Development of Instruments for Measuring Attitudes, Perceptions and Awareness in the OTK Sarpras Subject Using the Rasch Model

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Abstract. The purpose of this study is to determine the feasibility of the instrument. Scores obtained from students are used to determine the validity and the reliability of the instrument. Data analysis for instrument testing used Rasch model analysis software to get a measuring tool in research on perception, awareness of students' attitudes in the OTK Sarpras subject. After being analyzed with the application, it is known that 16 of the 17 perception instruments tested had a p value above the significance level of 0.005. 14 items of awareness instrument have a p value above the significance level of 0.05. The attitude instrument of 10 of the 11 items also has a p value above a significant level of 0.05. Instruments that are invalid, item perseption no 2 (0.000), item afektif /attitutude no 6 (-0.003). The measurement tool can be used to measure the perceptions, awareness and attitudes of students in learning OTK Sarpras.

Keywords: Instrument, Measuring, Rasch Model Introduction

1. Introductions

Learning lost in Indonesia has been going on for a long time. The pandemic period has exacerbated the learning lost. Learning lost occurs because of gaps or balances in the achievements of learning aspects and assessments carried out by teachers. Aspects of learning that should be carried out holistically have not been achieved as expected. This happens because there is no relation between these aspects.

Until now, the authors still find that learning and assessment activities have been carried out separately, both cognitive (knowledge), affective (attitude), and psychomotor (skills). In adaptive normative subjects, assessment is more emphasized on cognitive assessment only. Affective assessment (attitude) is only carried out by Civics and Religious Education and Characteristics teachers. Assessment of vocational subjects focuses more on skills assessment because the weight of the skill score is higher than the knowledge score. Teachers who teach a lot of practice only have practical value, whereas teachers who teach a lot of theoretical knowledge only have knowledge value. On the other hand, most teachers focus on completing the material so that they prioritize aspects of knowledge

The 2013 curriculum with Bloom's Taxonomy mandates educators to implement PBM with 3 learning aspects namely affective (attitude), cognitive (knowledge) and psychomotor (skills). To deal with various complex situations and challenges, students need a variety of knowledge, attitudes and skills to be able to manage their personal and social lives. Thus these three aspects should be applied in holistic learning so that they do not favor only one aspect.

Education must be able to encourage the harmonization of cognitive, social and emotional aspects of students in accordance with the main idea of Minister of Education and Culture Regulation No. 20 of 2018. The regulation regulates Character Strengthening Education in Formal Education Units, oriented towards developing the potential of students as a whole and integrated, exemplary in implementing character education in each educational environment; and takes place through habit and all the time in everyday life. Thus the affective, cognitive and psychomotor aspects need to be complemented by social and emotional aspects.

Through the improvement of learning that begins with a diagnostic assessment, both non-cognitive assessment and cognitive assessment so that a uniform perception of the material to be taught is obtained and it is hoped that the teacher will carry out the learning by paying attention to learning readiness and the differentiation of students in achieving their learning goals. It is very important to ensure that students have a strong perception and correct understanding of the material. Positive student perceptions will raise awareness to follow the learning well. This awareness affects how students behave or affective aspects to how students act when participating in learning to gain the expected knowledge and skill competencies.

Vocational school teachers are tasked with preparing graduates who are ready to work, so they need to realize the importance of soft skills and hard skills. In addition to aspects of attitude, knowledge and skills, teachers must also pay attention to aspects of perception and awareness to help students achieve the expected proficiency.

Given the importance of affective aspects or attitudes, perceptions and awareness of students in learning automation of management of infrastructure facilities at SMKN 1 Slawi, researchers are trying to develop and validate instruments to measure perceptions, affective abilities or attitudes and awareness of students with the Rasch model. With the provision that affective abilities are limited to the feelings of students when participating in automation learning and management of infrastructure facilities. Perceptions are limited to students' opinions about automation subjects and management of good infrastructure related to teachers, learning materials and learning activities. Awareness is limited to knowing the extent to which students realize that automation and infrastructure management lessons are important and very necessary when entering the world of work.

