USABILITY TESTING AND VALIDATION OF MULTIFUNCTIONAL ELECTRONIC REPORT-SYSTEM FOR ADVISERS (MERA)

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Usability Testing and Validation of Multifunctional Electronic Report-System for Advisers (MERA)

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Abstract

This action research intends to reduce the number of hours on data entry and increase accuracy through a teacher-developed software, (MERA) Multifunctional Electronic Report System for Advisers. The junior high school teacher advisers of Rebokon Agricultural and Vocational High School volunteered to be the participants in the study. The software was validated by IT Experts using the methods of evaluation used in action research by Macapugas (2021). The researchers also used a descriptive qualitative approach to determine if the software really reduced the time spent on data entry and increased the accuracy of the advisers. Respondents reported an increase in their efficiency in the preparation of school forms thus minimizing their time spent on clerical tasks. Furthermore, the ease of access to the software and its features was reported to be high, as users found it easy to navigate through the various functionalities. In terms of functionality, the software was rated to have adequate functions, suggesting that it offers a satisfactory range of features and capabilities necessary for form preparation. Additionally, the average time taken to prepare school forms (SF9-SF10) ranged from 1.5 to 2 hours, indicating that the software contributes to a relatively efficient form completion process within a reasonable time frame. Moreover, the high SFCR accuracy average rate of 97% indicates high precision and reliability in the data captured and processed by the software, which is crucial for the accuracy of school forms.

Keywords: *MERA (Multifunctional Electronic Report-System for Advisers); School Forms; Teacher productivity; Work simplification*

Acknowledgment

We are pleased to acknowledge the vital support and inspiration that made the successful completion of this research possible. The administration of Rebokon Agricultural and Vocational High School played a significant role in facilitating this endeavor. Their support was instrumental in guiding and encouraging us throughout this research journey.

We extend our heartfelt gratitude to our esteemed Division Research Coordinator and District research coordinator, whose continuous encouragement and dedication fueled our enthusiasm in transforming our ideas into a well-structured research document and for funding the conduct and implementation of this research through the Basic Education Research Fund (BERF). Additionally, we express our deep appreciation to our School Principal, Michael Paul M. Carandang, for believing in our capabilities and providing unwavering support in our pursuit of knowledge.

Above all, we offer our gratitude to the Almighty Father for bestowing upon us the wisdom, strength, and determination needed to successfully complete every aspect of this research study. His divine guidance has been instrumental in this achievement.

Furthermore, we emphasize the significance of inspiration in achieving success, and our immediate family has been a constant source of motivation and encouragement. Their unwavering support has fueled our determination to strive for excellence and has been a driving force behind the successful completion of this research.

Context and Rationale

Completing and verifying school forms is among the important jobs finished at the end of each school year, confirming students' assessment reports and information's accuracy and consistency. This is the reason why teachers are expected to become more productive these days as they are required to perform both managerial and administrative tasks. This notion contradicts their primary responsibility, which is teaching and educating learners. Public School Teachers are subsequently required to comply with these clerical tasks on top of their regular teaching loads; hence, it requires much time and work for the teachers to prepare the forms, which is tedious. The time spent on these tasks could deter them from performing at their utmost potential in the classroom. These tasks can be complex for teachers to complete and cause issues if they aren't automated using procedures and methodologies. Teacher productivity is an essential concern for both government and private schools because productivity could boost the school's economic and social growth and can also enhance collaboration among stakeholders, which could lead education leaders to develop a long-term plan to improve the quality of instruction.

