A Rasch Model Analysis on Designing Needs-Based Teacher Professional Development Programs

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Abstract—Teacher professional development programs (TPDs) have always become an interesting topic of discussions in the body of teachers' professionalism literature. Over a decade of the Teachers and Lecturers Act enactment in Indonesia, professional development (PD) programs yielding teachers who possess pedagogical, professional, personality, and social competences as insisted by the Act remain questioned. This study aims at analysing teachers' needs-based PD programs and validating the used needs analysis instrument in a Rasch Measurement Model. Fifty-five teachers representing each sub-district in Pesisir Barat district, Lampung, Indonesia were involved in a focused group discussion guided by an instrument for PD needs analysis. The instrument was developed on four factors; PD Participation, PD impacts, PD needs, and PD frequencies, and then validated by using Rasch Measurement Model for the reliability, validity, variable map, as well as persons and items analysis report. The findings suggest the necessity to consider teachers PD experience, impact, needs, as well as modes of professional activities in designing PD programs.

Keywords: Rasch model, professional teacher

I. INTRODUCTION

Teacher reform in Indonesia has undergone a very fundamental shift by the enactment of the Act Number 14 Year 2005 Republic of Indonesia about Teachers and Lecturers. From then on, teachers' professionalism has been marked by the acquisition of four teacher competencies, namely pedagogical, professional, personality, and social competences [1]. Indonesian Teacher Professional Development (TPD) programs in Indonesia, therefore, have been designed and oriented for the achievement of those four competences. A number of TPD Programs in Indonesia have been carried out along with the enactment of the Act. Among many others, those TPD programs are teacher certification programs (through portfolios, Education and Professional Training for teachers (PLPG), Teacher Profession Education (PPG), workshops on teachers' capacity improvements, as well as other forms of training programs conducted by local governments or appointed training institutions (*Lembaga Penjaminan Mutu Pendidikan*/LPMP). Having been more than a decade from the Act enactment and implemented in a number of miscellaneous modes, TPD programs in Indonesia still leave unsolved teachers' professionalism issues and are still regarded not being optimal to be the solution for improving teacher competencies [2].

The result of teachers' national competence test or known as *Ujian Kompetensi Guru* or UKG in Indonesia, for instance, still indicates that Indonesian teachers still have problems with content and pedagogical knowledge, whereas the national average of their competence test score was 42.00 in 100 scoring scale. This average score is still far below the baseline of the competence test score stipulated by the Ministry of Education and Culture which is 70 [3,4,5]. The poor competence level of the teachers is particularly assumed due to a number of reasons, such as, among many others, relatively few opportunities for systematic in-service teacher trainings that intensively facilitate them to sharpen their content and pedagogic mastery. Although they know well how to transfer their content knowledge (pedagogic), having a restricted mastery on content they teach will affect the students' mastery on content as well. In addition, World Bank research results also indicate the weaknesses of teacher competences in the subject matter (content knowledge) even though some TPD programs have been carried out for them [2,6,7]. This condition still leaves a wide space for educational researchers and practitioners to formulate programs that assist teachers to improve their content and pedagogical knowledge [8,9,10,11]. Other alternatives for TPD programs throughout the nation, therefore, need to be probed and developed extensively to address teachers' professionalism issues in Indonesia.

Given the necessities to probe for the appropriate TPD programs in the nation, there has been an increasing call to design TPD programs which are developed from the needs-based approaches [12,13,14]. TPD programs really have to be based on

their needs for PD activities, existing level of competence, as well as targeted teachers' competence to teach in the 21st century education. For this reason, appropriate attempts to identify their real needs have to be carried out. Considering the necessity for developing TPD programs with the needs-based approach, the present study aims at analysing a needs-based TPD programs and validating the used needs analysis instrument in a Rasch Measurement Model. Fifty-five teachers representing each sub-district in Pesisir Barat district, Lampung, Indonesia were involved in a focused group discussion guided by an instrument for PD needs analysis. The instrument used in the study was adapted from Teaching and Learning International Survey (TALIS) by the Organization for Economic Co-operation and Development (OECD) and modified into Indonesian context. The result was then analysed by using Rasch measurement model to validate the used instrument that identifies teachers' needs for PD. Factors considered for the needs analysis were focused on teachers' experience in TPD programs and their impacts, their expected programs, and their regularity on PD programs. This paper will first highlight in short global issues on teachers in the 21st century. The discussion is then followed by the Indonesian Qualification Framework (shortened as IQF), teacher professionalism, and issues on Indonesian TPD programs. In the next section, development and validation for the TPD needs analysis instrument will be discussed covering the design of the study, participants and setting, as well as instrumentation and validation. The findings and discussion are presented afterwards accompanied by the Rasch measurement model analysis validating the TPD needs analysis result and its interpretation.