2. Methods

This study uses a quantitative approach to the type of descriptive analysis research. The research location is at SMK Negeri 1 Slawi. Data was obtained using a questionnaire developed by researchers with respondents being students of SMK Negeri 1 Slawi, Department of Office Management Automation, for the 2022/2023 academic year.

The instrument used for data collection was a questionnaire and was developed by the researcher. Researchers provide instruments to experts to get some suggestions and comments on the instrument. Comments given by experts help in developing tests. The instrument was tested on 114 students outside the predetermined sample. There are 3 sets of questionnaires that include indicators of affective abilities or attitudes, perceptions and awareness.

According to Paradigm (2019: 15) perception is "the process of organizing and interpreting a person's stimulus, which is influenced by the desire, knowledge and experience relevant to the stimulus which is influenced by human behavior in determining life goals." Perceptions in this study are limited to students' perceptions of teachers and subjects. Meanwhile, indicators of teacher perception include pedagogical competence, personal competence, social competence, professional competence. Meanwhile, indicators of perception on subjects include the ease or

difficulty of the OTK Sapras subjects, the importance of learning OTK Sarpras subjects, how to learn OTK Sarpras subjects.

Krathwohl et al., (1964) states that the affective domain is a domain that includes feelings, values, appreciation, enthusiasm, motivation, and attitudes. Included in behavior that reflects a good attitude/affection from students, for example discipline in carrying out all obligations related to the learning process, being responsible for what is done, enthusiasm and enthusiasm in participating in learning, respecting and appreciating teachers and peers, and so on. The attitude indicator is limited to the tendency to act in likes and dislikes towards an object.

Awareness according to Goleman (2018: 513) "knows what we feel at any given moment, and uses it to guide our own decision-making; have realistic benchmarks for self-ability and strong self-confidence". The indicators of awareness are being serious in carrying out sacred teachings, always pursuing true and beneficial knowledge, respecting anyone, not arbitrarily.

The purpose of this study is to determine the feasibility of the instrument. Scores obtained from students are used to determine the validity of the instrument and the reliability of the instrument. Data analysis for instrument testing used Rasch model analysis software.

3. Result and Discussion

The results of this study are valid and reliable instruments for measuring students' perceptions, awareness and attitudes when participating in Sarpras OTK learning. The instruments that will be tested on 86 respondents. Berikut ini akan diuraikan analisis instrument pada masing-masing variabel.

Perception

The operational definition of perception in this study is the students' memories or responses to the teacher and the OTK Sarpras subject according to the experience gained. The lattice of measurement instruments is as follows.

Table 1. Perception Instrument Item List

Perception on	Indicator	Sub Indicator	Total Item
Teacer Competency	Pedagogical Competency	Mastering the characteristics of students from the physical, moral, social, cultural, emotional and intellectual aspects	
	Personality Competency	Present yourself as an honest person, have noble character, and be a role model for students Present yourself as a steady, stable, mature, wise person	
	Social Competency	Be inclusive, act objectively, and not discriminate	
	Personal Competincy	Mastering the material, concepts, scientific structure of the subjects being taught	
OTK Sarpras Subject	Easy or difficult OTK Sarpras Subjects		

	The importance of learning the subjects of brain and sarpras		
	How to learn brain science subjects		

The perceptual instrument items were then analyzed using the Partial Credit Model (PCM) using the eRm package based on the R Program. The following are the steps;

```
> library(eRm)
> A<-read.table("persepsi.txt")
> summary(PCM(A))
Results of PCM estimation:
Call:  PCM(X = A)
Conditional log-likelihood: -757.7689
Number of iterations: 46
Number of parameters: 50
```

From this command it produces Item Difficulty parameters with 0.95 CI and Item Easiness Parameters with 0.95 CI.

Then to test the compatibility of the items with the model, continue the analysis with the command to generate a table as follows;

```
> itemfit(person.parameter(PCM(A)))
```

The following is a table of the results of the analysis.

