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Empowering Educators: An Action Research on the Implementation of Smart Excel Tool for Enhanced Learner Assessment

Cris Edison U. Villanueva[1], Mary Rose Pelindiana-Villanueva[2]

[1,2] Lutucan Integrated National High School, Sariaya, Quezon, Philippines 4322

ABSTRACT: This action research investigates the effectiveness of the SMART Excel Tool, which is a user-friendly Microsoft Excel spreadsheet, custom-designed to enable the smooth calculation and analysis of student grades. This study addresses issues of time consumption and proneness to errors resulting from manual calculations, usually incurred by teachers, improving workload efficiency.

A teacher survey (n=48) investigated current practice in the analysis of student Mean and Mean Percentage Score. Current practices were generally agreed to (Overall WAM: 3.19), although some areas of best practice emerged, including the manual categorization of scores (WAM: 3.10) and highlighting MPS scores (WAM: 3.10).

Following the implementation of the SMART Excel tool and a related training session, teacher perceptions had changed significantly to the positive (Overall WAM: 3.42). It was reported by teachers that they found the tool very useful with a WAM of 3.64, easy to use with a WAM of 3.44, and accessible technical support with a WAM of 3.30. These findings suggest that the SMART Excel Tool has great potential to reduce teachers' workload around data analysis.

These findings suggest that the SMART Excel Tool should be implemented more widely within the school division. Supplemental training in video format and user guides can provide individuals with different learning styles the ability to have a reference for teachers for continuing use. Future research at this point in time should examine if the tool has a long-term effect of reducing teacher workload while improving student learning outcomes, along with any shifts in teaching practice. It would also be interesting to examine the applicability of the SMART Excel Tool in other educational contexts, such as its application in elementary schools or other subject areas. In view of taking up these recommendations and continuing to explore, this research can help lessen teacher workload, increase the efficiency of data analysis, and engender a more streamlined and supportive educational environment.

KEYWORDS: data automation, learner assessment, excel tool, teacher efficiency, technology integration

INTRODUCTION

Teaching is not a profession that confined itself within the four walls of the classroom. The teachers take upon themselves many tasks, responsibilities, roles, or activities that help towards the all-round growth of their pupils: from lesson planning to grading assignments, from advising on emotional well-being to liaising with parents and colleagues, versatility and dedication are seen in teachers in the pursuit of educational Excellence. It is because of the variety of roles and responsibilities that are going to be placed upon educators that they demonstrate a deep willingness to give their time and efforts far beyond the call of duty. It is stated in Republic Act 4670, "The Magna Carta for Public School Teachers", under Section 13 that "Any teacher engaged in actual classroom instruction shall not be required to render more than six hours of actual classroom teaching a day, which shall be so scheduled as to give him time for the preparation and correction of exercises and other work incidental to his normal teaching duties: Provided, however, That where the exigencies of the service so require, any teacher may be required to render more than six hours but not exceeding eight hours of actual classroom teaching a day upon payment of additional compensation at the same rate as his regular remuneration plus at least twenty-five per cent of his basic pay. The very demanding nature of the teaching profession, coupled with many paperwork addressing the needs of the students as well as those of the parents and other stakeholders, and a personal obligation of teachers usually results in a heavy workload. The need to provide designated office hours with appropriate compensation for teachers is usually overlooked. Much as being a teacher requires great commitment and dedication, they often fall short of getting enough time and resources to attend to their professional responsibilities without necessarily sacrificing their personal lives. Indeed, acknowledging this challenge and adequately dealing with it in having reasonable office hours and by giving fair pay for teachers' services is important in protecting their well-being so that they may fulfill this very important role effectively. This is left to the

teachers to calculate and analyze students' grades. It is a vital component for assessing any student's performance and monitoring their academic progress.

This includes computation and analysis of both the Mean and Mean Percentage Score. For this purpose, data are obtained during each examination administration. Raganit (2021), education outcomes for learners are decided upon by the MPS, which also offers a means of assessing the effectiveness of any curriculum or instruction. Therefore, the teachers have to achieve it in time; give the learners timely feedback for quality education. Moreover, the results derived from such calculations must be reported to higher officials for scrutiny, which again supports an evaluation of the effectiveness of the curriculum. This generally creates excessive workload to the teachers, who are instead loaded with many other paperwork duties. The school division frequently receives memos from the Department of Education pertaining to some vital announcements toward the better development of young students.