The Department of Education is trying to relieve its employees from the burden of paperwork through a series of orders and issuances. In 2018, DepEd released DO 11, the guidelines for preparing and checking school forms. The order aimed to reduce school personnel's time and effort spent on records management and clerical tasks, as indicated in paragraph 2. With the policy issuance mentioned earlier, which replaced manual form preparation with the advent of simplified and computerized school forms made accessible for download through the Learner Information System (LIS), this burden is significantly reduced. However, things are still manual and redundant in terms of data entry to the different school forms. These would require teachers to spend long hours in front of their PCs, risking their eyes with fatigue and stress. One remedy for workers who are upset by increased job demands is task simplification. It includes a detailed analysis of all factors affecting job effectiveness, the implementation of improved standards, and the production of quality work. This simple solution could increase teachers' efficiency, which reduces their time spent on screen and minimizes their errors in handling crucial student data. Moreover, teachers could now put their time and effort into developing lesson plans and instructional materials so that they could deliver quality education to learners. A teacher's duty is to extend beyond simply instructing students in a classroom. Teachers must learn how to juggle several responsibilities in a flexible, ever-changing, and loosely structured position (Raffo et al. 2015). Thus, the necessity of having software that could eliminate the redundant task of the teacher, hence improving their ability to utilize new technology to ease the burden of their task.

The advent of this teacher-developed software marked a pivotal turning point in educational administrative efficiency. By leveraging this innovative tool, the arduous and time-consuming task of redundant data entry was drastically reduced by 50%, demonstrating a significant time-saving advantage for class advisers. Additionally, this automation-driven software contributed to a remarkable accuracy improvement, elevating data precision to an impressive 99%. However, it's important to note that the accuracy is contingent upon proper housekeeping within the Learners Information System (LIS).

Furthermore, the potential impact of this research extends to supporting struggling class advisers burdened by clerical tasks. The software, utilizing precise automation commands, accurately populates the requisite data across various school forms, aligning with the guidelines outlined in Department Order No. 58, s. 2017. This compliance ensures that class advisers can focus more on their core responsibilities,

alleviating the paperwork load and facilitating a seamless and efficient preparation of routine checks and forms.

A crucial aspect of validating the effectiveness and user-friendliness of the software was through feedback and evaluation from users, including input from IT experts at both the Division and regional levels. Their valuable insights and assessments refined the software, ensuring its user-friendly interface and optimal efficiency. Moreover, being a non-commercialized teacher-developed software, it presents a cost-effective solution for advisers, granting them unrestricted access to a valuable tool that significantly lightens their clerical workload.

This teacher-initiated software represents a remarkable advancement in educational technology. By revolutionizing data entry processes, enhancing accuracy, and simplifying administrative tasks, it contributes to a more efficient and productive educational environment. The positive impact of this software not only addresses immediate concerns but also lays a foundation for a future where technology supports educators in delivering the best possible education to their students.

Innovation, Intervention, and Strategy

The researchers recognized a critical issue plaguing the educational system: the redundant and inefficient management of teacher data. To address this, they conceptualized and developed an application software named MERA (Multifunctional Electronic Record-System for Advisers). The primary objective of MERA was to streamline data management for teachers, specifically class advisers, enhancing their ability to prepare school forms swiftly and efficiently.

