VALIDATION OF A DEVELOPED TEACHER ADVISER SYSTEMATIC KIT (TASK) USING MICROSOFT EXCEL: INPUT FOR WORK SIMPLIFICATION TO IMPROVED TEACHER PRODUCTIVITY

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Completed 2021

Validation of a Developed Teacher Adviser Systematic Kit (TASK) Using Microsoft Excel: Input for Work Simplification to Improved Teacher Productivity

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ABSTRACT

Teachers no longer just teach in the classroom but are also compelled to provide reports required by DepEd personnel. The number of tasks to be done is increasing. Without tools and methodologies that can simplify these tasks, it can become a burden to teachers and may cause a problem. This study attempts to validate a researcher-developed system called Teacher Adviser Systematic Kit (TASK) that can be used by teachers. The methodology of this study involved a systematic tool validation process and tool application using the Guidelines for the Development and Validation of Spreadsheets by Peter M. Esch following the OECD Principles of GLP from an Article in The Quality Assurance Journal 2010. The TASK was subjected to the different steps in the qualification process that includes, Installation Qualification (IQ), Operational Qualification (OQ), and Performance Qualification (PQ). The researchers also used a descriptive qualitative approach to know the respondent's point of view on the usefulness of the TASK. Respondents strongly agree that the TASK is an effective tool in the efficient and simplified preparation of DepEd school forms that are prepared by the advisers at every end of the quarter and can contribute to the improved and simplified work for teachers.

Keywords: *Teacher Adviser Systematic Kit, TASK, work simplification, Teacher Productivity*

INTRODUCTION

Teacher productivity is a major concern for both government and private schools due to the effect of productivity on the school's economic and social growth, as well as an integrative goal, encompassing as it can improve labor-management collaboration among stakeholders, the requirements for school competitiveness, and the formulation of a long-term strategy for alleviating quality education.

Nowadays teachers' responsibilities are no longer limited to teaching in the classroom; they are now compelled to provide reports required by DepEd personnel. The number of activities to be completed is growing. Without methods and methodologies to help automate these assignments, they can become a challenge for teachers and trigger problems.

Work simplification is one solution for workers who are feeling frustrated by rising workplace uncertainty and knowledge overload. Work simplification is a cost-cutting tool that makes the most use of available materials, resources, and human energies. It is a thorough examination of all aspects influencing job efficiency, the execution of improvement standards, and the creation of proper work procedures. Improvement entails eliminating inefficient applications of human activity, materials, machinery, and services, as well as maximizing the return on each unit of effort, capital, or time spent. Work simplification is a time-honored technique.

A need, therefore, exists for the development of a tool that can be used by teachers to simplify recording and can be used to facilitate consistent and more efficient reporting.

This study presents the validation of such a tool, which aims at simplifying teacher's work to improve teacher's productivity.

Generally, this study aims to validate a developed work simplification tool called Teacher Adviser Systematic Kit (TASK) using Microsoft excel and apply it to the field. The study also delves into teacher's perception on the usefulness of the developed TASK.

Specifically, it aims to answer the following:

- Can the developed Teacher Adviser Systematic Kit (TASK) an efficient tool that can be used to simplify teachers' works and facilitate consistent and more efficient reporting?

- How do the teachers find the Teacher Adviser Systematic Kit (TASK) as a tool for work simplification?

REVIEW OF LITERATURE

It is widely known that teachers in public schools in the nation have their hands full. In a policy paper published by the Philippine Institute of Development Studies (PIDS), David, C., Albert, J.R., and Vizmanos, J.F. (2019) stated that the workload of public-school teachers is not only confined to teaching but also includes other non-teaching activities. If teachers are to be followed, they tend to concentrate on teaching and have more opportunities to talk with students, provide guidance, and demonstrate what they have learned about differentiated education.

Productivity enhancement necessitates a significant expenditure in innovation as well as the implementation of new tools, infrastructure, and skilled labor. Job simplification methods and procedures are rapidly being used in businesses, infrastructure, private and public organizations, and other systems including projects, including paperwork. According to popular press articles on job simplification strategies, productivity would increase as a result of intelligently designed and enhanced work processes that eliminate waste of some sort in a process.

High efficiency, as an effective measure, means that output materials are completely used and waste is reduced. Efficacy, on the other side, ensures that outcomes (operations and processes) contribute to the achievement of the organization's specific objectives, whether they be satisfying consumer needs, achieving corporate targets, or contributing to the achievement of the society's social, economic, and ecological goals. Productivity enhancement is an improvement in productivity that entails the use of high-quality resources to generate products of consistent or higher quality (Prokopenko,1997).

