Development and Evaluation of Video Tutorials and Their Impact on Students' Laboratory Performance

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ABSTRACT:

The study examined the effects of video tutorials on the laboratory performance of 80 BSIT students. Understanding the struggle that students may face in understanding complex database procedures through traditional instructions, the researchers utilized a single-group pretest-post-test design to examine student's performance. Initially, students answered a pre-test, went through the modules that incorporated video tutorials into its instruction, and answered a post-test a week later. Numerical data were interpreted using descriptive statistics and paired samples t-tests, and the perceived quality of the video tutorial were determined using an adapted IVQC validated by five subject matter experts across three aspects: content, usefulness, and design. To acquire the students' qualitative response on the usability, helpfulness, and effectiveness of video tutorials, focus group discussion was used, and themes were extracted using the Braun & Clarke's six phase analysis framework. In results, the video tutorials received favorable remark across content, usefulness, and design. The students significantly gained improvements in their laboratory performance; they learned complex information more quickly, developed higher mastery over technical skills and became self-sufficient learners. It follows then that, validated video tutorials are not simply additional learning resources but equally potent instructional tools that reinforce and bridge the gap between theory and practice. The study therefore concludes that multimedia resources, specifically validated video tutorials can significantly increase performance in IT laboratory courses, support self-paced learning, and reinforce mastery of skills; it also presents valuable input in the planning process of creating validated video tutorials for technical programs.

Keywords: Laboratory Performance, Multimedia Instruction, Self-Paced Learning, Student Engagement, Video Tutorials.

1. Introduction

The subject Advanced Database Systems is part of the Information Technology degree program, and aims to enable students with the required proficiencies and skills to start a professional career in the role of database programmer. Teaching the concepts, theory and practice of database systems, and linking these to practical applications remain great challenges (Canedo, Bandeira, & Costa, 2021). More specifically, traditional instructional materials including printed resources or online modules might not fulfill the needs of students that require additional support and interactive instructions when performing lab assignments.

The COVID-19 pandemic has led to an increasing usage of digital technologies; thus, it encourages educators to find alternative ways of enhancing student learning. Video tutorial is one possible approach that can supplement conventional lecture. Video tutorial offers flexible learning which allows the students to be in control of their own pacing and the frequency with which they will replay concepts that are not clearly understood. This may lead to more profound comprehension and a better outcome in the lab activities (Shek, Wong, Li, and Yu, 2023). For the present study, video tutorials were developed with a specific reference to Advanced Database Systems topic taught at Cagayan State University-Lasam Campus (CSU-Lasam) for the content to be aligned with syllabus, have its factual content verified and course objectives appropriately satisfied. Although the utilization of video tutorial among educators is increasing, not many research specifically investigate the effect of video tutorial in laboratory performance at college level education especially in Bachelor of Science in Information Technology (BSIT) at CSU-Lasam.

Recent studies emphasize the various benefits of using tutorials and educational videos in higher education. A study by Kuhlmann et al. (2024) found that videos can improve student understanding and memory, especially when integrated into active learning with students actively interacting with the tutorials. Evidence by Martin and Swarts (2024) indicates that videos can reduce cognitive load and encourage deeper learning by allowing students to self-pace, review difficult sections, and construct their own learning path which is beneficial in the learning of procedural and technical material. A systematic review of educational video use indicated that videos have catered to a wide range of learners and offer the possibility to review course content and learn at one's own pace and time outside of the classroom (Polat, 2025).

Using principles of Multimedia Learning Theory, this study focuses on determining the impact of video tutorials on students' performance on laboratory activities of the course Advanced Database Systems. In the context of academic institutions, the results of this study might be able to assist in creating effective strategies and policies based on the use of technology in education and improving performance on laboratory activities (Fabito, Trillanes, & Sarmiento, 2020). Furthermore, studying the contribution of video tutorials to skill development would reveal how technology can be employed to support technical instruction.

1.1 Research Objectives

This study aims to design and evaluate the impact of video tutorials to students' laboratory performance. Specifically, it aims to develop video tutorials for Advanced Database Systems course; validate these tutorials in terms of content accuracy, usefulness, and design; determine whether there is a significant difference in the laboratory performance of BSIT students; and examine students' feedback on the usability and perceived impact of video tutorials on their overall learning experience to identify areas for improvement.

1.2 Review of Relevant Literature

1.2.1 Video Tutorials as Instructional Tools in Higher Education

The recent growth in popularity of video tutorials as an extension teaching method in computing can be attributed to its compliance with multimedia learning theory. Multimedia learning

that makes use of both visual and auditory channels keeps the learners focused on the lesson and facilitates greater comprehension (Mayer, 2020). Through step-by-step demonstration of what to do, video tutorials help solidify the underlying principles of the course. In the context of Advanced Database Systems, students have to construct complex queries, tune the database at optimum efficiency, provide sufficient security for the database; video tutorials are essential as a medium for bridging between theory and practice.

Recent computer science and technology education research has demonstrated the potential benefits of video tutorials on both learning effectiveness and engagement. Wilson, Meehan, and Farrelly (2024) discovered that instructional videos in computer science classes boosted student comprehension of complex concepts, enabled self-directed learning pace, and contributed to improved laboratory performance.