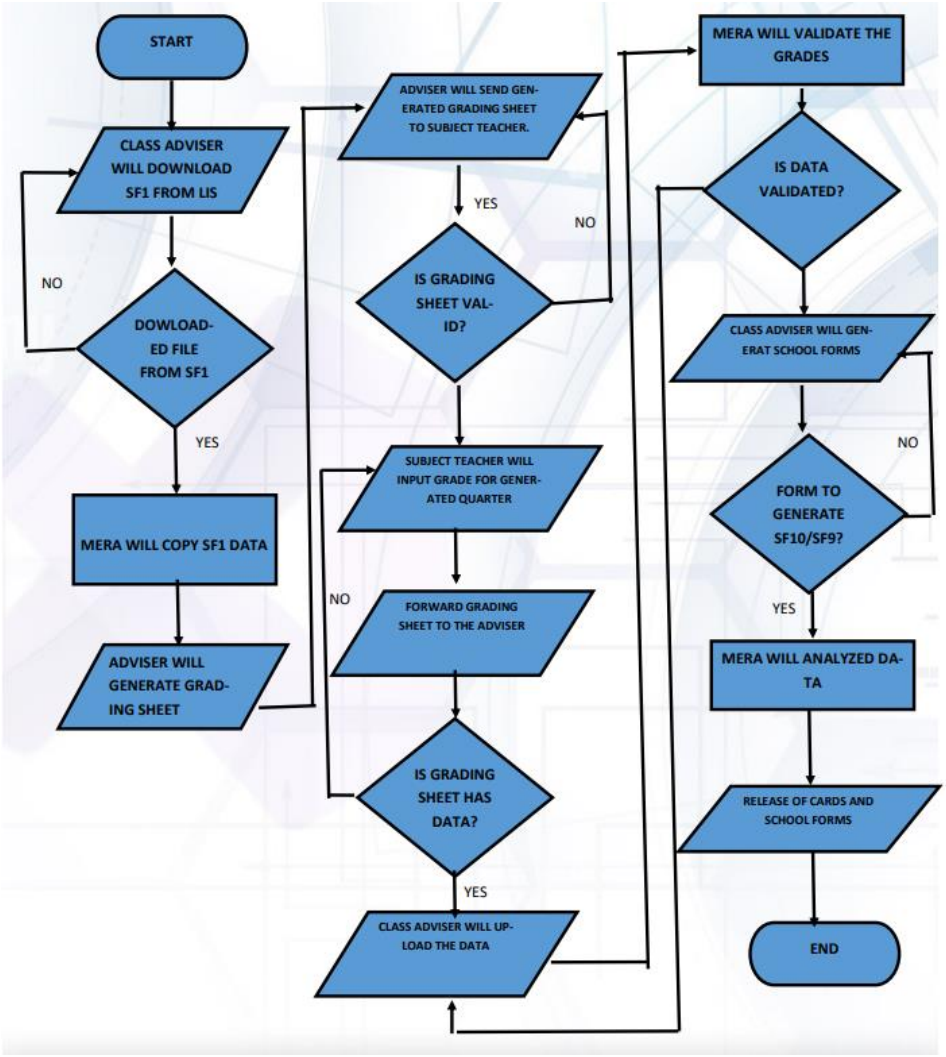
MERA was ingeniously designed to facilitate a seamless integration of existing data from the Learner Information System (LIS), effectively reducing redundancy and minimizing the risk of errors. Class advisers could log into the application, ensuring a secure platform for the confidential student data they handle. Additionally, the application was designed to extract and retrieve information from downloaded forms from the LIS, enabling a smoother transition and utilization of available data.

One of the fundamental features of MERA was its capability to generate grading sheets in an Excel format, compatible with any version of Microsoft Office. This feature significantly expedited the grading process for subject teachers. After updating the grading sheets, teacher advisers could effortlessly upload them within the MERA system, eliminating the need for time-consuming manual entry of grades per subject and reducing the potential for typographical errors associated with manual data entry.

Moreover, once the basic information and quarterly grades were uploaded into the system, MERA showcased its automation prowess by seamlessly generating crucial school forms like SF9 (Learner Progress Report Card) and SF10 (Learner's Permanent Record). This automation not only saved time but also ensured consistency and minimized bias in reporting student performance.

In essence, MERA served as a game-changing tool, revolutionizing the way class advisers managed student data and prepared essential school forms. By mitigating redundancies, reducing manual efforts, and enhancing accuracy, MERA empowered teachers to focus more on their core responsibilities—providing quality education and guidance to their students. The positive impact of MERA was not only limited to efficiency gains but also extended to the assurance of fair and accurate reporting, ultimately benefiting both educators and learners within the educational ecosystem. The figure below indicates the process flow of MERA.

