ACADEME University of Bohol, Graduate School and Professional Studies Volume 22 • March 2023
DOI: https://doi.org/10.15631/aubgsps.v22i1.185

E-Class Record for Basic Education Department, University of Bohol, Tagbilaran City

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ABSTRACT

Article history:

Received: 12 Nov 2022
Revised: 09 Dec 2022
Accepted: 04 Jan 2023
Published: 26 March 2023

Keywords — E-class Record with Analytics, Web-based e-class record, ISO quality standards

E-class record systems offer easy data management and record-keeping for teachers, allowing for tracking and analysis of student success. A study aims to create, test, and develop a web-based e-class record for the University of Bohol Basic Education Department in Tagbilaran City for the 2024–2025 academic year. The study assesses the ISO-based quality of two e-class record formats and evaluates instructors' Excel and Google Sheets skills. The study examines the link between software quality and instructor technical knowledge and the quality differences between old and new e-class records. The study uses an ISO 9126 software quality model and a descriptive survey to assess the effectiveness of the proposed e-class record. However, the study found that respondents had limited knowledge of Microsoft Excel and Google Sheets, suggesting the need for a web-based e-class record with analytics.

INTRODUCTION

The student class record is a crucial document for teachers, providing information on student performance and academic success. It is a commercially

accessible document and is essential for classroom management (Dellosa, 2014). Accurate grades guide students' advancement to the next level. However, many educators spend significant time calculating students' grades due to stress and workload. Many argue that the time spent tracking and calculating grades could be better spent on other tasks, such as lesson preparation, research, or student interaction (Gutierrez, 2022).

E-class records are a valuable tool for teachers, providing faster and more effective outcomes with less effort. They are typically maintained in Microsoft Excel or Google Sheets, using arithmetic functions like VLOOKUP, AVERAGE, IF, COUNTIF, and SUM. A worksheet template is used to input teacher information, subject, section, student number, grade level, gender, class date, base grade, test items, attendance, and student performance. The e-class record automatically calculates student grades using the same grading scheme (Dellosa, 2014). In today's digital age, managing records manually is no longer practical, and precision, speed, and large data storage capacities are crucial for workplaces. As technology enters workplaces, precision, speed, and large data storage capacities are essential (Apao, Feliscuzo, & Romana, 2019).

The University of Bohol's basic education department uses electronic class records to record and calculate student marks using Microsoft Excel spreadsheets or Google Sheets. The records are available in various forms and designs, with some teachers using the department's provided records and others using customized versions based on grading requirements. However, these e-class record formats need to generate progress visualizations that can inform instructional decisions and enhance the learning process, according to a researcher who has taught in the department for years.

The researcher evaluated the department's e-class record formats during the 2022–2023 academic year, creating a class record for teachers and administrators to track student progress using analytics and visual representations. The new record will be accessible online without compromising security or safety. The researcher adheres to the learning analytics principle, aiming to improve teaching and learning using student data. This research will help the University of Bohol advance towards Education 5.0, an initiative focusing on technological integration and sustainable development, aiming to equip individuals with the skills, attitude, and flexibility needed in a rapidly changing world.

Related Literature. The importance of grading and reporting in education is underscored by its impact on students, departments, and teaching methods (Mcdaniel, 2022). O'Connor (2017) contends that grading is a mechanical process, relying on formulas and software for calculation. Lee (2020) emphasizes the integration of ISO 9126's quality attributes in computer-based grading systems, ensuring functionality, usability, dependability, efficiency, portability, and maintainability.

Standards-based grading, also known as formative assessment, focuses on accurate evaluation to enhance learning rather than merely earning points (Andersson & Palm, 2017). Posekany (2022) suggests strategies to change standard-based grading, including non-graded homework and multiple opportunities for assessment.

The implementation of computer-based grading systems in educational institutions facilitates faster and more accurate grading, adapting to both offline and online environments (Aldriye et al., 2019). Learning analytics and data analytics play a crucial role in education, utilizing information about learners and learning environments to enhance the learning process (Viberg et al., 2018; Stedman, 2020).

The ISO 9126 standard provides a framework for evaluating software quality with attributes such as functionality, reliability, usability, efficiency, maintainability, and portability. These attributes ensure that educational technology systems meet specified conditions and effectively contribute to the learning process (Botella et al., 2004).