More recently, research has been undertaken to extend the learning advantages of video-based instruction to other technical disciplines. Fan, Bower and Siemon (2024) demonstrated that including instructional videos alongside face-to-face teaching helped lower cognitive load in students, but promoted extensive learning which ultimately led to enhanced conceptual understanding. Surur et al. (2023) drew a similar conclusion by demonstrating that interactive learning contexts supported by video boosted performance in mathematics, an assertion applicable to computing disciplines where step-by-step reasoning and fluency with procedures is critical. Kleftodimos (2024) went on to highlight how computer-animated videos with narration and corresponding visuals improve learner motivation and concept comprehension, a clear demonstration of the benefit of sophisticated multimedia design.

Furthermore, research indicate that video tutorial does not only increase engagement, but also promotes learner autonomy because it offers flexible and self-study opportunities, two of the key elements when learning difficult database concepts. Aisyah, Suryana & Fitriana (2024) found that video tutorial has raised outcomes in the skills-based online learning setting and that it plays a critical role when a skills-based learning environment is employed. Trenholm and Marmolejo-Ramos (2024) complemented by stating that clear learning videos in the tertiary setting improved knowledge retention and access to information enabling students to refer back to difficult topics to gain further comprehension.

The use of video and multimedia in database systems education has also proved promising. As Mitri (2023) found students who followed a video-directed exercise set in a business intelligence course (using Python and AWS DynamoDB) performed better at applying theoretical concepts to practical situations in a database context. Indeed, Wang and Wang (2023) also promoted using media-based teaching for NoSQL course, pointing out that complicated course material can motivate and understand the students. Likewise, Hernandez-Sabat et al. (2024) concluded that engineering students who completed short, flipped-classroom videos regarding relational database design and SQL queries outperformed those who learned the same material through lectures. Moreover, Nasaruddin and Awang (2024) noted that university students in a database course showed improved conceptual understanding and practical skills using YouTube videos.

The development of video tutorials in the Advanced Database Systems course is an educationally valid strategy as it is evidence-based. These tutorials allow BSIT students to correlate their acquired theoretical knowledge about database concepts with a hands-on lab exercise; a technique that truly helps students understand the theoretical perspective and apply it to their practical performance. It can be concluded that by integrating benefits of multi-media tool, activities, and self-paced approach, video tutorial may play a crucial role to increase confidence of BSIT students for executing complex tasks regarding databases.

1.2.2 Design and validation of instructional resources

The design and validation of instructional video tutorials are essential for ensuring their effectiveness, particularly in technically demanding courses like Advanced Database Systems. Studies reveal these videos must not only deliver accurate and relevant content, but also demonstrate practical usefulness, meaning that learners perceive them as applicable, relevant, and well-structured. Effective design encompasses aspects such as clear narration, appropriate visuals, suitable pacing, and accessibility. For instance, Ikram, Omar, Mohamed & Mohamed (2024), argue that in order for video tutorials to function as effective learning tools, both the media production or interface and the instructional content must be carefully engineered.

According to an analysis of learner reviews by Deng and Gao (2023), features such as being "organized," "detailed," "comprehensible," and "practical" are closely linked to students' perceptions of a video tutorial's usefulness. Similarly, Dumlao (2024) found that video lessons designed for scientific learners were more effective when validated for accessibility, usability, relevance, and clarity.

Based on these results, the validation framework for video tutorials in Advanced Database Systems should focus on three primary dimensions. The first is content, which includes technical accuracy, alignment with learning objectives, and comprehensive coverage of relevant topics. The second is usefulness, encompassing relevance to students' tasks, perceived applicability, and practical value. The third is design, which addresses video structure, pacing, narration, visuals, and accessibility across different devices and learning environments. This framework is consistent with established evaluation tools such as the Instructional Video Quality Checklist (IVQC), which emphasizes the importance of assessing instructional videos across content accuracy, usability, and multimedia design to ensure their effectiveness. By systematically validating tutorials across these dimensions, educators can create lessons that are not only technically accurate but also learner-centered, engaging, and optimized to improve laboratory performance (Mayer et al., 2019).

1.2.3 Impact of video tutorials on student performance

Studies have already shown that integration of video lectures in lab courses have made impacts on students' performance and learning outcomes. For example, the research by Mutch-Jones, Sengupta, Minor, and Goudsouzian (2020) revealed that biology students that utilized professionally produced instructional video materials before conducting experiments achieved significantly higher scores on the post-laboratory assessments compared to their counterparts who did not. Moreover, with a study on the effect of flipped laboratory, Del Ro-Gamero, Santiago, Schallenberg-Rodrguez and Melin-Martel (2022) indicated that the engineering students that were part of the flipped laboratory were highly satisfied and had better performance and grades in the lab. Also, in the study of Mecida et al. (2023), they found that learners rated pre-laboratory video tutorials to be easily accessible and very useful which has been associated to students having higher performances in their laboratory tasks. Dunlap et al. (2022) indicated that videos together with preparations prior to experiments significantly improve the laboratory outcome and performance of the students. Based on these studies, integrating video tutorials into the laboratory activities for BSIT students taking up the course Advanced Database Systems may improve students' laboratory performance especially in performing tasks such as accuracy of database operation, efficiency in executing the queries and reduce of errors encountered. Given these findings, conducting a comparative study on how effective video tutorials would be in laboratory-based instructions is recommended.

1.2.4 Usability, student feedback, and self-paced learning

Student responses to the perceived usefulness and effectiveness of video tutorials in technical and lab-based courses are very important. Nasaruddin and Awang (2023), found that

student responders taking database courses had very favorable opinions of YouTube video tutorials because of the flexibility it offers and increased engagement in that students are able to review content and proceed at a self-paced level, which can increase comprehension. Greeves and Oz (2024), stated that students and instructors both agree that YouTube videos can be a useful teaching method and listed accuracy, expert presenter, and acceptable video length as being effective aspects of teaching using video. Kleftodimos (2024) also reported higher ratings of usability with well-designed multimedia videos that contained synchronized audio and visual, comfortable viewing pace, and good navigation features.