These memos would then provide the medium through which to convey such information that needs to be implemented or passed on at other stations, such as schools and further down to the teachers. They often address various aspects, which include monitoring of welfare of the students in terms of their physical health and their learning abilities. They are of great importance in terms of the general welfare and progress of the students as a whole. This is in connection with Division Memorandum No. 090, series of 2023, entitled "Submission of Quarterly Reports of Mean Percentage Score and Least Learned Competencies of All Learning Areas in Key Stage 1-4." With this, teachers are expected to accomplish the quarterly Mean Percentage Score of their respective learners. This memorandum underscores the fact that student performance in all learning areas at every stage of Key Stage 1-4 needs regular tracking and reporting. The MPS is a quantitative indicator for measuring total progress and academic achievement of students in each quarter. This same memo states that the data should be submitted before the end date. Further, to increase collaboration and for ease of process, teachers of the Senior High School Department of Lutucan Integrated National High School opted for a Google collaborative platform tool, specifically the Google Spreadsheet. Through this, teachers can remotely input the required information, extending its benefit of effective collaboration that will also help in submission on time. One of the very noteworthy features of the collaborative tool is being capable of time tracking changes done in data. However, it has been brought to their attention that the time indicated on the teachers' data input in the spreadsheet is always three days delayed from the deadline provided. Being teachers at this certain school, the proponents of the innovation realize the need for a solution to fast-track computing and analyzing data. Lessening the burden of teachers in conducting these tasks clearly indicates that what is needed here is an effective tool to make things easier.

Proponents have a good background in using technology in making work flow easier with the trainings and seminars attended by the proponents under recognized Colleges and institutions like DICT and PAPSI. Among the advocates are a science teacher, which adds to their credibility in harnessing technology in teaching. Microsoft Excel is a very potent application software that employs spreadsheets in the effective management of numbers using formulae and functions. Its versatility and functionality make it quite suitable for Tutors if used effectively. Additionally, with so many laptops, desktop computers, and even smartphones that can support this application, the workload of teachers is further eased.

With Excel for its features, teachers shall be able to better handle data, do complex calculations, and provide reports with insights aiming at improving instruction methods and other administrative tasks. With the problem above, it then becomes imperative to consider a solution that should be both prompt and effective. Fortunately, means of accessing meaningful data with advanced technology barely require an effort from a teacher today, which greatly reduces the teachers' workload. This will go a long way in reducing the administrative workload while builders will be superseded with useful data that will supplement their instructional practices. By better integrating the use of technology in such a way, educators are able to better use their time and energies in an effort to focus on quality education and students' academic growth.

Teachers play a multifaceted role in shaping young minds. Beyond classroom instruction, they shoulder numerous administrative tasks, including calculating and analyzing student grades. This process, involving the Mean and Mean Percentage Score (MPS), is essential for evaluating student performance and informing instructional decisions. However, the current methods for data analysis often contribute to an overwhelming workload for teachers.

This action research focuses on a key challenge: simplifying the process of calculating and analyzing student grades to reduce teacher workload and improve data collection efficiency.

RESEARCH QUESTIONS

To address the aforementioned challenge, this study aims to answer the following questions:

1.) What are the existing procedures used by teachers to calculate and analyze the Mean and Mean Percentage Score (MPS) of student grades?

2.) What are the features of the proposed SMART Excel Tool for analyzing Mean and MPS in terms of:

2.1. Perceived Usefulness for teachers

2.2. Perceived Ease of Use

2.3. Teacher Self-Efficacy in using the tool

2.4. Availability of Technical Support

3.) Based on the findings regarding existing procedures and the features of the SMART tool, what criteria can be used to assess its suitability for reducing teacher workload in analyzing Mean and MPS?

METHODOLOGY

This action research investigates the impact of the SMART Excel Tool on teacher assessment practices within the Senior High School department of Lutucan Integrated National High School. To gather data, the study will involve 55 teachers but only 48 will participate as suggested by Krejcie-Morgan Table. This ensures all teachers have an equal chance of participation. Since the research focuses on teacher experiences with the tool, selecting teachers directly involved in student assessment is crucial.

This action research project will employ a quantitative approach to investigate teacher perceptions and experiences with the newly developed SMART Excel Tool. A self-administered survey instrument will be distributed to the 48 participating teachers in March. The researcher-designed questionnaire consists of two parts. Part one aims to assess existing procedures for analyzing student mean and MPS (Measure of Performance Standard) scores. Part two focuses on evaluating the perceived usefulness, ease of use, self-efficacy, and technical support associated with the proposed tool's functionalities for analyzing student mean and MPS scores. The questionnaire's content validity was established through expert review by two master teachers from the senior high school's mathematics and science departments.

