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## RESEARCH ARTICLE

# THE EVALUATION OF THE IMPLEMENTATION OF PRIMARY SCHOOL STANDARD CURRICULUM: THE WORLD OF SCIENCE AND TECHNOLOGY SUBJECT

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**ABSTRACT**

The curriculum is important in providing quality human capital to meet the challenges of the 21st century. A systematic evaluation needs to be done to obtain information and data relating to curriculum implementation in schools. Hence, the researcher used the Tyler Assessment Model (1950) to evaluate the implementation of Primary School Standard Curriculum or known as *Kurikulum Standard Sekolah Rendah* (KSSR) of the subject World of Science and Technology (WST). Based on Tyler's Model, the four aspects of the evaluation are: objective, content, method, and assessment. The design of the study used an evaluation study of a mixed method known as an explanatory sequential design that has two phases of data collection i.e. quantitative data followed by qualitative data. A sample of the study consisted of 345 WST subject teachers and 12 interviewed respondents. A set of questionnaire was built and the value of Cronbach Alpha for the entire questionnaire ranged from 0.770 to 0.790. The descriptive statistical analysis is used to identify the level of understanding and skill of the teachers on the objective, content, method and evaluation aspects in implementing the WST curriculum learning standard. Overall, the findings showed that the level of understanding and skill of the teachers on objective constructs, content, methodology, and assessment are at high level. Regression analysis using the Stepwise method revealed four independent variables namely selection of content, Information and Communications Technology (ICT) Content Standards, curriculum goals and content appropriateness correlated and influenced the level of teachers teaching skills and methods in implementing Year Two WST curriculum Learning Standard. The assessment results provide input on the strengths or weaknesses found in each component of the assessment. Regular support, monitoring, and training should be taken into account to ensure that the curriculum has been developed and implemented successfully.



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## INTRODUCTION

Science education through pupils should be able to increase the level of scientific literacy of students in dealing with any problems in their daily lives. According to the Organization Economic Co-operation Development (OECD) (2007), a student with scientific literacy will demonstrate the eight main features among them: (i) know and understand the scientific concepts and processes required to engage in the current society; (ii) interpret, seek or seek the answers to any questions about their world based on curiosity; (iii) describe, explain and predict the natural phenomena of nature; (iv) able to understand science articles and be able to discuss the validity of conclusions made in society.

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The mastery of scientific literacy is also a science curriculum agenda in Malaysia that is manifested in the science curriculum. Thus, the science curriculum is formulated to instill interest and develop student creativity through experience and investigation to master science, scientific skills and thinking skills as well as scientific attitudes and values. Pupils are expected to master the knowledge and skills of science and technology that enable them to solve problems and make decisions in their daily lives based on scientific attitudes and morale values (MOE 2011). Hence, the emphasis to be given in the 21st-century science curriculum should take into account current changes, local issues and predict future conditions and requirements. Mastery of skills that includes scientific and thinking skills are also emphasized to ensure that students can adapt to the world of the future and be able to practice what is learned in daily life.

The principles to be held in the formulation of the science curriculum, especially science subjects in the 21st century are all students must be considered as the students of science, the curriculum must be flexible and modular (MOE 2012b). However, the curriculum that has been formulated and modified should be assessed from time to time to see how effectively the implementation and accessibility of the goals and objectives are expected. Assessment is also an important process in the curriculum development cycle. The information obtained helps curriculum developers to make changes, improvements or innovations to the existing curriculum in line with the needs and demands of the global world.

## PROBLEMS IN SCIENCE TEACHING AND LEARNING IN MALAYSIA

The challenge is to provide adequate and qualified technical and skilled manpower to ensure Malaysia is competitive and able to compete globally. To meet the needs of the future workforce as intended, education is seen as a capable key resource of developing a knowledgeable and highly skilled human capital in science and technology. Hence, a serious attention should be given to the basic education provided at schools until tertiary level to ensure the supply of the country human resources compatible to develop the country in future.
Although MOE has undertaken various efforts to realize the 60:40 Policy since 1967 yet, until now the policy has not yet been fully achieved. Based on reports from MOSTI (MOE 2012b), the overall achievement of Policy 60:40 is 20:80 only. According to Strategic Report 60:40 Science / Technical Flow: Literature (MOE 2012b) which examines the advantages and disadvantages of MOE providing basic education to human resource sources at the early stage of the study, found that the main factor of the inefficiency of these policy goals is that of a number of problems intertwined with each other.

Among the problems identified are the direction of science education, the curriculum, the quality of teaching and learning (TnL), the infrastructure, the perception of science and technology, the support, the popularity, the career prospects and the recognition. The delivery of TnL in Science and Technology subjects should be streamlined so that the quality of students produced through education in Malaysia is comparable to students in other countries (MOSTI 2012). Hence, the strategy to achieve the goal of creating creative and innovative Malaysians in tandem with the development of science and technology needs to be reviewed and reinforced. Furthermore, based on the National Science and Mathematical Subjects Report by the Board of Inspectors and Quality Assurance (JNJK) 2011discovered that the mastery of the subjects of science and mathematics is at a satisfactory level. To help students understand the lesson taught, most teachers are able to convey the content of the lesson based on the concepts or facts from simple to difficult which were clearly and successfully developed. The JNJK report (2010) also noted that the Science and Mathematics teachers are less diversified in the TnL method. In addition, science teachers poorly implement the experimental methods suggested for science teaching. Pupils are identified to produce lack of ideas or opinions though focus on the teacher's teaching. TheTnLis more like one-way ticket. Existing educational resources such as ICT equipment, software, glossary books and software supplied are not optimally utilized by teachers.

