slight, between VBL (17.77) and non-VBL (17.16), with a t-value of -0.882 and a significance level of .038. This could be attributed to the ease of collecting and organizing evidence in VBL environments, like photos, videos, or submissions of activity outputs, compared to the physical portfolios used in traditional settings.

Regarding mastering knowledge and skills, VBL students scored significantly higher (11.56) than their non-VBL counterparts (9.36), with a t-value of -3.469 and a significance level of .001. The VBL environment likely facilitated more frequent practice opportunities, simulations, or interactive exercises that enhanced students' skill acquisition.

In terms of reflection on learning, VBL participants scored 14.48 compared to 12.45 for non-VBL, with a highly significant t-value of -4.475 at .000. The digital learning environment in VBL might have encouraged more structured reflections, such as through prompts, digital journaling, or guided feedback sessions, which could be less integrated into traditional settings.

Presentation scores were also significantly higher in VBL (19.49) compared to non-VBL (15.89), with a t-value of -2.365 and a significance level of .001. Using digital tools and multimedia likely gave VBL students more dynamic and visually appealing ways to convey their knowledge, setting it apart from traditional methods.

Overall, the higher mean score for VBL (85.24) compared to non-VBL (76.95), with a t-value of -3.614 and a significance level of .000, indicates that Video-Based Learning positively impacted students' learning outcomes. The flexibility, interactive elements, and digital tools associated with VBL create a more conducive learning environment.

Several factors explain why the VBL group performed better. Increased engagement with digital tools and multimedia likely made learning more interactive, allowing students to demonstrate better, reflect on, and present their knowledge. The learning environment offered by VBL enabled students to learn at their own pace, access online resources, and utilize digital platforms, contributing to better mastery of skills. Additionally, VBL provides more formative feedback and structured reflection opportunities, significantly enhancing learning outcomes. The results imply that VBL offers distinct advantages over traditional methods, particularly in demonstrating learning, mastering skills,

reflecting on progress, and presenting information effectively.

Hegeman (2015) also pointed out that incorporating video-based learning in lessons can benefit students, as it has the potential to enhance their performance and learning outcomes. The use of videos allows for more flexible and engaging content delivery, enabling students to revisit materials at their own pace. This can reinforce understanding and support better retention of information. This approach can cater to different learning styles, making lessons more accessible and practical for diverse students.

The study's findings align with Medrano (2023), who emphasized that teachers view portfolios as essential for monitoring student progress and documenting classroom achievements. Portfolios provide a comprehensive picture of learning and are useful for assessing students' strengths and areas needing improvement within the K to 12 frameworks. Additionally, research on digital portfolios, or e-portfolios, demonstrates their effectiveness in enhancing student engagement, self-efficacy, and learning outcomes.

On the other hand, the findings disagreed with the study of Gambari et al. (2014), who found no significant difference in student learning outcomes between video-based lessons and traditional lectures, as both approaches had similarly low retention rates. However, students who learned through lectures showed slightly better retention. The statement implies that while video-based lessons and traditional lecture discussions lead to similar learning outcomes, neither method significantly improves how well students retain information. However, traditional lectures have a slight advantage in helping students remember the material better. This implies that while content delivery format might not drastically change learning outcomes, certain aspects of lecture-based teaching may contribute to slightly higher retention. It also highlights the need to explore other teaching strategies or combine methods to improve retention rates.

Test of Difference Between the Controlled and Experimental Groups' Engagement in Cookery

Table 3 presents the students' level of cognitive engagement after exposure to Video-Based Learning (VBL) through the mean, qualitative description, and interpretation.

Table 3. Level of Student's Cognitive Engagement

COGNITIVE ENGAGEMENT INDICATORS	VBL Group		Non-VBL Group	
	Mean	Interpretation	Mean	Interpretation
When learning new information, I try to put the ideas in my own words.	4.48	High	3.94	High
When learning things for school, I try to see how they fit together with other things I already know.	4.48	High	3.85	High
When I study, I try to connect what I am learning with my own experiences.	4.42	High	3.70	High
I try to think through topics and decide what I'm supposed to learn from them rather than studying topics by just reading them over.	4.40	High	3.79	High
I make up my own examples to help me understand the important concepts I learned from our cookery class.	4.38	High	3.91	High
I try to match what I already know with things I am trying to learn for school.	4.38	High	3.81	High
When I study, I try to understand the material better by relating it to things I already know.	4.35	High	3.91	High
When I study, I figure out how the information might be useful in the real world.	4.35	High	3.91	High
When learning things for school, I often try to associate them with what I learned in other classes about the same or similar things	4.27	High	3.70	High
I try to see the similarities and differences between things I am learning for school and things I know already.	4.23	High	3.96	High
I try to understand how the things I learn in school fit together with each other.	4.23	High	4.02	High
When studying, I try to combine different pieces of information from course material in new way.	4.13	High	3.94	High
Overall Mean Interpretation	4.34	High	3.87	High