Job simplification is one solution for employees who are overwhelmed by increasing organizational confusion and information overload. Work simplification is a cost-cutting strategy that maximizes the use of usable goods, energy, and human energies. It is a comprehensive review of all factors affecting job performance, the implementation of improvement criteria, and the creation of proper task procedures. Improving involves removing wasteful applications of human operation, materials, equipment, and utilities, as well as the return on each unit of effort, money, or time expended. Work simplification is a tried-and-true process.

Work Simplification's underlying principle is that all work that does not bring value to a commodity or service is a reducible loss. Reducible waste is classified into four categories: shipping, delay-storage-idle, testing, and inability to use proven faster equipment.

Based on the search for related studies it has been found out that there are only a few studies that have been conducted that are related to the present study. One of these is the study conducted by Rosales, et al. in 2018. The study reports on the development and validation of the Means of Verification – Automated Assessment Tool. The study aimed to heed the call of the Department of Education in crafting solutions for the improvement of the Result-Based Performance Management System Manual for Teachers and School Heads. They produced a Tool to be used in the process of performance assessment and rating of teachers by creating a program through a software application, particularly using Microsoft excel. Using a research sample of twenty-four (24), a research instrument called survey questionnaire on the use of MOV–AAT.

METHODOLOGY

The methodology of this research involved a systematic tool validation process and tool application. This study presents the validation of a developed Teacher Adviser Systematic Kit (TASK) using Microsoft excel by the author using the Guidelines for the Development and Validation of Spreadsheets by Peter M. Esch following the OECD Principles of GLP from Article in The Quality Assurance Journal 2010. TASK was subjected to the different steps in the qualification process that includes, Installation Qualification (IQ), Operational Qualification (OQ), and Performance Qualification (PQ).

Research Design

The researchers also used a descriptive qualitative approach to know the respondent's point of view on the usefulness of the TASK.

Research Locale

Leyte National High School served as the main locale of the study. LNHS was selected being the largest school within the region and is believed to be where this kind of innovation is needed due to the number of teacher advisers and student population.

Sampling procedure

An IT expert was recruited to evaluate the tool. The IT expert was selected from the pool of IT teachers in the Senior High School department of Leyte National High School.

Afterward, the tool was piloted using a sample of the population of teacher advisers from Leyte National High School that was randomly selected. Preferably 4 teacher advisers from each department and one from each grade level. A total of 32 teacher respondents voluntarily joined in this study.

Data Collection

Validation Approach was utilized in this study. The general approach for the validation of the Teacher Adviser Systematic Kit (TASK) includes a common validation process (user requirements, risk assessments, specifications, planning, testing, reporting), proper validation documentation, and rules for the archival and change management processes.

In the following sections, individual aspects of the validation approach for TASK will be described.

Qualification Process. The qualification process's goal is to show that the created system is fit for its intended use. It must be shown within this method that the desired outcome – namely, 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 software 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 of the basic functions was included. 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 wrong cells (text instead of digits and out-of-range values). The focus was 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 at the end of the execution. Since the system was now deployed in a productive setting, security testing was 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 user's perspective, this is the most important aspect of the validation process: using actual calculation data as input data. Depending on the intended use of the system, data can be entered manually or by importing a file. Real data from previous calculations was used, regardless of whether this is a manual or automatic step. It is important to use a sufficient number of different actual data sets to ensure that the system works as expected.

Step 4. Change Management. Any changes to the system was managed using change control processes that are standardized. If a proposed 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, a face-to-face interview using a semi-structured interview guide was used. In a semi-structured interview, the interviewer formulated a list of questions to be answered by all interviewees; at the same time, follow-up questions were asked during interviews to explain and/or further expound on some subjects (Boyce & Neale, 2006).

Data Analysis

The observations of the IT expert from the validation approach and the Feedback coming from the teacher respondents during and after the pilot testing using a semi-structured interview was recorded and kept in a database for safekeeping and was used for analysis. It was then used to modify the tool based on their recommendation.

Thematic analysis was used to the qualitative data that was collected. During the coding process, the researchers constantly reviewed existing codes to determine how they might be grouped into themes. As data was collected the researchers created categories of information based upon common properties and information.