II. 21ST TEACHERS, IQF, AND TPD PROGRAMS

The 21st century teachers are insisted to have the ability to provide technology-supported learning opportunities for their students and therefore they should know how technology can support the students' learning. This condition is indeed in response to the UNESCO's 21st Century Approach to Education Reform which states that education nowadays have been directed to human capacity development stressing on the six (6) components of the education system: policy, curriculum, pedagogy, Information and Communications Technologies (ICTs), organization, and teacher training [15]. One of the six components of the 21st education system is teacher training. Teacher training is an important component that needs to be considered in preparing the 21st century teachers to have the competencies' standards as required by the era comprising technology literacy, knowledge deepening, as well as knowledge creation. These competencies standards need to be well-considered in designing a training program for teachers in order for them to be ready for the 21st learning from the primary to the higher education level [16,17,18].

The Government of Indonesia itself has attempted to adopt those standards by the establishment of the Indonesian Qualification Framework (IQF), which addresses the national education system covering from year 9 to higher education (see table 1). The IQF was legally endorsed by the Presidential Decree No. 8 Year 2012 about the National Indonesian Qualification Framework, known as *Kerangka Kualifikasi Nasional Indonesia* or KKNI [19]. The IQF states that schools, education, and training institutions under the authority of the Ministry of Education and Culture should assess their learning outcomes or certificates of proficiency in conjunction with one of the relevant qualification levels specified in the IQF. The IQF itself is in line with the existing regulations endorsed by other ministries and authorized institutions, concerning manpower quality, development, and competence certification [19]. The IQF was born as a response to address the demands of an increasingly more mobile and globalized education market. The IQF will clarify the national education qualifications and clarify the education levels to be more effectively adjustable with the international standard. In other words, the IQF further specifies equivalencies between Indonesian and foreign qualification as well as market demands thus improving Indonesia's international competitiveness and making the country more open to a global trade [20].

TABLE I. EQUIVALENCES OF LEARNING OUTCOMES FROM DIFFERENT TYPES OF EDUCATION

Academic Qualifications	IQF	Technical and Vocational Education and Training
Doctoral Degree	9	Applied Specialist Doctoral
Master Degree	8	Applied Master
	7	Profession
Bachelor Degree	6	Diploma IV
	5	Diploma III
	4	Diploma II
	3	Diploma I
General High School	2	Vocational High School
Junior High School	1	

Source: Directorate General of Higher Education, Ministry of Research and Higher Education, Indonesia

With the endorsement of the IQF, the bargaining position of Indonesian manpower in both national and international job markets will be stronger. It is also expected to enhance the contribution of all learning outcomes by formal, non-formal or informal education in preparing the graduates to possess 21st century skills. It further improves educational mobility in order to foster mutual understanding and collaboration between higher education institutions across the world, and to increase Indonesia's recognition both regionally and internationally by considering its national identity, character, and local wisdoms. The role of teachers, their professionalism, and how they develop their professionalism in any TPD programs, therefore, play

very important roles in preparing the expected learning outcomes as indicated by the IQF [20]. This is certainly why the Indonesian government through the Ministry of Research and Higher Education has put teacher professionalism issues in one of the national strategic research agendas.

A number of studies have been devoted to address teacher professionalism issues as well as TPD programs aiming at enhancing teachers' professionalism [21,22,23]. TPD programs in Indonesia which focuses on improving four areas of teacher competencies: pedagogical, professional, personality, and social competences, have been developed intensively along with the implementation of teacher certification programs, Teacher Profession Education (PPG), as well as other forms of teacher training programs conducted by local governments or appointed training institutions. However, those programs carried out so far have are still regarded not as the best solution for increasing teachers' competence because they tend to be in top-down approach in providing the TPD programs. As a result, such programs are just merely as a routine agenda and teachers' professionalism remains problematical.