Legend:

RATING	RANGE	QUALITATIVE DESCRIPTION	INTERPRETATION
5	4.50-5.00	Strongly Agree	Very High (VH)
4	3.50-4.49	Agree	High (H)
3	2.50-3.49	Neutral/Unsure	Average/Moderate (M)
2	1.50-2.49	Disagree	Low (L)
1	1.00-1.49	Strongly Disagree	Very Low (VL)

The VBL group has a higher overall mean score of 4.34, indicating a high level of cognitive engagement. The non-VBL group has a mean score of 3.87, which also reflects a high level of engagement but is notably lower than that of the VBL group.

The VBL group consistently surpassed the non-VBL group in learning and critical thinking aspects. In putting ideas in their own words, the VBL group scored 4.48, compared to 3.94 for the non-VBL group, suggesting a stronger ability to internalize and articulate new information. Similarly, both groups scored high in connecting new information, but the VBL group (4.48) showed a greater ability to integrate new concepts with prior knowledge than the non-VBL group (3.85). Regarding relating learning to personal experience, the VBL group's score of 4.42 surpassed the non-VBL group's 3.70, indicating a greater tendency to connect academic content to individual experiences. Finally, the VBL group's score of 4.40 for critical thinking compared to the non-VBL group's 3.79 highlighted a stronger inclination towards critical analysis.

The VBL group consistently scored higher across various engagement strategies, such as making connections, understanding material, and applying knowledge to real-world contexts. For instance, both groups scored high on associating learning with previous classes, but the VBL group (4.27) was still ahead of the non-VBL group (3.70). The scores for the non-VBL group show some variability, with the lowest mean score of 3.70 for relating learning to previous classes, suggesting potential areas for improvement in engagement strategies.

The data indicates that students in the VBL group exhibit higher cognitive engagement than their non-VBL counterparts. This could be attributed to the interactive and integrative nature of virtual blended learning environments, which foster a more profound understanding and application of knowledge. The findings suggest that enhancing engagement strategies in the non-VBL group could help improve their cognitive engagement level.

The study supports Pumbaya and Pumbaya's (2019) findings that videos effectively convey complex information through visual demonstrations and capture tone and emotion, enhancing communication. Furthermore, videos offer versatility in both delivery and design, making them an engaging and enjoyable training medium. Seo et al. (2021) emphasized the critical role of student engagement when using video in online and blended courses, recommending that video players be adaptable to different contexts to help students easily find important information during exam periods or when revisiting content. Feedback from students also highlighted the positive impact of VBL on language learning, noting increased engagement, exposure to diverse cultures, and more flexible learning experiences, as Galendez and Ong (2024) observed.

The results align with Ali and Baig (2022), who highlighted the unique value of videos for student preparation in biology classes in the Philippines, noting that videos effectively engage students and are particularly useful for explaining abstract or difficult-to-visualize biological concepts. They also emphasized that instructors can boost student

engagement by customizing educational videos to make the material feel directly relevant to their students. Additionally, the advantage of using videos lies in their reusability for future classes and semesters. The findings also support Cruz et al. (2023), who underscored the benefits of video-based learning, particularly its ability to enhance engagement and knowledge retention. Compared to traditional text-based approaches, videos more effectively capture learners' attention by incorporating visuals, music, and interactive elements, creating a more immersive learning environment that increases the likelihood of students retaining concepts and information.

Conclusion

Based on the findings of the study, the following conclusions were drawn:

Pre-test scores indicated a need for improvement in both groups, but the post-test results showed significant improvement in VBL over non-VBL. Portfolio assessments revealed that VBL students outperformed non-VBL in various areas, including demonstration of learning, mastery of knowledge, reflection, and presentation. The overall mean score for the VBL group indicated a proficient level, while the non-VBL group's score reflected a developing level.
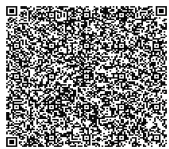
Furthermore, a significant difference was observed in the learning outcomes for Cookery, as measured by portfolio assessment, between students exposed to VBL and those not exposed, specifically in demonstration of learning, evidence of learning, mastering knowledge & skills, reflection on learning, and presentation. However, no significant difference was found in relation to sources of learning.

Students exposed to video-based learning (VBL) demonstrated higher levels of engagement and better learning outcomes in cookery than those not exposed. The effective engagement was very high for the VBL and non-VBL groups. Behavioral engagement was higher in VBL than in non-VBL, and cognitive engagement was high for both groups, with VBL having a slight edge.

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