In studies similar to this, Ramly et al. (2023) found that students in an introductory computer science class had a positive experience with the use of educational videos and that students felt that they understood the content better and that the videos piqued their interest in the course. Akamu et al. (2024) found that students in a hands-on microbiology lab generally viewed videos and virtual simulations positively, and would prefer to have both lectures online in the form of videos, along with in-person lab time. Providing further support for these two studies is the research study Engaging the New Generation: A Study on Student Pharmacists' Views on the Effectiveness of Pre-Laboratory Video Tutorials in Pharmaceutical Compounding (2023) which found that 64.6% of pharmacy students preferred to have pre-lab video tutorials over in-person labs.

Student feedback can be an important source of information on design, usability and effectiveness of video tutorials within laboratory-based courses. For an Advanced Database Systems course, by implementing a survey instrument with evaluation questions covering different aspects of the usability, effectiveness and satisfaction, more effective and student-centered video tutorials can be designed. By systematically assessing and evaluating students' responses, educators can identify the potential weaknesses, refine instructional design, and improve learning with video tutorials in laboratory.

2. Methodology

2.1 Research Design

A single group pretest-posttest design was used in this study. The study aimed to investigate the effects of using video tutorial materials on the laboratory performance of 80 BSIT students who are currently taking up Advanced Database Systems. A pre-test was administered to gauge the students' initial performance on the given concepts, and the students will be asked to view the video tutorial alongside the formulated modules. The video tutorials will serve as an aid in the students' learning, and a post-test will be conducted one week after the viewing of the videos to identify the level of improvement among the students.

2.2 Participants of the Study

This study involved 80 BSIT students who are currently enrolled in Advanced Database Systems at Cagayan State University - Lasam. The ages of the participants were from 19-24 with a mean of 20.36 and a standard deviation of 0.80. Out of 80 participants, there are 30 males and 50 females.

2.3 Research Instruments

In order to gather and obtain data that suit the study's objective, the researcher utilized a number of instruments which include a demographic information sheet, pre-test and post-test questions, an adapted Instructional Video Quality Checklist (IVQC), and Focus Group Discussion.

A demographic information sheet was used to gather the participants' ages and their respective sex. To measure the students' laboratory performance in Advanced Database Systems, a pre-test and post-test were administered to determine the students' baseline proficiency prior to intervention and students' achievement after the intervention, respectively. Both tests were based on the formulated Advanced Database Systems module from Cagayan State University - Lasam, and they were constructed based on the specified learning outcomes.

The instructional video tutorials developed was evaluated for their quality using a modified version of the Instructional Video Quality Checklist (IVQC) which has 20 indicators spread over three dimensions of content (6 indicators), usefulness (6 indicators) and design (8 indicators). Follow-up focus group discussions (FGDs) were held to collect qualitative data about students' attitudes toward the video tutorials. The focus of discussions involved students' perspectives of the extent to which video tutorials aid them to better understand difficult database concepts, how it affects their laboratory performance and overall learning process.

2.4 Data Analysis

Both the analysis of quantitative and qualitative data was applied to the present study. Describing statistics like mean and standard deviation were performed for participants' pre and post-test scores and demographics. Paired Samples t-test were performed to examine the participants' laboratory performance improvements after intervention.

The adapted Instructional Video Quality Checklist (IVQC) scores were summarized using descriptive statistics. Each indicator was rated using a dichotomous scale (1 = criterion met; 0 = criterion not met). The validation process was conducted by five subject-matter experts with experience in database systems. For each video tutorial, mean scores were computed for the three categories to assess adherence to established criteria. An overall mean score was also computed dividing the total number of criteria met by the total number of indicators. Acceptability was interpreted using the scale shown in Table 1.

Table 1. Score range and its Descriptive Interpretation

Score Range	Descriptive Interpretation
0.75–1.00	Highly Acceptable
0.50–0.74	Acceptable
Below 0.50	Not Acceptable

Qualitative data collected from focus group discussions were analyzed using thematic analysis, following the six-phase framework of Braun and Clarke (2006). Transcripts were repeatedly reviewed, then initial codes were grouped into themes that reflected students' perceptions of the usability, effectiveness, and overall impact of the video tutorials.

Quantitative and qualitative results were later triangulated to provide a more holistic interpretation of the impact of video tutorials on students' laboratory performance in Advanced Database Systems.

3. Results and Discussions

3.1 Development of Video Tutorials

Seven video tutorials were developed for the Advanced Database Systems course, with topics aligned with the approved course syllabus and the developed instructional module. The video tutorials were created using OBS Studio as the primary screen-recording software and were recorded using a laptop in a regular room setting. The topics and corresponding video durations are presented in Table 2.

Table 2. Topics and Corresponding Video Durations

Topic	Duration
MySQL Directory	9:17
Overview of the Command-Line Interface (CLI)	8:41
Overview of the MySQL/MariaDB Graphical User Interface (GUI)	5:03
Creating Database and Tables using CLI	11:31
Modifying Table Structure using CLI	19:01
Using Data Manipulation Language (DML)	28:16
Creating Views	15:19

3.2 Validation of Video Tutorials

Table 3 presents the summary of the mean scores obtained for the three validation dimensions, based on the adapted IVQC, which assessed the developed video tutorials.