Most teachers still have problems with the weaknesses of their competence in subject matter (content knowledge) as well as pedagogical knowledge even though they have attended some TPD programs [2,24,25]. Other alternatives of TPD program need to be further developed to address the issue of teachers' professionalism in Indonesia. This condition leaves a wide space for educational researchers and practitioners to formulate ideal programs that facilitate teachers to improve their professionalism [8,9,10,26]. Designing programs for teachers' PD needs to be initiated by carefully identifying their needs for PD. A TPD needs analysis can be carried out by designing an instrument that is used to identify PD program needs for teachers. The result of such needs analysis can be used for designing the appropriate in-service PD programs for teachers as further studies on teachers' PD needs analyses are still widely open in the search of appropriate TPD programs in Indonesian context.

III. DEVELOPMENT AND VALIDATION OF THE NEEDS ANALYSIS INSTRUMENT

In order to design a training program, two aspects have to be considered, i.e. information on the content of the training program and the process of learning or training. In the content of the program, this aspect gives information about the content or the subject matters the program participants will acquire [27,28,29,30]. To identify what content teachers actually need for a PD program, it can be achieved by considering both objective and subjective sides. From the objective side, information about what teachers need can be gathered from the result of a competence test such as the National Competence Test or known as UKG or UK in Indonesian context. The result of such

a test provides information to the government which aspects of teachers' competence are actually weak and strong. Another way of gaining information about what teachers need for their PD can also be achieved through a document analysis. This technique is usually carried out by conducting a literature review on what teachers need for their PD activities. In addition, analysing teachers' needs can be conducted by tracing related documents on standards of teachers' professionalism, for example by studying acts related to national teachers' competence standards and how should teachers' competence be in the 21st century.

The result of the document analysis about standards of teachers 'competence has to be synchronized with the four competences of Indonesian teachers. This way can help the training service providers to obtain information about teachers' strength and deficiency prior to designing relevant trainings or treatments those teachers need for their PD activities. Unlike the objective side, information about what PD programs teachers need is based on a direct communication with teachers, either with interview, questionnaires, or a focused group discussion. With this technique, information about what teachers need for their PD programs is gained from their voices and opinion about their lacks and weaknesses, and what they especially need for a PD program. Having decided on what should teachers acquired during a PD program, then, it is necessary to also design on how the content or the subject matters have to be transferred to teachers, modes of learning or training. The training or learning process has to be designed in effective and efficient ways on the basis on what teachers need and the availability of resources for the program. The program has to consider content standards, processes of the training program, as well as training assessments, which should be completed with information on training period, duration, modes of training, setting, as well as training resources [30].

In order to design a PD program for teachers as indicated above, it is necessary to prepare a need analysis instrument exploring issues, needs, as well as how the programs implementation shall be arranged. The instrument designed for the current research is adopted and modified into Indonesian context from the one developed by TALIS [31]. The instrument consists of two parts that reveal the conditions and activities experienced by teachers in their professional activities. The first part covers questions that probes activities or experience in relation to their professional development programs such as training or workshops attended. This part one also uncovers the impacts of the attended professional development activities. There are two alternative answers for this part, namely the *Participation* column (yes and no) and the *Impact* column (4 Likert rating scale) from none (1), small (2), enough (3) large (4)) to reveal the impact of the professional training followed. An example of the question in this part is "Do you always attend activities

or training or seminar related to education and learning related to content knowledge upgrading?".

The other part of the instrument probes the need for training or workshops as a medium for their professional development and teachers' competence enhancement. There are 4 categories of answers for this part ranging from unnecessary (1), few (2), enough (3) and very (4) and teachers are asked to describe the reason for the need for their professional development in accordance with the level of the perceived need. The statements in this category are those related to their content and pedagogical knowledge such as competency standards, classroom management, classroom assessment, etc. This instrument gathers two types of data; quantitative and qualitative data. The quantitative data were analysed and validated by using Rasch measurement model with a software named WINSTEPS version 3.73 [32].

A Rasch measurement model is the simplest Item Response Theory model, or the classical theory, which has strong measurement properties. Different from the classical theory, there are two parameters that can be generated by the Rasch measurement model, i.e. item difficulty and person ability [33,34,35,36]. There are several reasons why a Rasch model is preferably used rather the classical one. When a Rash measurement model is used, whether or not the items used are fit and whether or not item biases exist can be identified and measured. In addition, a Rasch measurement model is able to estimate items difficulties and convert them into an interpretable scale [34]. The model can also detect interactions between the persons and the items by transforming the ability estimates of the persons variable into a common scale. This is what in Heydari terms defined as a test-free person measurement [37]. The Chi-square of person fit variables can also be utilized to assess the measurement quality. By using Rasch measurement model, the construction and design of a test instrument can be a lot easier to be administered. With the benefits of Rasch measurement model, the need analysis for probing the expected TPD programs that really fits their background, existing professionalism, as well needs in professional development activities can be easily and proportionally conducted. Therefore, the present study is intended to address the research problems of how Indonesian teachers' needs-based PD programs could be developed and to validate the needs analysis instrument by using Rasch Model.