Sharifah Maimunah (1991) study indicated that the curriculum provided at the central level (BPK) is less reliable with the goals and objectives of education upon implementation. This is strongly emphasized by the weaknesses in the aspect of the spreading strategy of a new curriculum that is too fast and too optimistic upon the willingness of teachers to change their practices in TnL. Hence, teachers need constant professionalism support to enroll as the curriculum change agent and curriculum implementer (Robiah 2000). Problems arise when current teacher teaching practices lack of essential elements that have been clearly stated in the KSSR Standard Document. Lack of understanding on how to enroll on the standard of content and learning set out in the KSSR Standard Documentation Document, indeed affects the teacher's teaching skills. One of the reasons for teaching skills to be less effective is that the teacher is teaching subjects that are not their option (Nor Azlina 2011).

Comprehending on the subject matter and teaching skills in teachers are highly essential in ensuring the delivery of content meets the main goals of the curriculum development.
Regarding the elements of ICT, many academics agree that ICT is a requirement to develop the education system in Malaysia. At the school level, teachers are required to integrate ICT in TnL in an effort to educate students into a society that has the latest and global information (Yildiz-Duban 2013). But no matter what technology exists, it will not be useful if teachers do not have the knowledge, skills, and confidence to use them in the classroom (Rosnaini 2006). The study by Muhammad Sayuty (2012) discovered that teachers' readiness to implement ICT elements across KSSR has significant relationships with ICT elements of knowledge, equipment support, and administrative support. According to MOE (2011), teachers should plan holistic and integrated learning to enable some Learning Standard to be achieved depending on the suitability and learning needs. Teachers should also examine all Learning Standards in the applicable Content Standards before planning TnL activities. Next is the preliminary survey conducted by Fazliza *et al*. (2012) found that teachers were still uncertain about the methods and approaches that they should use during the TnL process in order to apply and improve their skills to students.
Kamisah *et al*. (2006) also reported that the failure of the science curriculum to achieve its objectives was due to the teachers' lack of knowledge and skills required to implement the curriculum. They also proposed continuous assessment to be made to ensure that the implementation of this program meets its objectives. In line with MOE's efforts to revise the direction and implementation of science and technology education at the school level, the review of the implementation of the WST curriculum is essential to ensure the objectives of the KSSR curriculum change can be realized.

## LITERATURE REVIEW

The curriculum is a process that involves the effective and complex participation of teachers and students (Ornstein & Hunkins 2004). The curriculum is carried out by teachers and pupils to achieve results in a conducive learning environment. Teachers and students involvement in implementing curriculum in the classroom are the most difficult circumstance as it involves the involvement and modification of student behaviour (Chan 2010).

This is also stated by Ornstein and Hunkins (2004) that the successful implementation of a curriculum is a process that can bring about new changes. It involves the process of restructuring and replacing old with new ones. This process requires an adjustment in terms of personal habits, learning environments, the input of curriculum and procedures used. Fullan (2007) said that implementation is a process for implementing elements such as ideas, programs or a list of new activities to the target of a curriculum. The importance of curriculum implementation is more important than the documented curriculum (Wan Harun 2008). This led to Fullan and Pomfret (1977) outlining two curriculum implementation orientations. The two orientations are (i) predominant orientation is to attract and determine the level of implementation of a curriculum innovation that achieves the real goal as intended. This is often referred to as the concept of actual implementation with fidelity of implementation and (ii) complex analysis orientation which is an analysis of how the innovation process is to be implemented or referred to as the concept of modification (mutual adaptation).

Curriculum evaluation is as part of the curriculum component. Suhaila (2008) considered that curriculum evaluation is a process of assessing the effectiveness, efficiency, and perfection of a curriculum. Stufflebeam (1971) regarded the assessment as a way of getting information and using it in making decisions. This assessment serves as a starting point, a goal or a way to keep an eye on or renew the curriculum continuously. Abu Bakar (1987) defined evaluation as part of the curriculum development process. This is especially important in analyzing and evaluating the extent to which the curriculum is realistic and in line with the situation the student is going through (Zuraka & Sharida 2002). Curriculum evaluation is also defined as a study designed and managed to help educators study and modify the effectiveness of an educational curriculum (Cronbach 1963). Stufflebeam (2003) emphasizes that curriculum evaluations can measure the level of student's achievement in meeting objectives, compare students' achievement with defined standards, elaborate and evaluate curriculum, identify areas in decision-making on curriculum, selecting and analysing information relevant to the given field, and use professional knowledge to assess the processes involved in implementing the curriculum. The first objective of the curriculum evaluation is to identify the curriculum's capabilities, weaknesses, and advantages and to determine the cause of the problem. The second is to improve certain aspects of the curriculum development process. The third is to determine the effectiveness of the curriculum, while the fourth is to determine its benefits in terms of financial allocation (Wan Harun 2008). Hence, curriculum evaluation is an important component in the curriculum development and development cycle. The results of the assessment process can help the curriculum developers to identify the strengths, weaknesses, efficacy, and completeness of the curriculum implementation. The curriculum evaluation will also provide opportunities for Ministry of Education (MOE) parties to transform, modify and improve the curriculum being drafted.

## RESEARCH OBJECTIVES

- To identify the level of teacher's understanding of the objectives of the Year Two WST Curriculum Standard documentary (DSK) objectives, contents and learning standards, and WST standard curriculum organization.
- To identify the level of teachers' understanding of the contents of Standard WST Curriculum Standard Two from the standard aspect of DSK Science content, DSK ICT content standard, selection of content and suitability of content taught.
- To identify the contribution of objective constructs and the content of teaching and assessment skills in implementing the Curriculum Learning Curriculum Year Two WST based on the teacher's perspective.