Figure 1: Process Flow of MERA



Action Research Questions

Basically, this study aims to test the usability and validity of a teacher-made Multifunctional Electronic Report-System for Advisers (MERA) to help class advisers prepare their required reports with increased efficiency.

Specifically, it aims to answer the following:

1. How will the Multifunctional Electronic Report-System for Advisers (MERA) increase the speed and accuracy of class advisers in preparing school forms?
2. What is the user's perception of the adaptability of the Multifunctional Electronic Report-System for Advisers (MERA) to commonly used programs such as Microsoft Word and Excel?
3. Will the Multifunctional Electronic Report-System for Advisers (MERA) pass the software validation to be conducted by the Division ITO and Regional ITO?

Action Research Methods

Research Design

The researchers used a descriptive qualitative approach to determine if the software really reduced the time spent on data entry and increased the accuracy of the advisers. This approach involves using qualitative methods to gather rich, detailed descriptions of perspectives from the participants. In addition, a validation tool was used to determine if the software fits the existing qualification standards of systems.

Participants and Other Sources of Information

The participants of this study were the sixteen (16) Junior High School class advisers of Rebokon Agricultural and Vocational High School. They used and evaluated the developed application software for the school year 2022-23.

Research Instruments

The study adopted the validation method of Macapugas 2021, which includes:

Qualification Process. The qualification process's goal was to show that the created system was fit for its intended use. It was shown within this method that the desired outcome – explicitly, a collection of processed data that has been subjected to operations such as estimates, rounding, formatting, and regrouping for display as a table, map, or study – is obtained in a correct and reproducible manner.

Step 1. Installation Qualification (IQ). To ensure that the system may be used, it is important to verify that it can be run on several machines and that it can be updated and used with various operating system versions.

Step 2. Operational Qualification (OQ). During the development testing process, systematic reviews of the initial user specifications were carried out by the software developer. In this step, common use cases for all the basic functions were incorporated. All experiments were run with separate and distinct data sets.

Test for limits and robustness. Select input values that result in undesirable or unlikely outcomes. Experiment with entering data in inappropriate formats or in the incorrect cells (text instead of digits and out-of-range values). The focus will be on problems that arise from the productive environment at that stage. This involved repeating experiments of actual data to find errors caused by loops or values that are not properly reset after the execution is complete. Since the system will be now deployed in a productive setting, security testing will be included at this point.

Step 3. Performance Qualification (PQ). This final qualification process showed that the system satisfies the user specifications that were originally established in the user's environment. The standard usage cases can be run by the future user under real-world environments. PQ is a kind of internal approval measure. Testing with actual data. From the perspective of the user, this is the most important aspect of the validation process: using actual calculation data as input data. Depending on how the system is supposed to be used, data can be entered manually or by importing a file. Real data from earlier calculations will be utilized, regardless of whether this is a manual or automatic step. Utilizing a sufficient number of distinct real data sets is crucial to ensure that the system works as expected.

Step 4. Change Management. Any modifications to the system will be managed applying change control processes that are standardized. If a suggested improvement is to be adopted, the device owner can do a risk assessment and determine how much further testing is necessary. The system should be officially published after a satisfactory test.

In addition, the participants will be asked to rate their experience and perceptions of using the software using a researcher-made Likert scale.

Data Gathering Procedure

The process involved securing official permission to conduct the study from the school principal. The researchers then conducted an orientation of the software to the class advisers through a LAC session. Their feedback from a researcher made questionnaire was gathered during the end of school year checking of forms. The researchers secured a copy of the School Forms Checking Report to determine the accuracy of data across different school forms. All participants agreed to voluntarily participate and signed an informed consent form to signify their willingness.

Data Analysis

The feedback from the teacher responders during and after the pilot testing utilizing the 5-point Likert scale questions was captured and saved in a database for safekeeping and used for analysis. The observations of the IT expert from the validation technique were integrated to increase the reliability of the software. The tool was then altered using it according to their advice. The qualitative data that was gathered was subjected to thematic analysis. The researchers continually checked the current codes during the coding procedure to see how the program could be improved based on common characteristics and information; the researchers will organize the data that will be gathered.