IV. METHOD

A. Design

This research was designed in a sequential explanatory strategy approach. The sequential explanatory strategy is a strategy for a mixed-methods design which is carried out by employing the combination of quantitative and qualitative data collection technique in a sequential order [38,39]. In the quantative data collection phase, the research was conducted by collecting the data, tabulating the data, and analysing the quantitative data. The data were taken by using a questionnaire of the Focused Group Discussion Program on Teacher Professionalism Development which was developed to analyse teachers' needs in PD programs. For the quantitative data, the analysis was done by using Rasch measurement model software named WINSTEPS version 3.73. The result of the quantitative analysis was then accompanied by qualitative analysis based on the given responses in order to come at a better conclusion regarding the PD activities needs for teachers.

B. Participants

The respondents of this study were selected randomly representing all sub-districts in Pesisir Barat District, Lampung, Indonesia. They were representatives of teachers, headmasters, as well as school supervisors numbering 55 respondents consisting of 36 males (65.45%) and 19 (34.55%) females. The education level of respondents varies from diploma level up to the postgraduate degree. The number of the diploma degree was 7 persons (12.73%), bachelor degree was 41 persons (74,54%), while the postgraduate degree was 7 persons (12,73%). The respondents were seven non-civil servants (12.73%) and 48 persons (87.27%) were civil servants. The data also show that there are 11 uncertified teachers (20%), and 44 of them have been certified (80%). The range of respondents teaching experience was divided into three categories namely 0 - 10 years, 11 - 20 years and 21 - 35 years. This category was based on the length of the respondent working as a teacher. The data also indicated that there were 6 teachers who were in the range of 0 - 10 years (10.91%), 13 teachers were in the range of 11-20 years (23.64%), and 36 persons were in the range of 21-35 years teaching experience (65.45%).

C. Instrumentation

The instrument used in the study is a questionnaire of a Focused Group Discussion for Teacher Professional Development Needs Analysis. The questionnaire is used to analyse the problems and needs of bottom-up teachers' PD programs. This instrument was designed in three parts, each of which consists of 10, 11, and 10 questions. The first part maps the PD activities or participation and their impacts (PD participation and PD impacts). The second leads to the needs of self-development and competence as a teacher (PD needs). The third part captures the frequency PD activities they have attended (PD frequencies). This instrument used a summated rating scale technique in a Likert rating scale of 4 categories.

In this study, the instrument was analysed by using the Rasch Measurement Model, which was processed in WINSTEPS software version 3.73. This software was used for its user-friendly features to earn dichotomous and polynomous responses, i.e. items with two potential responses (True and False), and more than two responses with a Likert rating scale [32].

The software, on the other hand, also informs the value of Cronbach-alpha, the one which informs us on the test reliability or internal consistency reliability in the classical theory. The Cronbach-alpha value for statistical reasoning test was given for each category of the instrument, i.e. TPD participation, impacts, needs, as well as frequency. The Cronbach-alpha value should be at 95 % confidence interval with the value p .05 [34,35,36].

By using Rasch Model, the person and items reliability could be well measured. The reliability refers to the ability of both items and persons if tested with the same items and persons, and they both tend to have the same characteristics. The reliability was also measured for different factors of the instrument and should meet the quality criteria [40]. The validity was also measured in the Rasch measurement. They could be seen from the logit value as well as the standard of error measurement, among many other ways in looking at the validity for the used instruments and the respondent selection. Separation is the distribution of position for the person and item along the variable and the value should be more than 1.0 for the items and the persons to have a good spread [34,41,42].

D. Findings

This research was conducted in Pesisir Barat District with 55 respondents, 36 male teachers (65,45%) and 19 (34,55%) female ones. The respondents were the representatives of every sub-district in Pesisir Barat. The data collection was conducted by using the instrument of Focused Group Discussion for PD needs for teachers in both quantitative and qualitative way. The quantitative data was obtained from the four categories of the instrument. However, the qualitative data was actually intended to be gathered form the given columns following the instrument. It seemed problematical for teachers or the respondents to fill out the qualitative section due to the time allowed by the committee as well as from the local government officers as they are not allowed to spend longer time outside the classrooms. The instrument itself probed the data of PD activities and its impact conducted by teachers, consist of 10 questions with 4 categories of alternative choice answers. The instrument also maps the needs of self-development and competence as teachers consisting of 11 questions with four alternative answer categories. Last but not least, the last part of the instrument probed the respondents' frequency in attending previous PD activities.