Related Studies. Numerous studies have explored automated grading systems, or electronic class records, offering functionalities such as final and quarterly grades, attendance data, grade sheets, and proficiency summaries. However, there is a need for further research on their application in online grade viewers. Gutierrez (2022) examined the use of an electronic class record at Cavite State University-Naic Faculty, finding it streamlined grade computation but revealed challenges in communicating academic strengths and weaknesses to students. Recommendations include addressing these issues, updating e-class records, providing necessary computer equipment, and offering computer skills training.

Lee's (2020) study on the Electronic Class Record (E-Class Record) at Diliman College-Quezon City highlighted its efficiency and accuracy in class recording reports, particularly for senior high school students. The E-Class Record, a Microsoft Excel spreadsheet, proved beneficial for grading information and assessments, reducing workload issues, and enhancing class recording management.

Francisco (2018) developed an electronic class record inquiry system for Central Philippine University, facilitating course data management with a tabular-format grading tool. Despite drawbacks, such as potential grade manipulation, the system improved the retrieval and updating of topic assignments, making data maintenance and student performance monitoring easier.

The study of Torrigosa et al. (2020) explored the use of spreadsheet applications, like Microsoft Excel, in grading. They addressed challenges faced by teachers unfamiliar with computers through the system development life cycle,

resulting in an automated grading system that offered security, usability, and reliable data entry. Recommendations for future research include strengthening system security and improving user-friendly concept designs for enhanced record storage.

Statement of the Problem. This study aimed to develop, deploy, and evaluate a web-based e-class record for the University of Bohol, Tagbilaran City Basic Education Department for the school year 2024–2025. The findings of the study will serve as the basis for proposing an e-class record embedded with analytics to visualize students' performance.

Specifically, the study aimed to answer the following:

1. What is the quality level of the two e-class record formats based on the
   ISO standards in terms of:
   - 1.1. functionality;
   - 1.2. usability;
   - 1.3. reliability;
   - 1.4. efficiency;
   - 1.5. maintainability; and
   - 1.6. portability?
2. To what extent are the technical skills among basic education teachers of
   the University of Bohol, Tagbilaran City, as to:
   - 2.1. Microsoft Excel; and
   - 2.2. Google Sheets?
3. Is there a significant degree of correlation between the quality level of the
   software and the technical skills of the teachers?
4. Is there a significant degree of difference between the two e-class records?
   formats as to the quality level?
5. Based on the findings, what e-class record could be proposed?

RESEARCH METHODOLOGY

Design. This study employed a descriptive survey design to compare the existing e-class record with a newly developed version, using ISO 9126 tools to assess software quality across six factors: functionality, usability, reliability, efficiency, portability, and maintainability. The aim was to propose an enhanced e-class record for the University of Bohol's basic education department in Tagbilaran City while maintaining the quality of the current record.

Participants. The study involved principals, subject area coordinators, and subject teachers from the University of Bohol's basic education departments in Tagbilaran City for the 2022–2023 school year.

Instruments. A checklist questionnaire assessed respondents' technical skills in Microsoft Excel and Google Sheets and the quality of two e-class record formats. Pilot testing at San Agustin Academy in Panglao, Bohol, ensured questionnaire reliability using SPSS Cronbach's alpha. ISO 9126 standards guided the quality assessment of the two formats, where the first e-class record was a modified version by the DEP, and the second was developed by the researcher with additional analytics and online hosting using Google Sheets.

Data Gathering. Permission was obtained from relevant authorities, and questionnaires were distributed to assess e-class record functionality, usability, reliability, efficiency, portability, and maintainability. Ethical considerations were followed, including obtaining consent from administrators and teachers, respecting their dignity, and ensuring the research's ethical conduct.

Statistical Treatment. Weighted mean calculations determined average responses for each item on functionality, usability, reliability, efficiency, portability, and maintainability of the two e-class record formats and teachers' technical skills in MS Excel and Google Sheets using SPSS. Nonparametric tests were used due to the rejection of the normality assumption at a 0.05 significance level. Statistical tools included Pearson product-moment correlation to assess the correlation between software quality and teachers' technical skills and a t-test for correlated means to determine differences between the two e-class record formats. The significance level was set at 0.05.