## HYPOTHESES OF THE STUDY

There is no contribution of elements in the objective constructs and the contents of the teaching methodology of teachers in implementing the WST Year Two based on the teacher's perspective.

## RESEARCH METHODOLOGY

This study is a review of the curriculum implementation assessment based on Tyler's curriculum evaluation model (1950) which has four aspects namely objective, content, method and evaluation. However, in this study, researchers only take two aspects, namely objectives and contents. The first construct is an objective that refers to the goals, objectives, Content Standards and Learning Standards and the DSK Year Two WST standard organization. The second construct is content referring to the standard list of DSK Science content, DSK ICT content standard, selection of content and suitability of KSSR WST Year Two content. Though the curriculum evaluation study uses the same methodology as other research, the primary purpose of the evaluation is to evaluate and decide on the effectiveness of the program or curriculum (Gay, Mills & Airasian 2006). The design of this study is an evaluation study using survey method for collecting quantitative data. According to Babbie (2015), survey is the best way to collect original data from large populations through sampling techniques.

The sample was selected based on stratified random sampling technique (Tabachnick & Fidel 2013). In this study, stratified random sampling techniques were used as the population of this study was scattered in each state. Selection of teacher sample in this study was conducted in stratified randomly based on four zones, namely north zone, south zone, east zone and central zone. The population of teachers teaching WST subjects in primary schools in Peninsular Malaysia was 9682 people (BPTNL April 2014).According to Krejcie and Morgan (1970) and supported by Gay, Mills, and Airasian (2006) the appropriate sample size was 374 people. This study uses a questionnaire instrument as the main tool for collecting data to evaluate the implementation of KSSR WST based on the perception of the subject teachers. The questionnaire was divided into six sections: Part 1: Respondent Self Information; Part II: Objective Constructs; Part III: Content Constructs; Part IV: Method Constructs; Part V: Assessment Constructions and Part VI: Challenges and Obstacles. The research instrument was developed by the researchers based on the conceptual framework of the study. The basis of the four constructs that have been selected is based on the related literature review. The items formed in this questionnaire were developed by the researchers based on the operational definition of each construct applicable in this study.

Likert scales containing five options are used to facilitate respondents to state the degree of consent of each item presented. This Likert scale is chosen because it is a major measurement scale with high reliability and validity. The questionnaire instrument is tested by its validity through content validity. For that purpose, the items in the instrument have been referred to experts specializing in the field. A total of 13 experts has been referred based on their respective field of expertise related to the research instrument. The reliability value of each construct and substructures obtained from the pilot study was between 0.85 and 0.92. According to Sekaran and Bougie (2010), the reliability value of Cronbach Alpha between 0.60 and 0.80 was accepted as a strong reliability index in an investigation.

The SEM-PLS analysis test is also used to determine the construct validity and internal consistency of the item being constructed. Convergent validity is a positive relationship between items measuring the same construct. To determine this validity indicator reliability or external loading and average variance extracted (AVE) is taken into account. External loading value must be greater than 0.708 and the AVE value must be equal to or greater than 0.5 (Hair *et al*. 2016). The measurement model analysis to obtain external loading and AVE value has been done. The AVE value for all study constructs obtained from PLS-SEM measurement model analysis exceeds the minimum requirement of 0.50. This situation shows that the items measuring the constructs have a convergent validity level of satisfaction. The descriptive data were used to answer the research question 1 and 2. The mean score of each variable is used in the questionnaire instrument was interpreted according to the scale range as follows; The mean score of 1.00 to 1.80 was very low, the mean score of 1.81 to 2.60 was low, the mean score of 2.61 to 3.40 was moderate, the mean score 3.41 to 4.20 was high and the mean score of 4.21 to 5.00 was very high. Interpretation of the mean scores for the level of implementation of KSSR WST Year Two is a modification from the original interpretation of Nunnally and Bernstein (1994) to show the level of understanding and skill of teachers in implementing the Year Two WST KSSR.

For inferential analysis, multiple regression (Stepwise) is used to determine the inherent ties in linear between some independent variables with dependent variables (Alias 1999; Borg & Gall 1983; Mohd Majid 2005). According to Hair et.al (2010) and Mohd Yusri (2010), a customized double linear regression model can be used to predict the value of dependent variables. Before the multiple regression analysis was performed, the investigator ensured and validated the distribution of normal and linear questionnaires scores or otherwise. This is done by obtaining residual scatter plot and regression normal plot contained in Statistical Package for the Social Science (SPSS) program. This step is important because multiple regression analysis assumes that the score distribution is normal and linear. In this study, multiple regression models were used to predict the relationship and interaction between the dependent variables i.e. the teaching methodology of teachers in implementing the WST KSSR Year Two learning concurrently with independent variable groups consisting of (1) Objectives, (2) Goals (3) Content Standards and Learning Standards, (4) WST Standard Curriculum Organizations, (5) DSK Science Content Standards, (6) DSK ICT Content Standards, (7) Selection of Contents and (8) Content Appropriateness. The F value of the ANOVA regression table is used to test whether the relationship between the dependent variable (Y) and the independent variable (X) is significant or vice versa (Pedhazur 1982; 1993). The multiple linear regression analysis used in this study is aimed to test the null hypothesis that has been stated.