E. Reliability and Validity

In the classical test theory, the Cronbach Alpha value gives us information about the reliability of the instrument used in the study. However, the weakness of this theory is that the analysis does not give us information whether some problems with the persons or the items are there. By using Rasch measurement model, such limitations can be overcome as the model can inform us about both the person reliability and item reliability. In addition, this model also informs us the separation value, the value that informs us both the person and item distributions. Different from item reliability, the person reliability refers to the reproducibility of each person's sequence of order if they are given another set of items assessing the same construct. The reliability of both person and item of the four categories or factors (PD Participation, PD impacts, PD needs, and PD frequencies) of the instrument are adequately informed. Based on the rating scale instrument quality criteria [41], the person reliability of the four categories/factors in this study was .60, .71, .81, and .82 respectively (see table 2). These values inform that the person reliabilities of the instrument were all acceptable and good in terms of answering the instrument given. However, there is one problem with the item reliability. It seems that the questions asking for teachers' frequencies in attending professional development should be revised as the reliability on the PD frequencies factor is .50. This reliability value is poor. To revise the item reliability for this case, the items of the instrument should be revised to be the more easily understandable.

Furthermore, Table 2 also informs us the logit value for both person and item. This value informs us the minimum and maximum level of persons and items in interacting with the instrument given. If their range is very wide, there is a probability of the outliers' existence for both persons and items. The information about the outliers is displayed in detailed in the variable maps discussed in another section of the paper below (see table 3). If seen from the standard error of measurement (S.E. Mean) for the persons, all the S.E. mean values fall below .5, which means that persons variable has a good reliability. There is one factor, PD participation, whose S.E. mean is above .5, which means that there is a problem with (an) item(s) used in the instrument, but if seen from the KR 20 value, the items used are still acceptable (.68). In short, it seems to be safe to conclude that both persons and items reliability of the instrument range from strong to very strong for the four factors.

TABLE II. TABLE 2. SUMMARY OF PERSON AND ITEM RELIABILITY

| Factors | Person Reliability | Item Reliability | Person Logit | | S.E Mean | Item Logit | | S.E Mean | Cronbach Alpha (KR 20) |
			Min	Max	Person	Min	Max	Item	
PD Participation	.60	.95	-5.06	4.40	.23	-3.66	2.11	.60	.68
PD Impact	.71	.94	-2.67	3.88	.12	-0.65	1.30	.20	.73
PD Needs	.81	.84	-5.43	5.41	.28	-0.78	1.29	.19	.92
PD Frequencies	.82	.50	-1.4	1.80	.11	-0.40	.25	.06	.86

Table 3 below informs us how validity can be measured in Rasch measurement model. One of the many output tables generated by Rasch analysis to see the validity of the instrument used is by looking at table 23, i.e. Unidimensionality. Unidimensionality means that the one variable measurability must be similar and consistent. This is often referred to as the construct validity. In details, the result of the dimensionality analysis of four factors is illustrated in table 3 below.

TABLE III. VALIDITY

| Factors | Person Dimensionality | | Item Dimensionality | | Validity (Mean S.E. Measure) | |
	Raw Var (>40%)	Unexplained Var (<15%)	Raw Var (>40%)	Unexplained Var (<15%)	Person	Item
PD Participation	47.0%	10.4%	47.0%	12.1%	.93	.39
PD Impact	41.3%	12.2%	41.3%	14.1%	.38	.14
PD Needs	47.5%	18.2%	47.5%	17.9%	.71	.23
PD Frequencies	44.6%	14.9%	44.6%	19.3%	.30	.12