RESULTS AND DISCUSSIONS

Table 1 presents a comparative analysis of the efficiency between the current and proposed e-class records. The existing system holds the top position in terms of efficiency, recording a mean of 3.61, while the newly proposed e-class record ranks sixth. Notably, the proposed e-class record utilizes Google Sheets, necessitating a faster internet connection.

In terms of functionality, however, the proposed e-class record excels, securing the top position with a composite mean of 3.91. This enhanced system incorporates analytics that autonomously showcases students' progress, empowering teachers to monitor class advancement and adapt teaching strategies accordingly.

Table 1. Summary of the ISO Quality of the Two E-class Record Formats

ISO Quality	Currently Used e-class Record				Proposed e-class Record			
	Composite Mean	SD	Interpretation	RANK	Composite Mean	SD	Interpretation	RANK
Functionality	3.11	1.26	Good	**5**	3.91	0.10	Very Good	**1**
Usability	3.14	0.090	Good	**4**	3.81	0.08	Very Good	**5**
Reliability	3.58	0.04	Very Good	**2**	3.89	0.02	Very Good	**2**

Efficiency	3.61	0.00	Very Good	**1**	3.80	0.00	Very Good	**6**
Maintainability	3.26	0.06	Good	**3**	3.86	0.165	Very Good	**4**
Portability	3.10	0.13	Good	**6**	3.87	0.054	Very Good	**3**

Parameters:

3.26 – 4.00	Very Good
2.51 – 3.25	Good
1.74 – 2.50	Fair
1.00 – 1.75	Poor

The reliability of e-class records demonstrates a commendable standing, sharing the second position with a composite mean of 3.89. This result outperforms the currently utilized grading software, which trails with a mean of 3.58. In terms of portability, the proposed e-class record secures a notable third position, boasting a mean score of 3.89.

A distinctive feature emerges in the assessment of ISO quality, where the currently used e-class record receives two descriptive ratings. In contrast, the proposed e-class record attains a robust "Very Good" rating across all dimensions, encompassing functionality, usability, reliability, efficiency, maintainability, and portability.

In an insightful study conducted by Tagayan (2023), the effectiveness of faculty employing the Electronic Grading System (EGS) for student assessments was thoroughly explored. The results shed light on challenges such as power outages and data retrieval difficulties. However, the study highlighted significant benefits, including heightened accuracy, reduced effort, improved systematicity, and enhanced efficiency. To tackle these challenges, the study introduced an innovative online e-class record format featuring an auto-save feature. Notably, respondents expressed unanimous agreement with the proposed e-class record, acknowledging its prowess in functionality, usability, reliability, efficiency, maintainability, and portability.

Technical Skills of the Teachers in Microsoft Excel and Google Sheets. Table 2 provides insights into teacher respondents' perceptions of their technical skills in Microsoft Excel and Google Sheets, gauging their preparedness to utilize or create electronic class records. Proficiency is notably high in fundamental tasks such as opening and saving workbooks, deleting worksheets, and entering/editing data. However, the development of an electronic class record with advanced features like analytics and online monitoring demands additional competencies in functions such as importrange, query, and validation. These skills are pivotal for the creation of remedial programs, contributing to more personalized student support.