Table 3. Mean Scores of the Evaluated Video Tutorials and their Interpretation

Dimension	No. of Indicators	Mean Score	Interpretation
Content	6	0.83	Highly Acceptable
Usefulness	6	1.00	Highly Acceptable
Design	8	0.88	Highly Acceptable
Overall Mean = 20		0.90	Highly Acceptable

With an overall mean score of 0.90, the results indicate that the developed video tutorials were highly acceptable, signifying strong instructional quality and suitability for use in Advanced Database Systems course.

3.2.1 Content

The content dimension had a mean of 0.83 and was rated as Highly Acceptable. All 5 evaluators stated unanimously that all the learning objectives of the video tutorials were presented and aligned with Advanced Database Systems module. All major topics were also properly covered and that the explanations were accurate and the application were relevant and that the materials are up to date. However, an indicator on citation of references yielded zero (0) by all evaluators. This shows that the video tutorials were up to date but there was no reference embedded within the video tutorial itself, although it did not decrease the accuracy and clarity of the material, it is important for the advancement of learning in order for student to conduct self-independent study with reference materials.

3.2.2 Usefulness

The usefulness dimension had a perfect score of 1.00 as indicated in the evaluation rubric, this shows that all experts unanimously agreed on the indicators of usefulness of the video tutorials and that all of the students were highly assisted with the laboratory activities due to step by step guide, allowed students to move on with their pace of study and was suitable for the level of BSIT. The designed video tutorials compliment the developed instructional module by adding learning experiences. Based on the gathered data, it can be seen that the video tutorials were effective for the use of supporting instructions of a laboratory course like a computing course

where detailed demonstrations are needed and that self-paced learning is one important feature of it.

3.2.3 Design

The design dimension had a mean score of 0.88, which is rated as Highly Acceptable. It was agreed by all evaluators that the videos were logically structured and well-organized, visually clear, and sound and video components were synchronized. Visual cues, appropriate video length, and absence of disturbing element made it convenient for a learning experience.

However, an indicator regarding accessibility of the video tutorials, e.g., closed captions/subtitles, was rated zero by all evaluators and the audio quality in some videos were also reported poor. These were noted to not have significant effects for most of the students but there should be consideration in having a more inclusive design.

3.3 Impact on Laboratory Performance

As depicted in the Table 4, the students' academic performances in laboratory had shown a significant increase from pre-test mean of 44 (SD=11.05) to post-test mean of 51.78 (SD=12.02), thus, gaining an average increase of 7.78 points (SD=8.14). The gained 7.78 points represents a noteworthy increase in student performance in the laboratory.

Table 4. Students' Pre-test, Post-test, and Improvement Scores

Variables	Mean	SD
Pretest	44.0	11.05
Post-test	51.78	12.02
Improvement	7.78	8.14

A paired samples t-test (Table 5) also revealed that the difference between post-test and pre-test scores were significant at $t(79)=8.54$ and $p=7.60 \times 10^{-13}$. The findings provided substantial evidence for the positive effects of video tutorials on students' academic performances. The very low p-value indicates that the observed increase was not attributed to chance but to the learning brought by video tutorials.

Table 5. Students' Pretest and Post-test Scores

Test Variable	Mean Difference	t(79)	p-value	Interpretation
Pretest vs Post-test	7.78	8.54	7.60×10^{-13}	Significant

The increase in post-test scores may be attributed to video tutorials offering easily accessible, repeatable, and dynamic learning materials, which would permit learners to revisit database concepts until thoroughly understood at their own pace. This conforms with Mayer's (2009) multimedia learning theory asserting that learners are more successful when the media element is present both visually and verbally, and supports prior literature which notes that the use of videos have proven to improve comprehension, retention, and motivation in technology-based learning (Buzzetto-More, 2015; Kay, 2012). These results are consistent with and support literature supporting the use of video tutorials as a supplement in higher education. The increase in lab performance can serve to support that videos provide increased motivation and allow learners to better comprehend difficult topics.

3.4 Students' Feedback on Usability and Impact

Below is the list of the themes from the FGD regarding the usability and impact on the student learning experience.

Table 6. Students' Positive Experiences with the Video Tutorials

Themes	Description	Sample Responses	Frequency (n=72)
1. Clarity and Detail of Explanation	Students appreciated that the tutorials provided clear, step-by-step, and detailed explanations that made learning easier and more understandable.	"The explanations were clear and easy to follow." / "Every step was explained in order." / "The videos are detailed and easy to understand."	25
2. Ease of Understanding and Learning Enhancement	Many students reported that they learned faster and understood lessons better through the videos compared to traditional materials.	"I understood the lessons faster than using the module." / "I immediately understood the topics and could cope easily."	18
3. Helpfulness and Support for Independent Learning	Students found the video tutorials helpful, especially when they had no teacher or needed additional review for activities and practical tasks.	"They helped me understand lessons when the teacher was not around." / "The videos help us do activities on our own."	9
4. Accessibility and Flexibility (Rewatch Anytime)	Several students valued that they could replay the videos anytime, allowing them to study at their own pace.	"I liked that I can rewatch them anytime I want." / "You can go back and watch it again if you don't understand it yet."	8
5. Relevance and Practical Content (SQL Commands and Database Operations)	Some students particularly liked the topics covered, such as database creation, insert, update, and delete functions, which they found relevant and useful.	"I liked the videos about creating, inserting, updating, and deleting records."	7
6. Motivation and Inspiration	A few students described the videos as inspiring and enjoyable, showing appreciation for their positive learning experience.	"Inspiring." / "I enjoyed the videos because they were easy to learn from."	5

From the findings obtained, the students agreed that the explanations in video tutorials were easy to understand because they were structured and explained the detailed steps for complicated database tasks (f=25). The clear demonstrations seem to be lessened the cognitive workload and promote better processing. The findings of Mayer's (2009) multimedia learning theory suggested that with the combination of visual and auditory effects, it would strengthen the learners' knowledge on complex subjects, such as technology related tasks.