It can be inferred from table 3 above that the value of Raw Variance explained by measures has to be above 40% in order an instrument to have a good validity. Of all dimensionality, person and item, they have value of Raw Variance Explained by Measures more that 40%, i.e. ranging from 41.3% up to 47.5%. This is further confirmed by the value of Mean of Standard Error Measure below 1, this value is acceptable in Rasch analysis. In other words, this instrument can be used to ask respondents about PD participation, PD impact, PD Needs, as well as PD frequencies. However, there are 3 values of unexplained variances which are more than 15%, i.e. PD Needs person and item dimensionality as well as item dimensionality for PD frequencies. The items in PD needs and PD frequencies both need to be considered for the items revision for different group of teachers, or similar teachers, but with better conditioning and setting for the focused group discussions. For example, in PD needs factor, Figure 1 below that suggest that the Item Characteristic Curve (ICC) for item number 4, for instance, the behaviour of the respondents' answers (marked by "x") was not in a good pattern as expected in the RED line (the ideal model). In other words, how respondents respond on the PD Needs questions are not evenly distributed, i.e. some outliers are there. Ideally, the measured value should approach the ideal model line. This means that there are some respondents who answered the given questions carelessly.
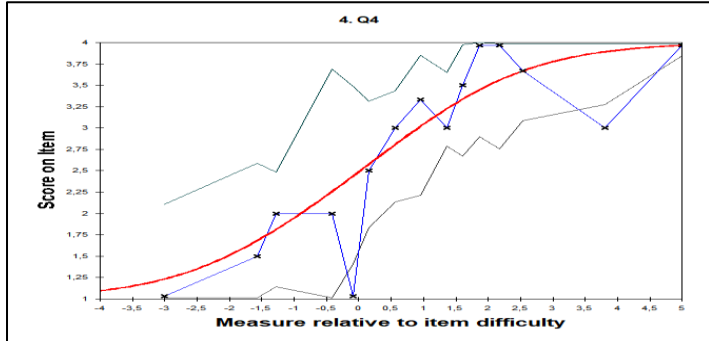

Fig. 1. Item Characteristic Curve (ICC) Graph for PD needs Question No.4

Overall, to see further the validity of the instrument used, it can be measured from the logit value of each item or person. If there are some outliers, then the persons or items need to be revised or changed. The logit or measure of each person and item would be better if the value is near zero. In addition, the standard of error of measurement (S.E. of Measurement) should be less than .5 for the items or person to have a high accuracy, between .5 to 1 are acceptable or having a moderate (or good) accuracy, and if more than 1.0, then the persons or items have a poor degree of accuracy. In addition, the value of Outfit Mean Square (OUTFIT MNSQ) should be in the range of 0.5 to 1.5; the value of OUTFIT ZSTD should be between -2 and +2,

whereas the Point Measure Correlation should be between 0.4 to 0.85 for an instrument to have a good validity.
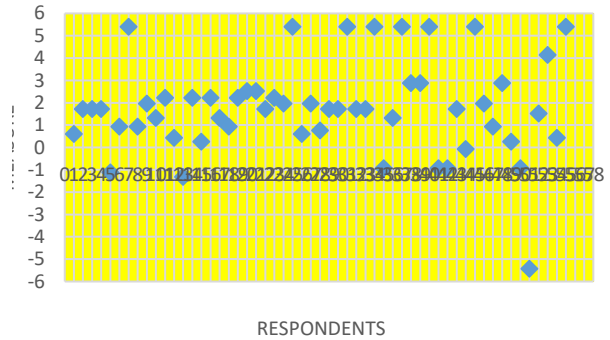
PERSON LOGIT DISTRIBUTION

RESPONDENTS

Fig. 2. Scattered Plot for Respondents responses toward PD needs questions.

F. Variable map

The variable map demonstrates the distribution of the respondents and item difficulty on a same logit scale. The respondents' behaviour in answering the questions is displayed on the left side of the map while the item difficulty is on the right side of the map. Higher logits represent respondents with higher ability (left side) and more difficult items (right side) and vice versa [34,43,44]. The variable map allows us to identify both items and persons' behaviour. The value of Logits 0 represents the test items means measure. Table 3 below is the variable map of one factor, PD participation where the proportion of the respondents above and below the mean of the test items is almost equal. The range of person logit is between -5.06 and 4.40, with the assumption that the zero point is the mean logit. This means that for PD participation section, the variable maps the persons' ability in answering the questions which is above average (see Table 2 above). The values of logits obtained from the maximum measure and minimum measure. In other words, the respondents' behaviour in statistical reasoning was quite high as most of them answer the questions carefully, and the items were quite well understood by the respondents (the range of the item logit is between -3.66-2.11).

Table 3 gives us information on the variable map for teachers' professional development and the interaction on the person and the item. The last digit in the above map on the left side, the respondents, tells us the gender of the respondents which is coded as 1(male) and 2 (female) while the two digits earlier is the number or the code for the respondent.