The responses to questions on a 5-point Likert scale were used to produce descriptive statistics using frequency, percentage, and mean. The overall mean response for each construct variable and the mean replies for each item in the construct variables.

Results and Discussion

Table 1: Summary of Teachers' Perception of Using the Software

Efficiency:	**Response**
How efficient was the software in helping you complete forms quickly and effectively?	Very efficient
Ease of Access:	
How easy was it for you to access and navigate the various features and functions of the tool	Easy
Functionality:	
How would you rate the tool in terms of offering a wide range of functions and capabilities?	Adequate Functions
Average time to prepare school forms (SF9-SF10)	1.5 – 2 hours
SFCR Accuracy average rate	97 %

The provided data pertains to the evaluation of a software tool with regard to efficiency, ease of access, functionality, and performance in preparing school forms (SF9-SF10) and maintaining accuracy in SFCR (School Form Consolidation Report). Let's break down the information and elaborate on each aspect.

Efficiency: Very Efficient. The users found the software to be very efficient in helping them to complete forms quickly and effectively. This suggests that the software optimizes the process, saving time and effort when working on these specific forms (SF9-SF10).

Ease of Access: Easy. The user experienced no significant challenges in accessing and navigating the various features and functions of the software. Ease of

access indicates an intuitive interface and a user-friendly design, allowing users to quickly learn and utilize the software.

Functionality: Adequate Functions. The user rated the software as having adequate functions, suggesting that while it offers a range of functions and capabilities, there may be room for improvement or expansion of features. The term "adequate" implies that the tool meets the basic requirements but might benefit from enhancements to accommodate more diverse needs.

Average Time to Prepare School Forms (SF9-SF10): 1.5 - 2 hours. This data point indicates the average time taken to complete the school forms (SF9-SF10) using the software, ranging from 1.5 to 2 hours. Lower time requirements suggest efficiency and effectiveness in completing these forms, aligning with the efficiency rating.

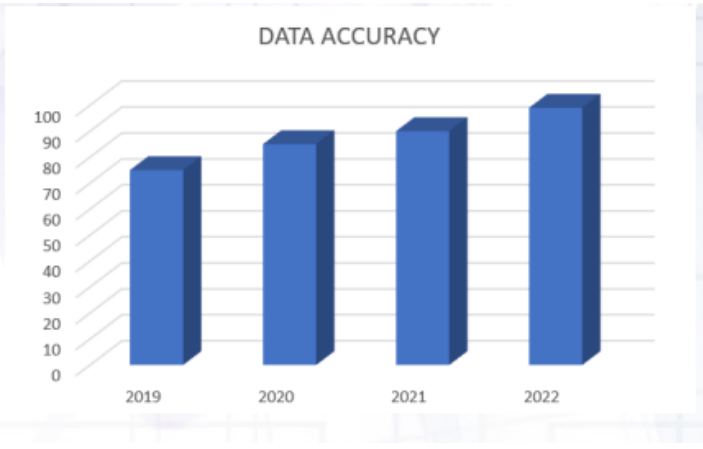
SFCR Accuracy Average Rate: 97%. This figure represents the accuracy rate achieved using the software in generating SFCR (School Form Consolidation Report). A high accuracy rate of 97% suggests that the software is reliable and precise in its operations related to SFCR, instilling confidence in its functionality.

The software is deemed very efficient, indicating its effectiveness in helping users quickly and effectively complete forms. Additionally, it is described as easy to access and navigate, implying a user-friendly interface. The functionality is perceived as adequate, suggesting room for enhancement while meeting basic requirements. The average time to prepare school forms is relatively low (1.5-2 hours), showcasing the efficiency of the software. Furthermore, the high SFCR accuracy rate (97%) demonstrates the reliability and precision of the tool in generating School Form Consolidation Reports. Overall, the software appears to be a valuable tool for streamlining form completion processes in an educational context, showcasing efficiency, accuracy, and user-friendliness.