Additionally, the students reported being able to grasp concepts and learn more easily (f=18), suggesting that they were able to understand the database topics faster via the video tutorials than via the text-based modules. The students'

remarks support recent research finding that videos promote understanding of procedures and hasten the learning process for computer and laboratory course-based subject matter (Fiorella & Mayer, 2020; Ibrahim et al., 2021). Students found being able to stop, play and rewind the video materials helpful (f=8), while tutorials help students learn at their own pace. Students also appreciated this feature in more recent video tutorials in higher education settings (Noetel et al., 2021; Giannakos et al., 2022).

Content relevance and motivation are other favorable themes which imply that the tutorials were engaging and interesting to users. The results also corroborate previous findings which indicated that the relevance to the context of instructional video can improve student persistence and interest in technical courses (Liu & Elms, 2023). For all feedback areas the number one most mentioned positive points were the clarity, the hands-on demonstration, and practical information of the videos.

Table 7. Impact of the Tutorials on Understanding Hands-On Activities

Theme	Description	Sample Responses	Frequency (n=80)
1. General Positive Affirmations (Yes Responses)	Responses that simply affirmed the usefulness of the tutorials without elaboration.	"Yes." / "Yes po." / "Oo." / "Opo."	37
2. Strong Agreement / Very Helpful	Students explicitly stated that the video tutorials were extremely helpful in understanding the hands-on activities. Many used expressions such as *"very helpful," "super helpful,"* or *"a big help."*	"Yes, the video tutorials were a huge help." / "They were super helpful." / "Very useful for our activities."	22
3. Improved Understanding and Performance	Students explained that the tutorials deepened their comprehension, made lessons clearer, and improved their scores and task execution.	"Yes, because my scores increased compared to our first exercise." / "Yes, because I understood the lessons better and could do the hands-on activities more easily."	9
4. Rewatchability and Flexibility	Students emphasized that they could replay the videos anytime, allowing for repeated learning and clarification of difficult parts.	"Yes, because you can watch them repeatedly to understand better." / "Through the tutorials, I had the chance to revisit parts I didn't understand right away."	5
5. Alignment with Lessons / Practical Application	Students noted that the videos were aligned with lessons and hands-on tasks, especially those involving database operations and coding.	"Yes, because everything needed in the lessons, such as terms and processes in creating a database, was included there." / "Especially in creating databases in phpMyAdmin."	4
6. Enhanced Visualization and Learning Experience	Students mentioned that the tutorials helped them visualize processes and provided deeper, more practical learning experiences.	"They helped me visualize things more deeply." / "They help promote advanced learning."	3

In Table 7, the majority of students strongly agreed that the video tutorials enhanced their comprehension of hands-on activities. Commonly mentioned benefits included very general positive comments (f = 37) and strongly worded comments indicating the tutorial was "very helpful" or "a huge help" (f = 22). There were numerous specific positive remarks that the video tutorials enhanced students' grasp of important concepts and laboratory procedures (f = 9). Students noted that the ability to replay the videos aided them in reinforcing concepts, boosting their understanding and their confidence (f = 5). Alignment of videos with lectures and laboratory work also played an important role in terms of interest and performance (f = 4), consistent with previous literature in effective use of video instructions (Giannakos et al. 2022, McBride & Burgess, 2023).

Table 8. Perceived Improvement in Scores and Task Performance

Themes	Sample Responses	Frequency (n=69)
1. Improved Understanding Leading to Higher Scores	"Yes, because through the video tutorials, I understood the lessons that I couldn't grasp from the module." "Yes, because they helped me better understand the topics and prepare more for the hands-on activities." "Yes, because I understand the lessons better and can apply them well during activity days."	28
2. Reinforcement and Review Aid	"Yes, because it made reviewing easier, especially when the activity time was near." "Yes, because they gave me a basis before doing the activity." "Yes, because of the video tutorials, I was able to improve my performance in the activities."	12
3. Clear Guidance and Demonstration of Process	"Yes, because the discussion in the videos was clear." "Yes, because they showed the correct process for doing the activity." "Yes, because the video tutorials show how they are applied in real-life situations."	16
4. General Positive Impact (Unspecified)	"Yes." "Yes, sir." "Yes, definitely." "Yes po."	13

As illustrated in Table 8, for all practical skills, students reported that the videos increased their level of performance. Most prevalent was an increase in understanding that leads to a higher score (f = 28). Students reported that after watching the video, concepts that previously they had not understood, were made clear. This result goes hand-in-hand with the aforementioned significant post-test result, and is in line with studies that suggest multimedia explanations lead to greater cognitive processing (Fiorella & Mayer, 2020).

Students also viewed tutorials as effective review materials (f=12), especially before laboratory quizzes, as seen in other studies which determined the role of instructional videos on learning and readiness to performance-based tasks (Noetel et al. 2021; Schmidt et al., 2022).

Clear procedural guidance and demonstrations were also prevalent in the student responses (f=16), with students highlighting that the tutorials presented explicit procedures for database tasks and therefore were useful in learning skill-based tasks.