RESULTS AND DISCUSSION

Before the development of the TASK, the developers/researchers define and document the requirements of the developed excel system including functionalities and objectives (calculations, layout, etc.). This is defined in the User Requirements Specifications (URS). The following are the URS of the developed Teacher Adviser Systematic Kit (TASK):

User Requirements

- URS-1. The system using MS Excel should contain the different DepEd school form that are usually prepared by the advisers such as SF1, SF2, SF5, SF8, SF10, Consolidated grade sheet, Rank List and Student official list. Each form should be in a separate sheet inside the excel workbook.
- URS-2. A sheet in the system called TASK interphase that contains basic information about the school, the school year, the name of section, and the adviser is linked to all the forms inside the system.
- URS-3. The system should perform excel functions needed in the preparation of the forms such us IF, COUNT, COUNTIF, AVERAGE, RANK, and VLOOKUP.

- URS-4. Sheets of the forms that needs the same data should be linked together so that user need not to re-encode the same data to simplify the work.
- URS-5. Print out Settings of each sheets should be already set such that the user can print the forms readily.
- URS-6. The system should be password protected for added file security.
- URS-7 The calculations in the system should be protected against unauthorized modifications. Cells with formula are protected and locked so that users cannot modify/change its content accidentally or purposely.
- URS-8 Making changes to the system (modification/deletion) after its final version should not be possible.
- URS-9. The system should be retained in a secure location in an electronic form with access control.

System Design

The system design corresponds to the system architecture of a software program, in this case, developed using Microsoft excel. To illustrate a structured layout, the sample shown in Figure 1 below shows the system interphase of the developed TASK for teachers.
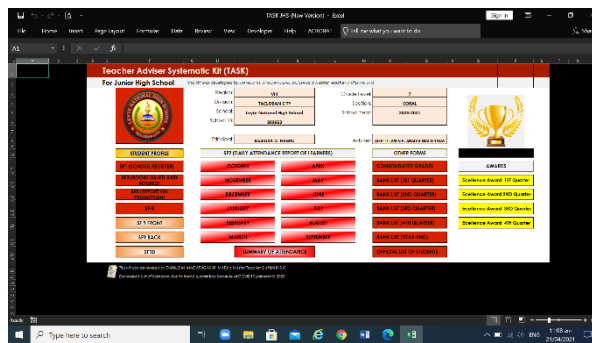

Figure 1. System Layout (System Interphase)

The system is password-protected, and data can only be entered in the marked cells with light brown color. The forms found in the interphase includes, the STUDENT PROFILE, SF1 (School Register), SF2 (Attendance Report from October to September), SF3 (Books Issued and Returned), SF5 (Report on Promotion), SF8 (Learners basic health and nutrition report), SF9 (Student Report Card), SF10 (Learner Permanent Academic Record), Summary of attendance, and other forms such us, Consolidated Grade sheet, Rank list (first quarter to fourth quarter), The official list of students and the automated certificate of academic excellence award certificate.

Calculations, constants and parameters cannot be changed by the user (locked cells). A blank template is used – the use of "master copies" with typical data should be avoided. Each of the template is also password-protected (at sheet, workbook and VBA code level). All input data, constants and calculation results are shown, which allows stepwise verification, e.g. with a calculator.

Development Testing

Systematic testing of User Requirements Specification. The developers tested whether the system fulfils the User Requirements. A simple set of typical data for the input values was used and varied in order to simulate the situations that are needed to test all User Requirements.

Code review. This review was conducted by the developer/researcher and an experienced reviewer, an IT expert from the school, who is familiar with the intended use and the applied functions. For developed TASK, the code review was consisted of checking the content of cells, especially

formulas, formula locations, cell numbers and ranges, syntax of additional functionality, and VBA code.

The cell contents were reviewed by using the "view by formulas" functionality. In particular, cell contents created by the automatic "fill- down" function have to be verified, since the use of this function can be error-prone, depending on the zoom factor and mouse sensitivity. The formula auditing tool was used for checking cell ranges and references. The VBA code has to be evaluated line by line for consistency, program logic, correctness, etc.

Qualification Process

The purpose of the qualification process is to demonstrate that the developed TASK is valid for its intended purpose. Within this process, it has to be demonstrated that the desired result – namely, a set of processed data, which was subject to operations such as calculations, rounding, formatting and re- grouping for presentation as a table, chart or report – is achieved in a correct and reproducible manner. In this process, the developer/researcher identified teacher adviser that served as respondents and will use the developed TASK. Prior to the distribution of the TASK to the respondents, they were all subjected to an orientation on how to use the system. In the orientation they were taught on how to open the file, input data and generate a printed copy of the forms. The researchers also made an online group chat where the developers and the respondents can communicate in case a problem or an important feedback that needs immediate response is needed.