Impact of the Utilization of MERA. The implementation of the Multifunctional Electronic Report-System for Advisers (MERA) has significantly streamlined school-form preparation processes in schools. This streamlined approach has allowed educators to redirect their focus toward teaching and learning, ultimately delivering a higher quality of education. Here are the key impacts:

Efficient Data Handling: MERA simplifies data collection and reporting tasks, reducing the time and effort required for school-form preparation. This efficiency minimizes administrative burdens on teachers and staff, freeing up valuable time.

Figure 2: MERA Efficiency and Data Accuracy



Timely Updates: With MERA, school forms are updated in real-time, ensuring that data is always current and reflective of the student's progress. This timeliness benefits educators in making informed decisions promptly.

Conclusions and Recommendations

Based on the collected data, it is evident that the software demonstrated high efficiency in helping teachers complete school forms quickly and effectively. Teachers found the tool to be very efficient, indicating that it streamlined the form completion process effectively. Furthermore, the ease of access to the software and its features was reported to be high, as users found it easy to navigate through the various functionalities. This ease of access contributed to the overall efficiency of the tool in assisting users with form completion. In terms of functionality, the software was rated to have adequate functions, suggesting that it offers a satisfactory range of features and capabilities necessary for form preparation. Additionally, the average time taken to prepare school forms (SF9-SF10) ranged from 1.5 to 2 hours, indicating that the software contributes to a relatively efficient form completion process within a reasonable time frame. Moreover, the high SFCR accuracy average rate of 97% indicates a high level of precision and reliability in the data captured and processed by the software, which is crucial for the accuracy of school forms.

Recommendations include:

Continuous Enhancement of Functionality: Given the feedback on adequate functions, it is recommended to continue improving the software's functionality by incorporating additional features that could further enhance the user experience and streamline the form completion process.

User Training and Support: To maximize the software's efficiency, provide comprehensive training and support to teachers. This could include tutorials, user guides, and responsive support to address any issues promptly and ensure users can effectively utilize the tool.

Performance Monitoring and Updates: Implement a system to monitor the software's performance, including its efficiency and accuracy in form completion. Regular updates based on user feedback and evolving needs will help maintain optimal performance and relevance.

Efficiency Optimization Strategies: Explore and implement strategies to further optimize the software's efficiency, potentially reducing the average time required to complete school forms while maintaining accuracy. This could involve process analysis and integration of time-saving features.

User Feedback Integration: Encourage users to provide continuous feedback and suggestions for improvement. Use this feedback as a valuable resource for future software enhancements, ensuring that the tool evolves to meet the changing needs and preferences of the users.

Action Plan
School Year 2023-24

Goals/ Objectives	Activities/ Strategies	Persons Involved	Resources Needed	Time Frame	Success Indicator
To communicate the results of the assessment to the respondents, immediate school head, and division research coordinator.	Submit the completed copy of the action research along with the data gathered aligned with the questions previously set in the study.	Researcher Respondents School Head Division Research Coordinator	Supplies	NOVEMBER 2023 (After the completion of the study)	Submitted A completed copy of the Action Research
To introduce the intervention to those schools who are interested to adopt the software.	Write a letter requesting the Office of the SDS to conduct an orientation regarding the use of the software. Coordinate with ITO Personnel to adapt the software for division wide usage	Researcher SDS Program Owner	ICT materials	Depends upon the time approval will be granted. Aligned to the timeline set in the Here to Hear program of the Division	Oriented ICT coordinators on the use of the software.

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Financial Report

The table below shows the cost estimates expended before, during, and after conducting this action research.