## RESEARCH FINDINGS

**The teacher's understanding of the objective constructs of the Year Two WST Curriculum Documents Standard from the goals, objectives, content standards and learning standards, and the curriculum organization standards**

Based on Table 1.1, generally, the results of the study have found that the level of teachers' understanding of the objective constructs of the Year Two WST Standard Document is at a high level (mean = 4.00, SD = 0.47). The objective aspects (mean = 3.96, SD = 0.51), aspects of Content Standard and Learning Standard (mean = 4.00, SD = 0.52) (mean = 4.00, SD = 0.54), and aspects of Content Curriculum Standard (mean = 4.04, SD = 0.52). However, the details of the mean score for teachers' understanding of the WST Standard Year Two are the highest at 4.04 (SD = 0.47). Based on Figure 4.1 it is found that 205 teachers have a high level of understanding in the aspects of WST curriculum content organization. Meanwhile, the lowest mean score among the four aspects is the level of teacher's understanding of KSSR WST Year Two that is 3.96 (SD = 0.51). This means that teachers have a high degree of understanding of the objectives contained in the Year Two WST Curriculum Documents Standard.

**Teachers' understanding of the contents of the Curriculum Documents Standard WST Year Two from the standard aspect of DSK Science content, ICT DSK content standard, content selection and content suitability**

Based on Table 1.2, the results of the study have found that teachers' understanding of the content of DSK WST Year Two as a whole is at a high level (mean = 3.89, SD = 0.51). Similarly, the findings of the four aspects that were below the content construct recorded the mean score at the high level namely the aspect of the DSK Science Content Standard (mean = 3.98, SD = 0.55), the aspects of DSK ICT Content (mean = 3.75, SD = 0.59) Aspects of content selection (mean = 3.94, SD = 0.59) and content suitability (mean = 4.05, SD = 0.57).

However, in detail, the mean score for teachers' understanding of the suitability aspect of WST Year Two as a whole is the highest of 4.05 (SP = 0.57). Figure 4.2 also shows that a total of 201 teachers have a high level of understanding for the suitability of WST curriculum content. While the lowest mean score is the level of teachers' understanding of the aspects of DSK ICT Content Standard which is 3.75 (S.P = 0.59). This means that teachers have a high level of understanding of the content of the WST Standard Document Year Two WST.

**The contribution of independent variables (objectives and content) to the level of teaching methodology of teachers in implementing the Curriculum Learning Standard for Year Two KSSR WST**

The results of the multiple regression analysis (Stepwise) are carried out to determine the relationship and contribution of the variants of the elements in the independent variable

(objective and content) to the teacher's teaching skills in implementing the Year Two DSS KSSR Learning Standard as stated in the null hypothesis ($Ho_1$). To test $Ho_1$, step-by-step regression analysis (Stepwise) is used. The use of this analysis is due to the fact that the researcher does not know which independent variable which contributes significantly to the dependent variable. Accordingly, the Stepwise multiple regression analysis helps the researcher to identify the contribution of a free variable over the dependent variable. In this study, multiple regression analysis is performed between the mean score of teacher teaching method (dependent variable) with objective and content (independent variables) involving eight independent variables namely (1) Goal, (2) Purpose, (3) Learning Content and Standards, (4) WST Standard Curriculum Organizations, (5) DSK Science Content Standards, (6) DSK ICT Content Standards, (7) Selection of Content and (8) Content Suitability.

Before conducting the analysis, the regression assumptions need to be followed and fulfilled. The researcher has fulfilled the prescribed conditions such as confirming the distribution of questionnaire scores is normal and linear. This can be seen through a plot of regression distribution plot (residual scatter plot) and a normal regression plot (regression normal plot). Normalized assumptions are seen in a normal probability plot comparing the cumulative distribution of actual data compared to normal cumulative distribution. The actual data is plotted together with a normal linear (diagonal) distribution. If the actual data distribution is normal, then the line representing the actual data equals or nearly matches the diagonal line. To determine the distribution of normal and linear scores and have variance similarities, the scatterplot sketch and the normal plots of regression plot are referred. This graph can be obtained from subprogram linear regression plot through SPSS software. If the graph shows a straight line in the plot graph and the scatterplot is centered and shuts off the value 0 then the data obtained is normal, linear and has a variant similarity. Figure 1.3 and Figure 1.4 proves that the study data satisfies the normality characteristics, linearity and variance equations.

To detect multicollinearity and singularity problems, statistical tests (Collinearity diagnostics) are performed (Coakes 2005, Hair *et al*. 2010, Pallant 2013). Prerequisites are related to multicollinearity and singularity in Figures 4.1 and 4.2. The Tolerance value has also been fulfilled, which after the analysis is conducted, the Tolerance value of all independent variables is greater than 0.10 (> 0.10) and VIF value is less than 10 (VIF <10). The correlation between independent variables and independent variables to determine whether or not multicollinearity exists (multicollinearity) has also been carried out. The correlation test results show that all independent variables have a correlation with dependent variables where the correlation value of all the variables is between 0.52 and 0.80. This is a value that is not too low and not too high (Tabachnick & Fidell 2013). Based on the results of the pre-regulatory analysis, regression analysis can be conducted. Before the regression analysis was conducted, the Multivariate Normality test was conducted to obtain the validity and accuracy of the findings. Therefore, the technique of Regression Residuals Statistics (Mahalanobis Distance) is done to look at the outliers' data by comparing the Residuals Statistics (Maximum Expenses Distance) with the critical value of Chi-Square (Pallant 2013). In this study, there are eight independent variables and Expected value. Distance obtained is 21.51 after the Regression Residuals Statistics (Mahalanobis Distance) is run twice and extreme outliers' data have been issued so as not to disturb the findings of this regression analysis. In this section, multiple regression analysis involves eight independent variables (objective and content) on dependent variables (teaching method) which are skill level of teacher teaching method in implementing Year Two DSK KSSR Learning Standard. There were four out of eight independent variables which showed significant correlation and contribution ($p < 0.05$) to the level of teaching skill. The independent variables are the selection of content, ICT Content Standards, curriculum goals and content adaptability such as Table 1.3 and Table 1.4. The four independent variables that are not predictors of the level of teaching methodology of teachers in implementing the Year Two WST curriculum Learning Standard are curriculum goals, Content Standards and Learning Standards, WST curriculum standards organizations and Science Content Standards.