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INPUT: 55 Person   10 Item   REPORTED: 55 Person   10 Item   2 CATS    WINSTEPS 3.73
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                                               Person - MAP - Item
                                                  <more>|<rare>
       3                                              191  +
                                                           |
                                                          T|
                                                           |
                              252  421  502  512           |  P6
       2                                              +
                                                           |  P10
                                                          S|
                              042  241  361  431           |  P2
                                                           |  P1
       1                                             S+
                012  152  391  451  471  482  491  521  531  541  |
                                    301  341  371           |  P9
                                                           |  P8
       0                                             +M  P5
                                                           |
                    022  052  162  222  271  352  461  551  M|
      -1                                              +
                                                           |  P7
        031  071  091  111  132  171  182  201  231  262  281  321  412  |
                                                           |
                                                          S|  S
      -2                                              +
                    061  081  102  121  211  291  312  401  441  |
                                                           |
                                                           |  P3
      -3                                              +
                                                          T|
                                   142  331             |
                                                          T|  P4
                                                           |
      -4                                              +
                                         381          +
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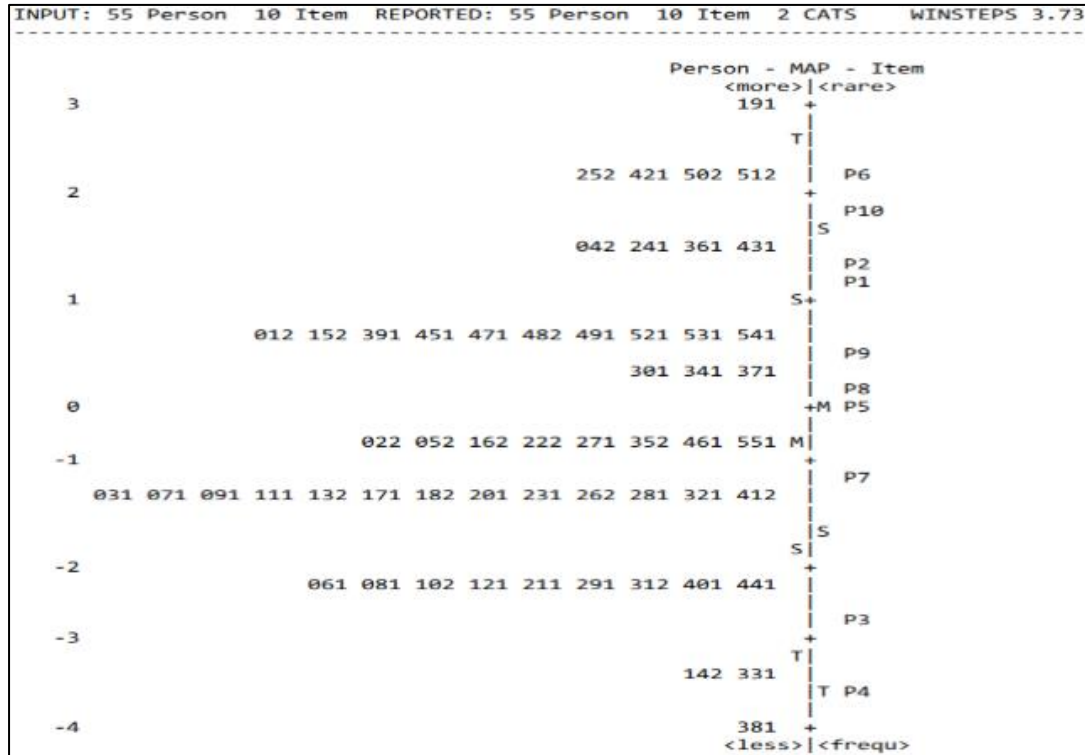
Fig. 3.   Variable Map for PD Participation

We see in the map above that respondent number 19 (male) answered or filled out the questions all better and did that carefully. On the other hand, the respondent number 38 (male) is the most careless and lazy one to answer the question given. Perhaps, they were reluctant to fill out the answer to the given instrument in a careful way and should be based on their real condition.

V.   DISCUSSION

This study has been driven by Indonesian TPD programs should be carried out by considering what they need for their PD programs, suggesting the appropriate PD programs based on the analyses of their needs, as well as how validating the instrument for the TPD needs analysis by using Rasch model. Indonesian teachers have been offered by several modes of professional trainings as discussed in earlier paragraphs, yet the issue of teachers' professionalism still sits as one of crucial aspects in the issue of national education problems, among many other aspects [5,25,45]. This means that the ongoing PD programs for teachers needs to be improved in its implementation. Such programs have to be really designed in such a way that could really train teachers to be more competent and professional, instead of just having some training projects as routines. This seems to be what needs to be considered very well by the training organizers in a way that PD programs have to be designed from teachers as the subjects of the PD programs.