Table 2. Technical Skills of Teachers as in Microsoft Excel and Google Sheet

Technical Skills Indicators	Mean	SD	Descriptive Rating (DR)	Descriptive Interpretation (DI)	RANK
1.1 open and save a workbook;	3.66	0.61	Highly Proficient	The teacher can use lookup functions, protect and validate data, and share worksheets.	1.5
1.2 insert new worksheet;	3.61	0.72	Highly Proficient	The teacher can use lookup functions, protect and validate data, and share worksheets.	4
1.3 delete a worksheet;	3.66	0.63	Highly Proficient	The teacher can use lookup functions, protect and validate data, and share worksheets.	1.5
1.4 insert simple formulas (e.g., sum, average);	3.03	1.05	Proficient	The teacher can set ranges, sort, modify tables, create charts, and share worksheets.	12
1.5 enter and edit data (e.g., names, score);	3.62	0.66	Highly Proficient	The teacher can use lookup functions, protect and validate data, and share worksheets.	3
1.6 format worksheet (e.g., test alignment, changing font size and color, cell color, merge cells, and wrap text);	3.51	0.68	Highly Proficient	The teacher can use lookup functions, protect and validate data, and share worksheets.	8
1.7 print worksheet (e.g., print area, print range);	3.56	0.70	Highly Proficient	The teacher can use lookup functions, protect and validate data, and share worksheets.	6
1.8 set ranges in a worksheet;	2.97	0.96	Proficient	The teacher can set ranges, sort, modify tables, create charts, and share worksheets.	13
1.9 sort data in ascending or descending order;	3.29	0.91	Highly Proficient	The teacher can use lookup functions, protect and validate data, and share worksheets.	9
1.10 modify tables;	3.07	0.93	Proficient	The teacher can set ranges, sort, modify tables, create charts, and share worksheets.	11
1.11 create a chart from the given data (e.g., pie chart, bar graph);	2.75	1.01	Proficient	The teacher can set ranges, sort, modify tables, create charts, and share worksheets.	16
1.12 edit/modify charts;	2.70	1.00	Proficient	The teacher can set ranges, sort, modify tables, create charts, and share worksheets.	17
1.13 use vlookup function to assign the equivalent grade;	2.17	1.04	Basic	The teacher can insert simple formulas, enter and edit data, format, and print worksheets.	22
1.14 protect the worksheet with a password;	2.34	1.17	Basic	The teacher can insert simple formulas, enter and edit data, format, and print worksheets.	21
1.15 use validation function;	2.06	1.08	Basic	The teacher can insert simple formulas, enter and edit data, format, and print worksheets.	25
1.16 share worksheet offline or online;	2.96	1.03	Proficient	The teacher can set ranges, sort, modify tables, create charts, and share worksheets.	14
1.17 use the find and replace option;	2.77	1.15	Proficient	The teacher can set ranges, sort, modify tables, create charts, and share worksheets.	15
1.18 copy and paste option;	3.59	0.73	Highly Proficient	The teacher can use lookup functions, protect and validate data, and share worksheets.	5
1.19 use the keyboard shortcut for copy and paste;	3.55	0.74	Highly Proficient	The teacher can use lookup functions, protect and validate data, and share worksheets.	7
1.20 use paste special option;	3.26	0.92	Proficient	The teacher can set ranges, sort, modify tables, create charts, and share worksheets.	10
1.21 create a dropdown list;	2.70	1.01	Proficient	The teacher can set ranges, sort, modify tables, create charts, and share worksheets.	17
1.22 apply conditional formatting to cell values;	2.42	1.10	Basic	The teacher can insert simple formulas, enter and edit data, format, and print worksheets.	20

1.23 use sparklines on a range of data;	2.11	1.00	Basic	The teacher can insert simple formulas, enter and edit data, format, and print worksheets.	24
1.24 name the range of the workbook;	2.52	1.13	Proficient	The teacher can set ranges, sort, modify tables, create charts, and share worksheets.	19
1.25 use data validation;	2.13	1.05	Basic	The teacher can insert simple formulas, enter and edit data, format, and print worksheets.	23
1.26 use query formula;	2.00	1.02	Basic	The teacher can insert simple formulas, enter and edit data, format, and print worksheets.	26
1.27 use importrange formula;	1.94	1.04	Basic	The teacher can insert simple formulas, enter and edit data, format, and print worksheets.	27
Composite Mean	**2.89**		**Proficient**	**The teacher can set ranges, sort, modify tables, create charts, and share worksheets.**	

Parameters:

3.26 – 4.00	Highly Proficient
2.51 – 3.25	Proficient
1.74 – 2.50	Basic
1.00 – 1.75	Below Basic

Bayucca's (2020) study reinforces the findings, revealing that instructors possess a foundational understanding of ICT skills but encounter challenges with more intricate applications. Proficiency gaps exist, particularly in navigating sophisticated computer programs for instructional purposes. The study recommends a shift towards the adoption of electronic class records, as opposed to manual generation, facilitating real-time monitoring of student progress. This shift not only streamlines administrative tasks but also empowers instructors to develop more targeted and effective ICT training programs within their educational institutions.