Table 1.3 and Table 1.4 show that all the four predictor variables (variants) of the eight variables are content selection, ICT Content Standards, curriculum goals, and content appropriateness have contributed 62.60 percent ($R^2 = 0.626$) to the change in skill level Teacher teaching method in implementing Year Two WST curriculum Learning Standard. Analysis of the variants found the value of F = 142.027 (DK 4, 339) and significant stages p = 0.000. Compared to the four predictors, the major and highest predictors who contributed 55.30 percent to the level of teaching skills of the teachers were the selection of content (ß = 0.331, t = 5.377 and p = 0.000). This situation shows that when the score on teachers' understanding of the selection of content increased by one unit, the level of teaching methodology of teachers in implementing the Year Two WST curriculum Learning Standard increased by 0.331 units. This means that the level of teachers' understanding of the content selection contributes to the improvement of the level of teaching skills of teachers in implementing the Year Two WST curriculum Learning Standard by 55.30 percent.

The second highest predictor, which contributed 5.30 percent to the level of teaching methodology of teachers in implementing the Year Two WST curriculum Learning Standard, was the ICT content standard (ß = 0.279, t = 5.023 and p = 0.000). This situation shows that when the score on teachers' understanding of ICT Content Standard increased by one unit, the skill level of teachers teaching method in implementing the Year Two WST curriculum Learning Standard increased by 0.279 units. In other words, the level of teachers' understanding of ICT Content Standards contributes to the improvement of the level of teaching skills of teachers in implementing the Year Two WST curriculum Learning Standard of 5.30 percent. The third highest predictor, which contributed 1.30 percent to the level of teaching methodology of teachers in implementing the Year Two WST curriculum Learning Standard, was the curriculum goal (ß = 0.158, t = 3.368 and p = 0.001). This situation shows that when the score of understanding on the target of WST curriculum among teachers increased by one unit, then the skill level of teacher teaching method in implementing the Year Two WST curriculum Learning Standard increased by 0.158 unit. This means that the level of teachers' understanding of the curriculum goals contributes to the improvement of the skill level of teaching methods in

implementing the Year Two WST curriculum Learning Standard of 1.30 percent. Forecasters fourth accounted for 0.70 per cent of the skill level of the teaching methods of teachers in implementing the curriculum WST Learning Standards Year Two is the appropriateness of the content (ß = 0.126, t = 2.575 and p = 0.010). This shows that when the score of understanding of the appropriateness of the curriculum content WST among teachers increases by one unit, then the skill level of the teaching methods of teachers in implementing the curriculum Learning Standards Year Two WST increased by 0.126 units. This means that the level of teachers' understanding of the suitability of the content contributes to the improvement of the skill level of teacher teaching methods in implementing the Secondary WST Curriculum Learning Standard of 0.70 percent.

Variables that predict the level of skill of teacher teaching methods in implementing the Year Two WST curriculum Learning Standard consist of four independent variables. From the findings they can be written as regression equation as follows:

$$Y = 0.903 + 0.289\ X_1 + 0.226\ X_2 + 0.146\ X_3 + 0.106\ X_4 + 0.294$$

whereas;

| | |
|---|---|
| Y | = Level of Teaching Skills Methodology |
| $X_1$ | = Selection of content |
| $X_2$ | = ICT Content Standards |
| $X_3$ | = Curriculum Goals |
| $X_4$ | = Content Suitability |
| Constant | = 0.903 |
| Error | = 0.294 |

Referring to the above regression equation, the zero hypothesis is rejected. Regression analysis using the Stepwise method discovered four independent variables, i.e. content selection, ICT Content Standards, curriculum goals and content appropriateness have correlation and contribute to the improvement of the skill level of teacher teaching methods in implementing Year Two WST curriculum Learning Standard.

## DISCUSSION

### The level of teachers' understanding of the objectives of the Year Two WST Curriculum Standard Document

Assessment of the level of teacher understanding of objective constructs consists of four aspects; namely understanding of objectives, goals, content standards and learning standards, and organizational content of the WST Curriculum Standards. Overall, in this study the level of teachers' understanding of the objectives of KSSR WST Year Two as a whole is high. This finding is different from the study of Fazliza *et al*. (2012)discover that teachers were still unclear and not really comprehending about the curriculum changes taking place in the education system and the main focus in KSSR. The implementation of KSSR WST Year Two has been running almost 5 years and the teachers are expected to understand the curriculum content well. However, in the context of the finding, the researchers found that the overall level of teacher's understanding was high. This suggests that there are still problems and improvements that need to be done to improve the level of teachers' understanding of the objectives of the Year Two WST Curriculum Standards Documents. In detail, the level of teacher's understanding of the goals contained in the Year Two WST Curriculum Standard Document is high. Teachers revealed a high level of understanding regarding the main goal of the WST curriculum by inculcating students' interest in science and technology. In addition, it is highly recommended to develop students' creativity through experience in mastering science and technology, scientific skills and attitudes as well as moral values. According to Lederman (2007), teachers' understanding of curriculum goals is crucial to ensure the successful implementation of a curriculum. Furthermore, from the aspect of the understanding of the teacher to the objectives contained in the WST Year Two Model WST Core Curriculum Documents, the overall mean score is high. This clearly demonstrates the teacher understands the ultimate goal of the Two Year WST curriculum that is to attract the students' interest in science and technology and ensure students master the science, scientific skills, scientific attitudes and morale values.