Table 9. Students' Perceptions on Expanding Video Tutorials to Other Subjects

Theme	Description	Sample Responses	Frequency (n=36)
General Positive Affirmations (Yes Responses)	Responses that simply affirmed the usefulness of the tutorials without elaboration.	"Yes." / "Yes po." / "Oo." / "Opo." / "Yes, sir."	12
Accessibility / Availability	Responses mentioning that video tutorials help when teachers are absent, classes cannot be held, or professors are busy.	"Yes, because if the subject teacher is unavailable, I can watch and understand it." / "It's also possible so that when the teacher is not around, we can watch the video tutorials." / "Yes, so that we have something to watch if we cannot meet the teacher in class." / "Yes, so that if the professor is busy, we can still learn through the video tutorials."	6
Better Understanding / Learning Support	Responses emphasizing that video tutorials help students understand lessons better or review content.	"Yes, this will help students like me." / "Yes, so that students have sufficient resources for what they need in their course." / "Yes, because you can go back to the video tutorials if you didn't understand something." / "Yes, so I can better understand lessons in different subjects." / "Yes, because with video tutorials, it's easier to understand what is being done and you can repeat it until you learn."	10
Convenience / Flexibility / Rewatchability	Responses highlighting convenience, faster completion of laboratory exercises, studying at own pace, or ability to replay videos for better understanding.	"Yes, sir, so that laboratory exercises can be done faster." / "Yes, so that even without meetings, we can still do something and study ahead." / "Maybe." / "I also want to watch it, and yes, I want it."	8

Table 9 demonstrates that the majority of students also support the integration of video tutorials into other lab classes. Many students generally endorsed the helpfulness of video tutorials (f=12), as well as the use of the videos in situations in which instructors were unavailable (f=6), which also reflects how technology enhances learning support systems and accessibility of instruction in general (Pokhrel & Chhetri, 2021). Several students agreed the videos were beneficial as they enhanced their understanding and served as great supplemental

resources for other technical classes (f=10), while others indicated the benefit of convenience, ease, and ability to learn at one's own pace (f=8), which are consistent with earlier research identifying the impact of accessible digital resources at higher education (Giannakos et al., 2022; Noetel et al., 2021).

Table 10: Areas for Improvement and Students' Suggestions

Theme	Description	Sample Responses	Frequency (n=51)
1. Complete Satisfaction/No Dislikes	Students expressed full satisfaction with the video tutorials and stated that there was nothing they disliked.	"I didn't dislike anything; I liked all of them." / "None, because I liked them all." / "So far, none."	34
2. Audio Issues (Low or Unclear Sound)	Several students mentioned difficulty hearing or understanding the lessons due to weak or unclear audio in some videos.	"The sound/voice was a bit weak." / "Even with full volume, it's still soft." / "You really need earphones."	10
3. Internet Accessibility Concerns	A few students indicated that they could not access or watch the videos without mobile data or an internet connection.	"You can't watch it without mobile data." / "You can't access it without the internet."	4
4. Fast Pacing of the Videos	Some students found the pacing of the tutorials too quick, making it difficult to follow certain steps or concepts.	"Sometimes the videos are too fast." / "It's a bit too fast."	3

Although overwhelming student feedbacks were positive, there are also students who raised their concern. As shown in Table 10, the most common concern involved audio quality (f = 10). Students thought some videos audio quality was very low or sound cannot be clearly heard. Thus, it would be suggested to have better equipment or better processing methods, as sound quality is very important for the understanding on multimedia learning context (Chen & Wu, 2022).

A small proportion of students complained about connectivity problems to the internet (f=4) and this reinforces the existence of the digital divide that still impact learners as revealed by the recent studies on education (Adarkwah, 2021). Also, few students complained that some of the videos were too fast to catch up (f=3) so it is likely to suggest slow explanations or step-by-step delivery. Indeed, speed of content delivery was observed to have a high impact on learning and cognitive load (Rasheed et al., 2022).

Even though some respondents had concerns regarding those factors, most respondents (f = 34) found themselves being satisfied and that they did not dislike anything at all. This leads to the belief that the factors listed were minor, technical factors rather than pedagogical ones. The comments in Table 10 lead one to conclude that the video tutorials were successful in terms of its content, and could be improved with slightly better audio quality and video pace.

4. Conclusion

In this study, video tutorials have been evaluated on how they affected laboratory performances of BSIT students on Advanced Database Systems based on the content, usefulness and design. The video tutorials have shown to be highly

acceptable for all aspects as validated by experts. On the other hand, students' laboratory performance has increased significantly upon using the video tutorials as learning materials. This implies that the video tutorials were successful as pedagogical intervention in the Advanced Database Systems course. This research added empirical evidence that video tutorials are effective as supplementary materials for higher education IT laboratory courses. It has also demonstrated that by providing students with instructional video tutorials on IT laboratory courses they can learn and work independently while improving their lab performance. However, some issues were noted during the conduct of the research that includes no references from sources were cited, audio issues were observed in some of the videos, and that no assistive technology like closed captions were included in the videos, these issues will definitely have to be improved on future endeavor.

5. Recommendation

Based on the results of this experiment, it can be suggested that valid video tutorials should be used in Advanced Database Systems as well as other IT laboratory courses in order to allow self-paced learning and to improve practical work of students. Policy could be put in place to incorporate video tutorials in the core IT laboratory courses on a regular basis. Before production and use of video tutorials, they should be validated. Content validity, use validity and instructional design should be taken into consideration when developing. The source from which the content of the video tutorials was extracted should be mentioned so that students can do more research on their own. High sound quality and clarity should be employed. Also, there should be some accessibility facilities like captioning and sub titles for different learners. Finally, faculty members should be equipped with high-quality recording tools and training in basic post-production editing, as these are essential for the development of high-quality multimedia instructional materials.