General Description	Particulars	Quantity	Unit	Unit Price	Total Cost
Travel expenses during validation	Gasoline				500.00
Food and other expenses during the conduct of the research	Snacks/Meals	16		350/person	2,900.00
Supplies for research reproduction	Bond paper	2	Rim	250	500.00
	Printer Ink	4	Bottles	250	1,000.00
	Folder	10	pc	10	100.00
				GRAND TOTAL	**5,000.00**

Appendix A

Researcher-Made Tool to Evaluate Efficiency and Accuracy in the Preparation of School Forms

NAME: _____
Year and Section: _____
Check the appropriate column that represents your response to the questions on the use of MERA Application

Efficiency:	**DESCRIPTIVE RATING**	**Response**
How efficient was the software in helping you complete forms quickly and effectively?	Very efficient	
	Somewhat efficient	
	Neutral	
	Somewhat inefficient	
	Not at all efficient	
Ease of Access:		
How easy was it for you to access and navigate the various features and functions of the tool?	Very Easy	
	Easy	
	Neutral	
	Difficult	
	Very difficult	
Functionality:		
How would you rate the tool in terms of offering a wide range of functions and capabilities?	Abundant Functions	
	Adequate Functions	
	Neutral	
	Limited Functions	
	Very limited functions	
Average time to prepare school forms (SF9-SF10)	1.5 – 2 hours	
	3 – 4 hours	
	5-6 hours	
	More than 6 hours	
SFCR Accuracy average rate		

Appendix B

Letter Request to Conduct the Study

June 26, 2023

_____
School Principal

Sir:

Greetings of peace!

The undersigned would like to request your permission to conduct a software testing for all teacher advisers of Rebokon Agricultural and Vocational High School for the completion of our action research entitled, “Usability testing and validation of (MERA) Multifunctional Electronic Report-System for Advisers.”

Your approval in this regard will surely make our research endeavor truly successful.

God bless, and more power!

Respectfully Yours,

Sgd. MARCRYL P. SUMALINOG
Researcher

Sgd. FELIX ANDREU P. LOPEZ
Researcher

Approved:

_____
School Principal

Appendix C

Letter Request to all Research Participants

June 27, 2023

Dear Respondent,

Greetings of Peace!

At present, the undersigned are conducting action research entitled Usability testing and validation of (MERA) Multifunctional Electronic Report-System for Advisers which was primarily focused on improving the efficiency and accuracy of advisers in Rebokon AVHS on the preparation of school forms SF 9 and SF 10

In line with this, we would like to request you to answer our questionnaire checklist, which evaluates your resiliency level. Rest assured, your responses and comments will solely serve the purpose they will serve in our study and will be kept confidential.

God bless, and more power!

Respectfully Yours,

Sgd. MARCRYL P. SUMALINOG
Researcher

Sgd. FELIX ANDREU P. LOPEZ
Researcher

Appendix D

Consent Form

Research Title **Usability Testing and Validation of (MERA) Multifunctional Electronic Report-System for Advisers**

Description of the Research

this study aims to test the usability and validity of a teacher-made Multifunctional Electronic Report-System for Advisers (MERA) to help class advisers prepare their required reports with increased efficiency.

Target Participants

Sixteen (16) Junior High School class advisers of Rebokon Agricultural and Vocational High School

Please read and complete the table by writing check mark (✓) on the second column.

1. I attest that I have read and understand the information about the research conducted by the proponent.	
2. I have had the opportunity to consider the information and ask questions specifically.	
3. I confirm that my participation in this study is voluntary wherein I can withdraw any time I want without giving reasons for withdrawal.	
4. I am aware that my name will not be reflected on the presentation of the results of the study.	
5. I give permission to the lead proponent to be able to access my academic records that are relevant to this research.	
6. I agree to take part on the above study.	

Participant:

_____	_____	_____
Name of Parent/Guardian	Signature	Date

Researcher:

_____	_____	_____
Name of Researcher	Signature	Date