Installation Qualification (IQ)

In order to ensure that the system can be utilized throughout the test, it was necessary to check that the system can be run on different computers (identical or different hardware configurations, user profiles, local settings) and that the system can be installed and run using different software versions (Excel, operating system, data generation system if applicable).The Ability to run the system on different computers is especially important when the system is stored as a template and run by different users on their desktop PCs or laptop. It is also important to test whether a system is capable of running on different computer hardware. Its ability to be install and run using different software versions is also important.

To be able to do this, a copy of the developed TASK was distributed to the selected teacher adviser respondents in the research local to test its function ability, its ability to run on different computer/laptops using different software versions. It is given that since teachers have different computer/laptops it is expected that the specifications and versions of excels in their units also varies. Thus, the researchers used this opportunity to test the developed TASK's Installation Qualification. It has been found out that the developed TASK runs properly and compatible to the respondent's PCs/laptops and excels versions.

Operational Qualification (OQ)

A systematic test of the initial user requirements has been performed during the development testing phase by the developer/researcher. It is not necessary to repeat every single test in this phase, but typical use cases with all the basic functions should be included. Tests should be performed with different and independent data sets, that is why the TASK was given to the teacher respondents to use. Their feedback and experiences were used to test whether all functions in the TASK are functioning.

Testing for limits and robustness. Some respondents input values that lead to unacceptable or impossible results. Some tried to enter data in incorrect formats or in the wrong cells. In these cases, the user requirements should already specify what behavior is required and expected from the system. As many of these tests have already been included in development testing, the focus was on issues arising from the productive environment at that stage. This may include repeated tests with real data in order to discover malfunctions due to loops, or values that are not correctly set before execution. Testing of security aspects was also included at this stage since the system is now installed in the productive environment.

Performance Qualification (PQ)

The aim of this final qualification phase is to demonstrate that the system meets the initially formulated user requirements, in the user's environment. The typical use cases should be run under everyday conditions, by the future user. PQ can be regarded as an internal acceptance test. The TASK was used by the teacher respondents for a period of two quarter (1st and second quarter) of the school year. This was done so that the data that they will be inputted into the system are actual data. From the user's point of view, this is the principal part of the validation process – applying actual data. In this case student's information and grades acquired for the quarter as input data. Every end of the quarter teacher advisers is subjected to a quarterly checking of forms. This is to make sure that the data that they entered in all of the forms are correct and consistent in all forms that requires the same data before it is released the student or parents for reporting during the portfolio day. The checking of forms was used by the researcher as an opportunity to test the performance qualification (PQ) of the developed TASK. Based on the result respondents reported minor errors that can easily be addressed by the developer/researcher. Generally, the TASK served its purpose. The work that the teacher adviser does in preparing all of the forms required for checking was made more efficient, faster and simpler.

Change Management

Any changes to the system was handled using systematic change management procedures. The developer performed risk assessment and decide on the amount of additional testing. In the case of changes in formulas and VBA code additional testing was implemented. The correction of any error detected in the template during operation was handled via change management. In addition, the influence of the detected error was evaluated. The system owner is responsible for the processes of change handling, testing, version control and distribution of a new version, together with SOP updates and training.

Teacher's perception on the usefulness of the developed TASK

The study also expounded upon the descriptive qualitative research questions as well as other relevant research findings. Open ended questions were also used to collect data from the respondents. The qualitative, open-response questions were used to get their perceptions on the use of the developed TASK. The data were organized and coded according to the individual responses of the teacher advisers in order to identify themes representing on the impact of the TASK.

Below are the themes generated from the data collected from the self-reported answers to open ended questions.

• Less Pressure	• Improve teacher productiveness	• Data consistency
•Teacher friendly	• Effective and efficient reporting	• Cost efficient

On Question #1: Can the developed Teacher Adviser Systematic Kit (TASK) an efficient tool that can be used to simplify teachers' works and facilitate consistent and more efficient reporting?

Some of the responses of the Teachers to the questions are the following. Teacher A said:

> "Yes, the TASK as a tool automates some processes that makes work more convenient. Its efficiency is highly hinged on automated data fill and formatting which possibly takes away numerous skill-related factors that any "not so tech-savvy" teachers do not possess."

Some other teacher respondent also said:

> "Yes, because it made the teacher's work easier and a lot faster than doing it manually. Everything seems easy to make things organize and neat.".