Whereas the low mean value is the item on the application of ICT across the curriculum creatively, applying the ICT to the level of student's ability and guide the students to develop ICT's basic skills. This proves that the teacher is still unclear with the purpose of the curriculum related to ICT applications. This is in line with the findings of Muhammad Sayuty (2012) and Terbiyik and Akdeniz (2008) which states that science teachers are still less skilled in implementing a new curriculum involving ICT applications in their TnL. This shows that the level of understanding is unclear which causes teachers to lack of confidence in using ICT in their daily TnL. The third aspect is the level of teachers' understanding of the Content Standards and Learning Standards contained in the WST Year Two Core Module Curriculum Documents and also discovered that the overall mean score was high. The fourth aspect of teachers' understanding of objective constructs is related to the layout or organization of the Curriculum Standard supplied by BPK to all primary schools. The findings show that the overall mean score of teachers' understanding of the organization aspect of WST Year Two WST is at a high level. This is in line with Adal's findings (2011) that highlights science teachers still less proficient at adapting the curriculum content upon their students' abilities. This causes teachers to be less creative and ineffective in modifying the implementation of curriculum content according to the background and knowledge of the students.

### The level of teachers' understanding of the content of Standard Year WST Curriculum Standard Document

Assessment of teachers' understanding of content to construct content consists of four aspects; namely the understanding of Content DSK Science Content Standards, DSK ICT Content Standards, selection of content and the suitability of the content of the Second Year WST curriculum. Overall, the findings related to the level of teachers' understanding of the contents of the Standard Document WST Year Two WST was high. This finding is consistent with the study of Nurfaradillah (2011) which states that science teachers need to master science knowledge in depth, in order to translate the contents of the curriculum and to deliver the knowledge in the TnL process. In detail, the findings have found that teachers' understanding of the aspects of the DSK Science Content Standard, DSK ICT Content Standards, the selection of content and the suitability of the content of the Second Year WST curriculum is at a high level. However, among the four

aspects, it is found that the aspect of the teacher's understanding level towards the aspects of DSK ICT Content Standard has the lowest overall score. This indicates that teachers have a lower level of understanding of ICT elements than Science elements. Khwela (2015) notes that the level of knowledge of the general use of ICT and the attitude of science teachers affects the use of ICT pedagogy. The results of the study on the level of understanding of the teachers on the first aspect of the content construct that is related to the Content of DSK Science, initiate that the overall mean score was at high level. The highest mean value of all items is items related to curriculum content compiled by fields, themes, topics, and subtopics. This proves that teachers can indeed identify and understand that the contents of the Year Two WST curriculum have been compiled by subject, theme, topic, and sub-topics. This is in line with the findings of Yildiz (2013) which states that teachers have a positive view on the content of the new curriculum that has been introduced as it is found that topics and subtopics are more geared towards the science and everyday life of the students.

Furthermore, the findings that are related to the level of understanding on the aspects of DSK ICT Content Standard finding is in line with the findings of Qhamariah (2012) which states that teachers' competence in the use of technology increases, thus the effectiveness of integration is also increasing. This shows that the level of teachers' understanding that is still lacking towards ICT elements should be improved by providing advanced courses or workshops on the use and enhancement of ICT understanding and skills to ensure the implementation of Year Two WST KSSR. The findings of the study on the level of teachers' understanding of the third aspect of the content are that the selection of content shows that the overall mean score is at a high level. The high level of teacher understanding of the selection of content listed in the Standard Documents of the Year Two WST Curriculum can help teachers plan for TnL and further launch the implementation and achievement of the curriculum standard in the classroom. The result of this study showed that the level of understanding of the teachers on the fourth aspect in the content of the content was related to the content of the content and again the overall mean score was high. This proves that the teacher agrees and understands the consistency of the content of the WST curriculum with the FPK, science education goals, relevant to the Learning

**Table 1.1. Min Score, Standard Deviation, Frequency and Percentage of Objective Constructs**

| Aspects of Understanding Level of Objective Constructs | Frequency (Percentage) | | | | | Min Score | SD | Level |
|---|---|---|---|---|---|---|---|---|
| | MS 1 VL | MS 2 L | MS 3 M | MS 4 H | MS 5 VH | | | |
| Goals | 0 (0.00) | 2 (0.58) | 38 (11.01) | 209 (60.58) | 96 (27.83) | 4.00 | 0.52 | High |
| Aims | 0 (0.00) | 0 (0.00) | 41 (11.88) | 216 (62.61) | 88 (25.51) | 3.96 | 0.51 | High |
| Content Standards& Learning Standards | 0 (0.00) | 1 (0.29) | 47 (13.62) | 189 (54.78) | 108 (31.30) | 4.00 | 0.54 | High |
| Organization of Content Curriculum Standard | 0 (0.00) | 0 (0.00) | 40 (11.59) | 205 (59.42) | 100 (28.99) | 4.04 | 0.52 | High |
| Overall | | | | | | 4.00 | 0.47 | High |

*Key:*

*MS1: Score Mean 1.00 – 1.80* — *VL: Very Low*
*MS2: Score Mean 1.81 – 2.60* — *L: Low*
*MS3: Score Mean 2.61 – 3.40* — *M: Moderate*
*MS4: Score Mean 3.41 – 4.20* — *H: High*
*MS5: Score Mean 4.21 – 5.00* — *VH: Very High*