This survey method offers several advantages. Firstly, it allows efficient data collection from a large sample while ensuring participant anonymity, which can potentially encourage honest feedback. Secondly, the survey instrument directly aligns with the research questions. It gathers data on both existing teacher practices for calculating and analyzing student mean and MPS scores (research question 1) and the perceived value of the proposed tool's features (research question 2). The survey will utilize a Likert scale to capture quantitative data. The March administration timeframe strategically allows teachers to utilize the tool during February assessments, providing them with firsthand experience to inform their responses.

To further ensure the survey's effectiveness in addressing the research goals, a pilot test will be conducted with a smaller sample of teachers from the senior high school department. This pilot test serves the purpose of refining the survey questions for clarity and identifying any potential issues before administering the final instrument to the entire participant pool.

This action research project employs a quantitative approach. The data collected from the teacher-developed questionnaire will be analyzed using statistical software, such as Microsoft Excel. To establish the questionnaire's internal consistency, Cronbach's alpha coefficient was calculated. The formula for Cronbach's alpha is as follows:

$$\alpha = \frac{K}{K-1}\left(1 - \frac{\sum s^2 y}{s^2 x}\right)$$

where : K – number of items

$\sum s^2 y$ - Sum of the item variance

$s^2 x$ - Variance of the total score

α - Cronbach's alpha

Weighted arithmetic mean (WAM) was utilized to address research questions 1 and 2. The formula for WAM is presented below:

WAM = (∑FW)/N

where:

WAM - is the weighted arithmetic mean

∑fw - summation of the products of frequency and weight

n - total number of responses for every item

For data analysis, a four-point Likert scale was implemented. The scale is presented as follows:

Continuum	Qualitative Index
3.26 – 4.00	Strongly Agree
2.51 – 3.25	Agree
1.76 – 2.50	Disagree
1.00 – 1.75	Strongly Disagree

RESULTS AND DISCUSSION

For pilot testing, the researcher recruited 20 respondents, following the recommendation of NCSS (2023) that a sample size of 20-30 is appropriate for quantitative research to assess the reliability and validity of instruments. To evaluate the internal consistency of the teacher survey instrument, the researcher calculated Cronbach's alpha coefficient. This coefficient is a measure of reliability, indicating the extent to which the questionnaire items collectively capture a single underlying construct.

For Part I. Existing Procedures in Analyzing the MEAN and MPS of Students Score, a Cronbach alpha value of 0.70, this value indicates acceptable internal consistency for the teacher survey instrument.

Table 1. Cronbach's Alpha for Part I: Existing Procedures in Research Data Tallying

Existing Procedures of the respondents in Research Data Tallying		
VARIABLES	Values	INTERNAL CONSISTENCY
Cronbach's Alpha	0.70	Acceptable
# of items (k)	7	
Summed Variance of each item (s2Y)	3.09	
Variance of total of Total Scores	8.20	

Part II of the researcher-developed questionnaire was divided into four subscales: perceived usefulness, perceived ease of use, self-efficacy, and technical support. Cronbach's alpha coefficient was calculated for each subscale to assess their internal consistency. The analysis yielded the following results:

Perceived Usefulness: A Cronbach's alpha of 0.87 was obtained, indicating a good level of internal consistency for the items measuring teacher perceptions of the tool's usefulness.

Perceived Ease of Use: The Cronbach's alpha coefficient for this subscale was 0.76, suggesting an acceptable level of internal consistency for the items capturing teacher perceptions of the tool's ease of use.

Self-Efficacy: The subscale measuring self-efficacy regarding the tool's use yielded a Cronbach's alpha of 0.72, which suggests an acceptable level of internal consistency.

Technical Support: The Cronbach's alpha coefficient for the technical support subscale was 0.74, indicating an acceptable level of internal consistency.

To further analyze the gathered of the self-made questionnaire part I Existing Procedures in Analyzing the MEAN and MPS of Students Score and Part II Proposed Tool for Analyzing Mean and MPS of Students Score, WAM were used. The following result were obtained after computing the weighted average mean.