The study found that all seven ISO quality levels had p-values less than 0.05, rejecting the null hypothesis that there is no significant correlation between the quality level of the current e-class record and the teacher's technical skills. The current e-class record is Microsoft Excel-based, offline, and has been used for a long time.

Table 2. Correlation Between the Quality Level of the Currently Used E-class Record and the Technical Skills of the Teacher

ISO Quality	Correlation	P-value	Decision	Interpretation
Functionality	0.28	0.01	Reject H_o	Significantly Related
Reliability	0.27	0.01	Reject H_o	Significantly Related
Usability	0.28	0.01	Reject H_o	Significantly Related
Efficiency	0.30	0.00	Reject H_o	Significantly Related
Maintainability	0.32	0.00	Reject H_o	Significantly Related
Portability	0.31	0.00	Reject H_o	Significantly Related

Table 3 compares the quality levels of the current and proposed e-class record formats in terms of functionality, reliability, usability, efficiency, maintainability, and portability. Respondents' perceptions show significant differences between the two formats, indicating they are not at the same ISO quality levels. The proposed e-class record features analytics, which is not present in the current format. The null hypothesis is rejected, indicating a significant difference between the two formats.

Table 3. Significant Degree of Difference Between the Quality Level of the Two E-class Record Formats

ISO Quality	Wilcoxon Test	P-value	Decision	Interpretation
Functionality	6.85	0.00	Reject H_o	Significantly Different
Reliability	6.53	0.00	Reject H_o	Significantly Different
Usability	4.10	0.00	Reject H_o	Significantly Different
Efficiency	2.73	0.01	Reject H_o	Significantly Different
Maintainability	6.27	0.00	Reject H_o	Significantly Different
Portability	6.65	0.00	Reject H_o	Significantly Different

CONCLUSIONS

Respondents differentiated e-class records, favoring the proposed format for its robust functionality despite the current record excelling in efficiency. The automatic display of student progress in the proposed format was particularly valued for effective class monitoring. Respondents demonstrated proficiency in fundamental technical skills crucial for utilizing pre-made e-class records. However, advanced technical skills, including functions like importrange and query, are essential for creating an online record with analytics. Instructors don't need specific technical abilities to use a pre-existing e-class record. However, creating a similar format demands heightened technical expertise, emphasizing the complexity of the process. Significant quality disparities exist between e-class record formats. The proposed format aligns more closely with ISO quality standards, suggesting its potential as a comprehensive solution for institutions enhancing electronic class record systems.

RECOMMENDATIONS

The following recommendations are made in light of the findings and conclusions discussed previously:

1. The proposed e-class record should prioritize efficiency, functionality, reliability, and portability. It should utilize an online Google Sheet, but instructors need a workshop on offline use. The record should

display student progress in diagrams and tables, monitor class progress and teaching strategies, automatically save data in case of computer termination, and be compatible with Microsoft Excel and Google Sheets. The new e-class record meets these criteria.

2. Teachers need basic technical skills in Microsoft Excel and Google Sheets, including saving and deleting worksheets, to use pre-made e-class records. They need importrange formulas, query formulas, and validation functions for real-time student progress monitoring, which most instructors lack.
3. To create an electronic class record with analytics and internet access, a high level of technical skill is needed. Teachers' current skills are limited to basic tasks like saving workbooks, removing worksheets, and inputting data. To develop an e-class record, pre-made grading software should be developed to address the lack of necessary skills.
4. Respondents' perceptions of existing and proposed e-class records differ significantly. The proposed e-class record offers analytics, formative assessment recording, password protection, and automatic data saving. It also offers usability, maintainability, and portability, unlike the current system. The current e-class record is not compatible with Microsoft Excel and Google Sheets, requires licenses, and is browser-based. A new e-class record with these features is recommended.
5. The current e-class record format has lower quality levels than the proposed one, lacking features, and teachers prefer the new format due to analytics, requiring implementation during 2023-2024.
6. The researcher plans to distribute detailed rep//;.orts and summaries of the study to stakeholders, including school administrators and teachers at the University of Bohol, and collaborate with the IT department to enhance their e-class record.

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