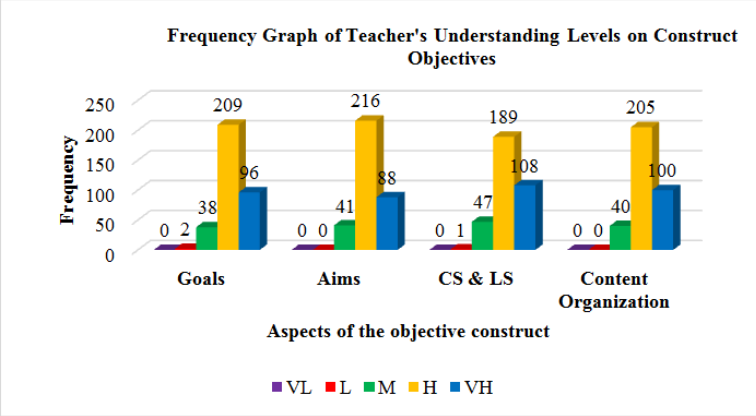


**Figure 1.1. The frequency graph of the teacher's understanding level towards the aspects of objective constructs**

Year Two according to the overall teacher's perception of the overall mean score is at a high level. A high understanding of ICT's DSK Content Standard is very important as the basis for the planning and implementation of ICT elements. This Standard, as taught in the classroom or in the science lab and can attract students to continue studying science. This is in line with the findings of Lee and Yin (2011) that discovered teachers have a positive outlook on the implementation of the

new curriculum transformation introduced. However, the results of the study revealed the lowest mean value is the items related to all the topics in the ICT field that to be taught by computer. This may be due to the problem teachers are not an option in the ICT field and the lack of infrastructure has prevented teachers from implementing ICT element content. This coincides with the interview data obtained by the researchers, where the teachers stated that the main challenge that is also a barrier to the implementation of ICT elements is the lack of computer lab infrastructure. This is not a new issue, but this problem has also been identified by Kamisah *et al*. (2006) in their study of the needs of science teachers implementing the primary school science curriculum. Therefore, teachers' understanding of the suitability of the content listed in the Year Two WST Standard Documents can help teachers to modify the content based on the existing knowledge of the pupils and plan for TnL to implement the curriculum standard in the classroom. Similarly, Adal's findings (2011) stating the success of the new curriculum implementation depends on the level of teacher's understanding of the content outlined in the curriculum.

**Table 1.2. Min Score, Standard Deviation, Frequency and Percentage Level of Understanding of Content Constructs**

| Aspects of Understanding Level of Content Constructs | **Frequency (Percentage)** | | | | | Score Mean | SD | Level |
|---|---|---|---|---|---|---|---|---|
| | MS 1<br>VL | MS 2<br>L | MS 3<br>M | MS 4<br>H | MS 5<br>VH | | | |
| DSK Science content | 0<br>(0.00) | 1<br>(0.29) | 51<br>(14.78) | 223<br>(64.64) | 70<br>(20.29) | 3.98 | 0.55 | High |
| ICT DSK content standard | 0<br>(0.00) | 13<br>(3.77) | 76<br>(22.03) | 203<br>(58.84) | 53<br>(15.36) | 3.75 | 0.59 | High |
| Content selection | 0<br>(0.00) | 7<br>(2.03) | 39<br>(9.00) | 221<br>(64.06) | 78<br>(22.61) | 3.94 | 0.59 | High |
| Content Suitability | 0<br>(0.00) | 3<br>(0.87) | 37<br>(10.72) | 201<br>(58.26) | 104<br>(30.14) | 4.05 | 0.57 | High |
| Overall | | | | | | 3.89 | 0.51 | High |

*Key:*

*MS1: Score Mean 1.00 – 1.80* — *VL: Very Low*
*MS2: Score Mean 1.81 – 2.60* — *L: Low*
*MS3: Score Mean 2.61 – 3.40* — *M: Moderate*
*MS4: Score Mean 3.41 – 4.20* — *H: High*
*MS5: Score Mean 4.21 – 5.00* — *VH: Very High*

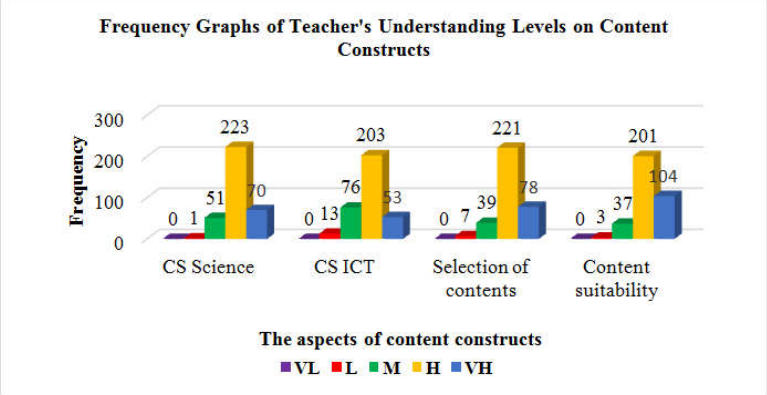


**Figure 1.2. The frequency graph of the teacher's understanding level towards aspects of the content**

**Table 1.3. Multiple Regression Analysis (Stepwise) for Independent Variables (Objectives and Content) Contributing to Teacher's Teaching Method Skills Implementing Year Two KSSR WST Learning Standard**

| Variable (X) | B | Beta (β) | Nilai-t | Sig.-t | $R^2$ | Contributions (%) |
|---|---|---|---|---|---|---|
| Selection of content | 0.289 | 0.331 | 5.377 | 0.000 | 0.553 | 55.30 |
| ICT Content Standards | 0.226 | 0.279 | 5.023 | 0.000 | 0.606 | 5.30 |
| Curriculum Goals | 0.146 | 0.158 | 3.368 | 0.001 | 0.619 | 1.30 |
| Content Suitability | 0.106 | 0.126 | 2.575 | 0.010 | 0.626 | 0.70 |
| Constant | 0.903 | | 6.585 | 0.000 | | |

| | |
|---|---|
| R | 0.791 |
| R Squared | 0.626 |
| Adjusted R Squared | 0.622 |
| Standard Error | 0.294 |