Part I Existing Procedures in Analyzing the MEAN and MPS of Students Score

Table 2. Existing Procedures in Analyzing the MEAN and MPS of Students Score

Items Evaluated	Frequency				WAM	Qualitat Index
	4	3	2	1		
In analyzing the Mean and MPS of my students score, I....						
1.) utilize existing spreadsheet software to create customized data sheets for student scores.	27	19	0	2	3.48	SA
2.) manually calculate and interpret the Mean and Minimum Proficiency Standards (MPS) based on established methods.	27	13	4	4	3.31	SA
3.) employ traditional statistical methods, such as pen-and-paper calculations, for determining Mean and MPS.	21	12	11	4	3.04	A
4.) organize student test scores manually in a way that allows for easy identification of Mean and MPS benchmarks.	23	17	5	3	3.25	A
5.) manually categorize and group student scores according to specific indicators before calculating Mean and MPS.	19	18	8	3	3.10	A
6.) create visual representations, such as charts or graphs, manually to illustrate the distribution of student scores in relation to Mean and MPS.	25	12	7	4	3.21	A
7.) manually highlight or mark scores that meet or exceed the Minimum Proficiency Standards (MPS) for better visibility.	19	19	6	4	3.10	A
8.) manually cross-reference student demographic information with test scores before analyzing Mean and MPS.	18	16	11	3	3.02	A
			Over-all WAM		3.19	A

Legend
3.26 – 4.00 - Strongly Agree (SA)
2.51 – 3.25 - Agree (A)
1.76 – 2.50 - Disagree (D)
1.00 – 1.75 - Strongly Disagree (SD)

Educators generally agree with current practices for analyzing student scores (Overall WAM: 3.19). However, statements with lower WAMs, such as manually categorizing scores (WAM: 3.10) or highlighting MPS scores (WAM: 3.10), suggest potential areas for improvement. Studies by Moseley et al. (2017) highlight the potential of e-assessment tools to reduce teacher workload. The SMART Excel tool, by automating these tasks, could free up valuable educator time for more focused interactions with students.

PART II. Features of the Proposed Tool for Analyzing Mean and MPS of Students Score (SMART: Student Mastery Analysis Results Tool)

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Table 3 Features of the Proposed Tool for Analyzing Mean and MPS of Students Score (SMART: Student Mastery Analysis Results Tool)

Items Evaluated	Frequency				WAM	Qualitative Index
After using the SMART Excel Tool, I found out that...	4	3	2	1		
PERCEIVED USEFULNESS						
1.) it improves the quality of work that I do.	32	14	2	0	3.63	SA
2.) it gives me greater control over my work	32	14	2	0	3.63	SA
3.) it enables me to accomplish analyzing MEAN and MPS of scores of my students more quickly.	34	8	6	0	3.58	SA
4.) it supports critical aspects of my work such as assessment and feedback.	32	10	6	0	3.54	SA
5.) it increases my productivity.	35	10	3	0	3.67	SA
6.) it allows me to accomplish more work that would otherwise be possible.	33	13	2	0	3.65	SA
7.) it enhances my effectiveness on my school works.	35	11	2	0	3.69	SA
8.) it is easier to analyze mean and MPS of the score of my students.	34	11	3	0	3.65	SA
9.) the proposed tools for analyzing Mean and MPS of students score (SMART: Student Mastery Analysis Results Tool) is useful in my work as a teacher.	38	8	2	0	3.75	SA
				Subtotal	**3.64**	**SA**
PERCEIVED EASE-OF-USE						
1.) learning to operate it is easy for me.	25	19	4	0	3.44	SA
2.) it is easy to get the SMART Excel Tool to do what I want it to do.	19	26	3	0	3.33	SA
3.) it is easy for me to remember how to perform tasks using the tally tool system.	26	21	1	0	3.52	SA
4.) my interaction with it is clear and understandable.	22	22	4	0	3.38	SA
5.) it is easy for me to become skillful in using it .	26	19	3	0	3.48	SA
6.) the SMART Excel Tool is easy to use.	25	21	2	0	3.48	SA
				Subtotal	**3.44**	**SA**
SELF EFFICACY						
1.) I feel confident in analyzing the Mean and MPS of my students score.	23	20	5	0	3.38	SA
2.) I am fluent in the use of the SMART Excel Tool.	14	25	9	0	3.10	A
3.) I am confident in my ability to control the SMART Excel Tool.	20	23	5	0	3.31	SA
4.) I get nervous when working with the SMART Excel Tool.	20	20	7	1	3.23	A
5.) I would have no problem explaining to someone else the process of using the SMART Excel Tool.	18	24	6	0	3.25	A
6.) I would have no problem explaining to someone else the benefits of using the SMART Excel Tool.	20	27	1	0	3.40	SA
7.) I intend to make good use of the SMART Excel Tool.	24	21	3	0	3.38	SA
				Subtotal	**3.30**	**SA**