References

Adarkwah, M. A. (2021). "I'm not against online teaching, but what about us?" ICT access challenges of rural students during COVID-19. *Education and Information Technologies, 26*(6), 7557–7575.

Aisyah, S., Suryana, S., & Fitriana, F. (2023). The effectiveness of video tutorials on improving learning outcomes in online learning for men's clothing courses. *TEKNOBUGA: Jurnal Teknologi Busana dan Boga, 11*(2), 128–133. https://doi.org/10.15294/teknobuga.v11i2.49251

Akamu, E. J., High, R., Iloghalu, U. B., & Jeffers Francis, L. (2024). Exploring the use of videos and virtual simulations in college microbiology lab courses: Student perception and pros and cons. *Trends in Higher Education, 3*(4), 861–871. https://doi.org/10.3390/higheredu3040049

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Buzzetto-More, N. A. (2015). Student attitudes towards the integration of YouTube in online, hybrid, and web-assisted courses: An examination of the impact of course modality on perception. *Interdisciplinary Journal of E-Learning and Learning Objects, 11*, 17–37. https://doi.org/10.28945/2096

Canedo, E. D., Bandeira, I. N., & Costa, P. T. (2021, October 13). Challenges of Database Systems Teaching Amidst the Covid-19 Pandemic. *2021 IEEE Frontiers in Education Conference (FIE)*, 1–9. https://doi.org/10.1109/FIE49875.2021.9637223

Chen, C., & Wu, J. (2022). The impact of audio quality on learning performance in multimedia learning environments. *Educational Technology Research and Development, 70*(5), 2231–2251.

Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications.

Del Río-Gamero, B., Santiago, D. E., Schallenberg-Rodríguez, J., & Melián-Martel, N. (2022). Flipped-lab format in engineering courses: Effects on student performance and satisfaction. *Education Sciences, 12*(11), 735. https://doi.org/10.3390/educsci12110735

Deng, R., & Gao, Y. (2023). Using learner reviews to inform instructional video design in MOOCs. *Behavioral Sciences, 13*(4), Article 330. https://doi.org/10.3390/bs13040330

Dumlao, R. (2024). Development and validation of video lessons in science for Grade 10 learners. *Studies in Technology and Education, 3*(3), 19–31. https://doi.org/10.55687/ste.v3i3.98

Dunlap, J. C., Goldberg, H. R., & Brady, K. P. (2022). Pre-lab video demonstrations to enhance students' laboratory experience in a first-year chemical engineering class. *Biochemistry and Molecular Biology Education, 50*(4), 341–350. https://pubmed.ncbi.nlm.nih.gov/36314428/

Fabito, B. S., Trillanes, A. O., & Sarmiento, J. R. (2021). Barriers and Challenges of Computing Students in an Online Learning Environment: Insights from One Private University in the Philippines. *International Journal of Computing Sciences Research, 5*(1), 441–458. https://doi.org/10.25147/ijcsr.2017.001.1.51

Fan, E., Bower, M., & Siemon, J. (2024). Video tutorials in the traditional classroom: The effects on different types of cognitive load. *Technology, Knowledge and Learning, 29*, 2017–2036. https://doi.org/10.1007/s10758-024-09754-1

Fiorella, L., & Mayer, R. (2020). Encouraging students to explain multimedia lessons: A cognitive theory of multimedia learning perspective. *Educational Psychology Review, 32*(4), 1055–1075.

Giannakos, M., Sharma, K., & Pappas, I. (2022). Video-based learning analytics in higher education: A systematic review of empirical research. *Computers in Human Behavior, 128*, 107126.

Greeves, S., & Oz, M. (2024). YouTube in higher education: Comparing student and instructor perceptions and practices. *Frontiers in Education, 8*, Article 1330405. https://doi.org/10.3389/feduc.2023.1330405

Hernandez-Sabaté, A., Albarracín, L., Ramos, O., Gil, D., Sánchez, C., & Martí, E. (2024). From traditional teaching to flipped classroom: Impact on learning in engineering degrees. *Journal of Technology and Science Education, 14*(3), 798–814. https://doi.org/10.3926/jotse.2623

Ibrahim, M., Antonenko, P., Greenwood, C., & Wheeler, D. (2021). Effects of video lesson design on learning from instructional videos: A meta-analysis. *Computers & Education, 171*, 104239.

Ikram, C., Omar, E., Mohamed, E., & Mohamed, K. (2024). Pedagogical video: a key learning object for e learning, from mediation to mediatization. *Frontiers in Education, 8*, 1229111. https://doi.org/10.3389/feduc.2023.1229111

Kafley, B., & Hossain, M. F. (2024). Engaging the new generation: A study on student pharmacists' views on the effectiveness of pre laboratory video tutorials in pharmaceutical compounding. *Journal of Pharmaceutical Compounding and Therapeutics, 1*(1), Article 011002. https://jpcts.com/articles/study-on-student-pharmacists-views-on-the-effectiveness-of-pre-laboratory-video-tutorials/

Kay, R. H. (2012). Exploring the use of video podcasts in education: A comprehensive review of the literature. *Computers in Human Behavior, 28*(3), 820–831. https://doi.org/10.1016/j.chb.2012.01.011

Kleftodimos, A. (2024). Computer-animated videos in education: A comprehensive review and teacher experiences from animation creation. *Digital, 4*(3), 613–647. https://doi.org/10.3390/digital4030031

Kuhlmann, S. L., Plumley, R., Evans, Z., Bernacki, M. L., Greene, J. A., Hogan, K. A., … Panter, A. (2024). *Students' active cognitive engagement with instructional videos predicts STEM learning. Computers & Education, 216,* Article 105050. https://doi.org/10.1016/j.compedu.2024.105050

Liu, Q., & Elms, T. (2023). The effectiveness of video-based learning in technical and computing courses: A systematic review. *Journal of Computer Assisted Learning, 39*(4), 1250–1265.