**Table 1.4. Analysis of Variance**

| **Model** | **Sum of Squares** | **df** | **Mean Square** | F Value | Sig. (p) |
|---|---|---|---|---|---|
| Regression | 48.974 | 4 | 12.244 | 142.027 | 0.000 |
| Residual | 29.224 | 339 | 0.086 | | |
| Total | 78.198 | 343 | | | |

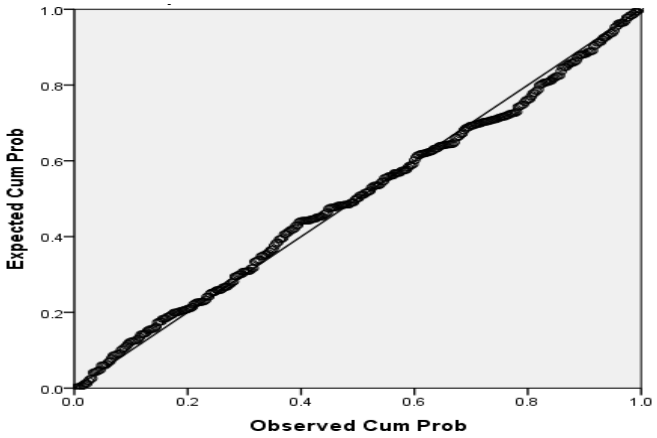


**Figure 1.3. Regression Normal Plot Graph**

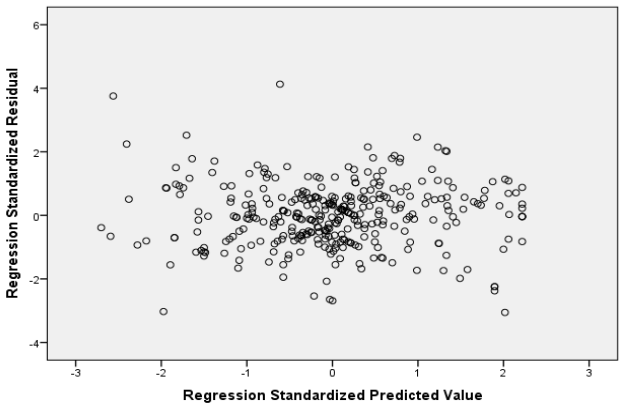


**Figure 1.4. Regression Distribution Plot Graph**

**Contribution to the teaching methodology of teachers in implementing the KSSR learning standard for Year Two WST**

The multiple regression analysis results involve eight independent variables (objective and content) on dependent variables (teaching method) which are skill level of teacher teaching method in implementing Year Two DSS KSSR Learning Standard. There were four out of eight independent variables showing significant correlations and contributions to the level of teaching skills of teachers. The independent variable is the selection of content, ICT Content Standards, curriculum goals and content adaptability such as Table 1.3 and Table 1.4. The four independent variables that are not predictors of the level of teaching methodology of teachers in implementing the Year Two WST curriculum Learning Standard are curriculum goals, Content Standards and Learning Standards, WST curriculum standards organizations and Science Content Standards. The results of the regression analysis using the Stepwise method found four out of eight independent variables; namely selection of content, ICT content standard, curriculum goals, and content appropriateness have correlation and contribute to the skill level of teacher teaching method in implementing Year Two WST curriculum Learning Standard. Overall, the four predictor variables (variants) of the eight variables; namely Content Selection, ICT Content Standards, curriculum goals and content appropriateness have contributed 62.6 per cent to the change in the level of teaching skills of teachers in implementing the Year Two WST curriculum Learning Standard. Compared to these four predictors, the major and the greatest predictors who contribute to the level of teaching skills of the teacher are the selection of content followed by the second most important predictor of the ICT Content Standards. The next third predictor is the fourth curriculum. The fourth predictor that contributes to the skill level of teaching methods in implementing the Secondary WST Curriculum Learning Standard is the suitability of the content. This situation shows that the level of teachers' understanding of the content selection has an impact on the implementation of the curriculum. Thus, teachers need to understand the content well to enable them to translate the curriculum content better. This coincides with the study of Maimun, Ramlee and Muhammad Hasyim (2007) who found that the knowledge and understanding of teachers are important factors in determining the effectiveness of a curriculum implementation. Regression analysis using Stepwise method found that four independent variables; namely content selection, ICT content standard, curriculum goals and content appropriateness have correlation and contribute to the level of skill of teacher teaching method in implementing Year Two WST curriculum Learning Standard. This is in line with the findings of Mohd Azmi (2016) which states that the need for in-service training is indispensable by teachers to strengthen their competence and teaching skills in the classroom. This can increase the effectiveness and quality of the curriculum implementation of a subject.

**Conclusion**

The results of the regression analysis using the Stepwise method discovered the four independent variables; namely selection of content, ICT content standard, curriculum goals and content appropriateness that have correlation and contribute to the skill level of teacher teaching method in implementing Year Two WST curriculum Learning Standard. As such, the curriculum has always been an important agenda in the development and formation of the future of nations and nations around the world. The curriculum is also widely regarded as the most strategic area for building a generation that will fill the future needs and developments, especially in the new millennium (Saedah, 2008). Therefore, a review and evaluation of curriculum implementation should be conducted continuously so that the problems and constraints can be resolved immediately. In addition, systematic and thorough research findings can help policymakers improve the curriculum content that has been enacted and thus ensure that the generation of skilled and capable generation of science and technology can be realized in line with the goal of Vision 2020.

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