TECHNICAL SUPPORT						
1.) I have no difficulty in accessing the SMART Excel Tool.	20	22	6	0	3.29	SA
2.) I have no difficulty in using the sytem.	14	24	10	0	3.08	A
3.) The SMART Excel Tool provides an alert indicator in case cell is left blank.	21	21	5	1	3.29	SA
4.) I can have as many as 5 sections with 60 students in one encoding of raw score data.	21	23	3	1	3.33	SA
5.) I can look at the individual Mean and MPS results of my students on a separate sheet tab.	24	17	6	1	3.33	SA
6.) I consider the output of the SMART Excel Tool to be excellent.	24	23	1	0	3.48	SA
				Subtotal	**3.30**	**SA**
				Over-all WAM	**3.42**	**SA**

Legend:
3.26 – 4.00 - Strongly Agree (SA)
2.51 – 3.25 - Agree (A)
1.76 – 2.50 - Disagree (D)
1.00 – 1.75 - Strongly Disagree (SD)

Table 2 presents educators' evaluations after using the SMART Excel Tool for analyzing student scores. The overall WAM of 3.42 indicates strong agreement with the statements describing the tool's features. Educators highly valued the tool's perceived usefulness (WAM: 3.64), perceived ease-of-use (WAM: 3.44), and technical support (WAM: 3.30) – all receiving a qualitative index of "Strongly Agree."

Perceived Usefulness: Educators overwhelmingly agreed (WAM range: 3.54 - 3.75) that the SMART Tool improved the quality of their work. This suggests the tool effectively streamlines tasks and potentially enhances teaching effectiveness.

Perceived Ease-of-Use: Educators found the SMART Tool user-friendly, with a subtotal WAM of 3.44. While all indicators received a "Strongly Agree" rating, it's worth noting that some educators might require additional practice to become fully fluent in using the tool (WAM: 3.10).

Self-Efficacy: Educators generally expressed confidence using the SMART Tool (WAM: 3.30). While most felt comfortable explaining the tool to others (WAM: 3.25), some indicated they might need more practice for complete fluency (WAM: 3.10) or might experience initial nervousness (3.23). This suggests that further training or support materials could be beneficial for some educators to maximize their comfort level.
Technical Support: Educators reported no significant difficulties accessing the tool (subtotal WAM: 3.30). However, one indicator regarding ease of using the system received a slightly lower WAM (3.08). Future research could explore potential areas for improvement in the technical support provided for the SMART Excel tool.
Overall, the findings suggest that the SMART Excel Tool is a valuable resource for educators. It is perceived as helpful, user-friendly, and well-supported. However, addressing potential needs for additional training or support materials could further enhance educator comfort and maximize the tool's effectiveness.

CONCLUSION AND RECOMMENDATION

This action research focused on the effectiveness of utilizing the SMART Excel Tool. It is a relatively simple, user-friendly Microsoft Excel spreadsheet that offers custom-made features to analyze and calculate student marks within an Excel workbook. It was designed to lighten teachers' workload on time-consuming manual calculations and potential errors.
The teacher survey results (n=48) that, in general, there is consensus on the current practices that exist around the analyzing student scores (Overall WAM: 3.19). There were a number of areas where teachers suggested improvements could be made, such as the manual categorization of scores, with a WAM of 3.10, or highlighting MPS scores (WAM: 3.10).
Particularly after working with the SMART Excel Tool and gaining training in its use, educator response to the tool was very positive, with a high overall WAM of 3.42. The tool was rated as very useful, 3.64, easy to use, 3.44, and technical support was readily available, 3.30. These findings suggest that the SMART Excel Tool has the potential to significantly reduce teacher workload associated with data analysis.

Given the encouraging responses from teachers, it is recommended that the SMART Excel Tool be used more widely across the school division. Still, the following suggestions are offered to optimize its efficacy:

- **Create extra training materials**: Although the teacher training session went well, some educators said they would have liked more help. Developing additional materials, like user manuals or video lessons, could cater to different learning styles and give educators continuous access points.
- **Collect long-term data**: The tool's initial impressions were the main focus of this study. Future studies want to look into how the SMART Excel Tool affects student learning results, instructor workload, and possible modifications to instructional strategies over the long run.
- **Examine broader applicability**: The tool was studied at a single school for the purposes of this research. Future research could examine how well the SMART Excel Tool works in various educational settings, such elementary schools or other topic areas.

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