Martin, M., & Swarts, B. (2024). *Video tutorials in the traditional classroom: The effects on different types of cognitive load. Technology, Knowledge and Learning, 29,* 2017–2036. https://doi.org/10.1007/s10758-024-09754-1

Mayer, R. E. (2009). *Multimedia learning* (2nd ed.). Cambridge University Press. https://doi.org/10.1017/CBO9780511811678

McBride, E., & Burgess, J. (2023). The effectiveness of instructional videos for improving performance in computer programming and technical tasks: A systematic review. *Journal of Computer Assisted Learning, 39*(5), 1523–1538.

Mecida, S. V., Barron, K. R. O., Lemana, H. E., Oberez, A. E., Sampulna, A. K., Huesca, S. M., Bailan, S. K., Sajorga, M. J. E., Sarceda, T. K. O., Teniero, Q. R., & Baculi, O. L. (2023). Contextual effects of video tutorials on the academic performance of STEM 12 students. *Universal Journal of Educational Research, 2*(2), 86–98.

Mitri, M. (2023). Teaching case: Using Python and AWS for NoSQL in a BI course. *Journal of Information Systems Education, 34*(1), 41–48. https://aisel.aisnet.org/jise/vol34/iss1/4

Mutch-Jones, K., Sengupta, N., Minor, V. C., & Goudsouzian, L. K. (2020). Professional science education videos improve student performance in non-major and intermediate biology laboratory courses. *Biochemistry and Molecular Biology Education, 48*(2), 151–159. https://doi.org/10.1002/bmb.21415

Nasaruddin, N. I., & Awang, N. (2023). Effectiveness of YouTube videos in learning database courses among university students. *Information Management & Business Review, 16*(4S), 1–12. https://doi.org/10.22610/imbr.v16i4(S)I.4278

Noetel, M., Griffith, S., Delaney, L., Kassis, M., Tay, H., & Lautenbach, F. (2021). Video improves learning in higher education: A systematic review. *Review of Educational Research, 91*(2), 204–236.

Pokhrel, S., & Chhetri, R. (2021). A literature review on online learning during the COVID-19 pandemic. *Educational Research International, 2021*, 1–10.

Polat, H. (2025). *Trend and issues in educational video research: A bibliometric analysis. Open Praxis, 17*(1), 721–735. https://doi.org/10.55982/openpraxis.17.1.721

Ramly, N., Rosli, A. N., Suhaimi, S., Abd Wahab, M. H., & Ariffin, A. H. (2023). The effects of using educational videos in online learning: A case study for basic computer science subject. *International Journal of Recent Technology and Applied Science, 5*(1), 12–23. https://doi.org/10.36079/lamintang.ijortas-0501.479

Rasheed, R., Kamsin, A., & Abdullah, N. (2022). A systematic review of pacing and cognitive load effects in multimedia learning. *Journal of Computer Assisted Learning, 38*(3), 675–690.

Schmidt, L., Tansley, G., & Allen, S. (2022). Video-based review materials and student preparedness in laboratory-intensive courses. *International Journal of Educational Technology in Higher Education, 19*(1), 45.

Schooley, S. P., Tackett, S., Peraza, L. R., & Shehadeh, L. A. (2022). Development and piloting of an instructional video quality checklist (IVQC). *Medical Teacher, 44*(3), 287–293. https://doi.org/10.1080/0142159X.2021.1985099

Shek, D. T. L., Wong, T., Li, X., & Yu, L. (2023). Use of instructional videos in leadership education in higher education under COVID 19: A qualitative study. *PLOS ONE, 18*(9), e0291861. https://doi.org/10.1371/journal.pone.0291861

Surur, A. M. S., Akhyar, M. K., Ridwanulloh, M., Mohamed, H. B., & Günerhan, H. (2023). Application of video-assisted online interactive learning to improve student mathematics learning outcomes. *Jurnal Pengembangan Pembelajaran Matematika (JPPM), 5*(2), 130–144. https://doi.org/10.14421/jppm.2023.52.130-144

Trenholm, S., & Marmolejo-Ramos, F. (2024). When video improves learning in higher education. *Education Sciences, 14*(3), 311. https://doi.org/10.3390/educsci14030311

Wang, H., & Wang, S. (2023). Teaching Tip: Teaching NoSQL Databases in a Database Course for Business Students. *Journal of Information Systems Education, 34*(1), 32–40. https://aisel.aisnet.org/jise/vol34/iss1/3

Wilson, S., Meehan, K., & Farrelly, W. (2024, November). Beyond the lecture: Enhancing computer science education with instructional video. In *Proceedings of the 17th Annual International Conference of Education, Research and Innovation (ICERI 2024)*. Atlantic Technological University. https://doi.org/10.21125/iceri.2024.0979

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8. Author Declaration

The authors confirm that this work is original and that there are no conflicts of interest.