Current TPD programs have mostly been administered in a top down way in that teachers really have some restrictions to be involved in the program design. In the decentralization era, the government has assigned the local government at the provincial level to organize trainings and PD for teachers under the authority of the Board of Education Quality Assurance (LPMP). This board is responsible for ensuring the quality of teachers in the provincial level and hence PD programs for teachers have been carried out so far by this institution. However, the role of this institution in promoting teachers' professionalism still need to be optimized. Regular training programs conducted by this institution have been trapped in routine and regular activities only and teachers have surely limited access to involve in the program design. Teachers have to be involved in preparing, discussing, and suggesting what kinds of PD programs that really fit in their needs. Ideally, teachers' involvement has to be put at front initiating the PD activities. Teachers by this way could consider the implementation and implication of their own learning experiences for their teaching and for creating conditions of their learning experience for the maximum result. By including a need-based TPD program design, teachers, accompanied by facilitators, would have more opportunities to discover more new knowledge and skills. A PD program for teachers through needs-based PD approaches enables them to be involved more from the need analysis to the feedback and evaluation steps of a PD program.

The result of needs analysis step in designing a PD program for teachers has indicated the importance of considering the four factors, i.e. PD Participation, PD impacts, PD needs, and PD frequencies in designing a

TPD program. In addition, to what extent the content of TPD programs should be developed as well as their modes of PD activities should be considered in order to prepare for the best TPD programs for them. The quantitative data as discussed above suggest what condition they are in at present, what they need for their PD programs as well as how they can be implemented. Moreover, in the variable map of Rasch measurement model analysis, we notice that most of the respondents, i.e. teachers, headmasters, as well as school supervisors agree with the need for understanding their current PD condition, what they need for PD activities as well as how they can be developed and implemented in designing a PD program for them. Content-related training activities as suggested by the variable map suggests that most respondents answered the given questions approaching or more the zero logits. Lower logits manifest their lack of interests in a PD program offered in the instruments, higher logits suggest the other way. On the other hand, the measurement of person reliability using Rasch measurement model was all above .50 which means that the person reliability in responding the instrument given is acceptable or moderate and good. It is the instrument that needs to be revised in such a way that probes their professional experience and needs for PD activities better. This is particularly indicated in the category of PD frequency where the reliability is the lowest one, .50. To wrap up what the needs analysis instrument suggests, it can be concluded that teachers' participation in the decision-making process for designing the proper training or learning model for their PD programs could be a vehicle for them for pursuing more effective PD activities they need. Furthermore, by involving them in the needs analysis and decision-making activities in deciding a training program, their PD activities emerge and initiate from themselves and this could promote teachers' knowledge and professionalism better. A PD program for teachers should have an appropriate level of challenge and support, provide them with activities demonstrating new ways to teach and learn, build their professionalism, as well as provide time for reflection, evaluate the effectiveness and impact of their PD activities.

VI. CONCLUSION

This study suggests that PD programs for teachers need should be prepared in such a way that enable teachers as the object of the program to propose and to design which PD programs that really fit their needs as this could lead the changing roles of teachers, their professionalism, as well as types of professional development programs and learning opportunities that teachers might need. The needs analysis for TPD programs in this study were driven by the 21st century teacher standards, Indonesian National Qualification frameworks as well as the Act about Teachers and Lecturers and its following regulations, teachers professional experience as well as their needs for PD programs. Teachers should be aware of their own

professional learning experience, processes of learning, expected outcomes, as well as adequate practice in the training program, and therefore, they should be involved in the decision-making step for their PD. The needs-based PD programs should be developed by identifying the context they are in at present, their PD participation, PD impacts, PD needs as well as PD frequencies. The findings suggest the necessity to consider teachers those factors in designing a more appropriate PD program identified in the needs-analysis step. Further studies in designing some more explicit curricula for TPD programs should be more investigated as this could better recognize teachers' knowledge and beliefs about their own professional learning, teaching, learners, pedagogical, technical, as well as subject matters. A PD program should provide more flexibilities for teachers to plan and organize their learning experience to build their own knowledge and skills.

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