The study revealed that the respondents indicated great expectations towards the developed Teacher Adviser Systematic Kit (TASK) as a tool for work simplification and consistent and efficient reporting;

• Research participants agree or strongly agree that system helps a lot on the efficient preparation and reporting of school forms to be checked every end of the quarter.

• Teachers believe that the TASK is an effective tool in reporting students' performance and contributes to the improvement in the simplified system of work that the teacher advisers does.

On Question #2: How do the teachers find the Teacher Adviser Systematic Kit (TASK) as a tool for work simplification?

Some of the responses of the Teachers to this question are the following. Teacher A said:

"The TASK as a tool hastens any process or literally "tasks" that any adviser or teacher would partake. Almost all of the documents needed are included in the TASK tool and its automated fill and conditional formatting makes work easier and faster. In other words, the manual job that used to be involved in the daily job of a teacher was made easier and more technologically-updated which I think is essential for any teachers nowadays."

Another teacher respondent also said:

"The TASK is a very good tool in making the tedious adviser's tasks more efficient. The incorporated automated School Forms are more accurate and easier to deal with".

The study revealed that the respondents indicated positive attitude towards the developed Teacher Adviser Systematic Kit (TASK) as a tool for work simplification;

• Result of the study show that teacher advisers have positive attitude towards the develop TASK. Many of them are excited on the fact that the time and effort in preparing the forms will be minimized.

• Teacher respondents also said that the TASK made them feel that being an adviser is no longer burdensome.

• Teacher respondents believed that because of this tool they will have more time in preparing lessons. The time that they will be using to work on the forms will now be used to prepare learning materials.

• Teacher respondents also believed that the cost for the preparation of the said forms will also be minimized as a computer-generated form has less or have no errors, thus wastage of paper and other resources will be minimized.

CONCLUSION

In the light of the findings derived from this study, the following conclusions were drawn:

1. Respondents has good disposition towards the developed Teacher Adviser Systematic Kit (TASK). Respondents agree or strongly agree that the TASK is an effective tool in the efficient and simplified preparation of DepEd school forms that are prepared by the advisers every end of the quarter and can contribute to the improved and simplified work of teachers.

2. Respondents prefer on using TASK than the traditional ways of preparing the forms.

3. After the TASK was subjected to the various processes in the qualification process, the teacher responses and the IT specialists, in collaboration with the developers, discovered no more issues in the system's final output.

4. The TASK is a cost-efficient tool as it will minimize or zero out wastage of paper and other resources.

LIST OF REFERENCES

Boyce, C. and Neale, P. (2006) Conducting In-Depth Interview: A Guide for Designing and Conducting In-Depth Interviews for Evaluation Input. Pathfinder International Tool Series, Monitoring and Evaluation-2. Retrieved from http://www.pathfind.org/site/DocServer/m_e_tool_series_indepth_interviews.pdf?docID=6301

David, C., Albert, J.R., and Vizmanos, J.F., (February 2019). Pressures on public school teachers and implications on quality. Philippine Institute of Development Studies (PIDS). ISSN 2508-0865. No. 2019-01.

Esch, P., Moor, C., Schmid, B., Albertini, S., Hassler, S., Donzé6, D. and Saxer, H.P. 2010. Good Laboratory Practice (GLP) – Guidelines for the Development and Validation of Spreadsheets. The Quality Assurance Journal

Ferguson. D. CSP; The Gilbreth Network, http://gilbrefunetwork. com,

Kitaw, D and Belachew, T. 2017. WORK SIMPLIFICATION FOR PRODUCTIVITY IMPROVEMENT A case study: Kaliti Metal Products Factory Journal of EEA, VoL 24

Prokopenko, J. and North, K. 1997. Productivity and Quality Management. Modular Programme, 1997.

Rosales, R., Molon M.L., G. Arias B. Development and Validation of the Means of Verification – Automated Assessment Tool: An Action Research., 2018

FINANCIAL REPORT

The following are the cost of conducting the research corresponding to the identified activities.

	Eligibilities	Particulars	Quantity	Unit Cost	Total Cost
a.	Supplies and Materials	Vellum papers / enclosure			3,693.00
b.	Domestic travel expenses	--------	--------	--------	--------
c.	Communication expenses	Load/Load Cards			1,700.00
d.	Reproduction, printing, and binding cost	--------	--------	--------	--------
e.	Food and other incurred expenses during the conduct of research	Snacks Meals (During consultations with respondents & IT expert)			2,527.70 12,103.00
f.	Other expenses related to research dissemination.	--------	--------	--------	--------
	GRAND TOTAL				20,023.7