Tabel 2. Itemfit Statistics Perception :

	Chisq	df	p-value	Outfit MSQ	Infit MSQ	Outfit t	Infit t	Discrim
V1	62.725	76	0.863	0.815	0.846	-0.638	-0.523	0.490
V2	149.307	76	0.000	1.939	1.378	1.346	1.758	0.022
V3	73.592	76	0.557	0.956	0.997	-0.063	0.052	0.295
V4	56.115	76	0.958	0.729	0.855	-1.037	-0.582	0.434
V5	51.080	76	0.988	0.663	0.858	-0.822	-0.430	0.448
V6	46.743	76	0.997	0.607	0.821	-0.907	-0.486	0.490
V7	35.662	76	1.000	0.463	0.752	-1.354	-0.629	0.545
V8	73.458	76	0.561	0.954	0.898	-0.108	-0.455	0.442
V9	74.969	76	0.512	0.974	0.887	0.202	-0.101	0.235
V10	37.266	76	1.000	0.484	0.886	-0.190	-0.042	0.194
V11	75.820	76	0.484	0.985	0.999	-0.048	0.036	0.358
V12	52.059	76	0.984	0.676	0.837	-1.120	-0.518	0.494
V13	75.563	76	0.493	0.981	1.032	-0.067	0.267	0.393
V14	76.365	76	0.467	0.992	0.962	-0.009	-0.224	0.481
V15	89.880	76	0.132	1.167	1.029	0.809	0.204	0.260
V16	73.580	76	0.557	0.956	0.966	-0.082	-0.056	0.317
V17	66.091	76	0.784	0.858	0.934	-0.714	-0.327	0.385

From table 2 it is known that the p value of item no 2 is 0.000 which is less than the significant level of 0.05. So it can be concluded that point 2 does not match the proposed modeling. While items 1.3 to 17 have a p value of more than a significant level so that these items fit or behave consistently with what the model expects.
The Outfit MSQ and Infit MSQ values of all items are also known to be in the interval from 0.5 to 1.5 so that all items can be stated according to the model.

Thus the instruments that can be used as a measurement of perception are as follows.

Table 3. Tabel Research Instruments "Learners' Perceptions of Teachers and OTK Sarpras Subjects"

STATEMENT	LEVEL OF DIFFICULTY		
1. The Sarpras OTK teacher makes students comfortable while studying, making it easier to understand the material	1.003	-0.944	-0.248
2. Sarpras OTK teachers provide various learning activities to actualize students' potential, including their creativity	-0.778	-0.672	-0.203
3. The Sarpras OTK teacher teaches using various methods so that all students can be active in learning.	-0.089	-0.883	-0.199
4. Show a friendly attitude to students and fellow teachers	-0.108	-0.330	-0.482
5. Explain the good values of the material being taught	0.292	-0258	-0.542
6. Be wise and prudent	0.982	-0.267	-0.575
7. When there are students who make mistakes the teacher does not get angry but gives advice	-0.590	-0.900	-.088
8. The Sarpras OTK teacher guides all students, whether they have good or bad grades.	0.972	0.493	-0.722
9. The teacher respects differences in religion, ethnicity and status while teaching	0.965	1.394	-0.792
10. At the beginning of learning the teacher repeats the previous material	-1.842	-0.945	0.887
11. The teacher conveys the material clearly when explaining in front of the class.	0.999	-0.819	-0.334
12. The teacher gives tests either orally or in writing at the end of the lesson	-0.843	0.886	2.873
13. Infrastructure Automation subject is an easy subject	-2.106	-0.975	1.718
14. The subject of Infrastructure Automation is an important subject and is needed by the community.	-0.073	-1.148	0.059
15. Infrastructure Automation subjects are managed in a balanced way between practice and theory	0.315	-0.932	-0.208
16. Tasks in learning Infrastructure Automation are challenging and made according to ability	-0.900	-1.128	0.278

Awareness

The operational definition of awareness in this research is something that allows a person to be able to observe himself or distinguish himself from the world (other people), and that allows a person to be able to place himself in a certain time and situation.

Table 4. Awareness Instrument Item List

NO	INDIKATOR	TOTAL ITEM
1	Earnest in carrying out the holy teachings,	4
2	Always pursue true and beneficial knowledge	3
3	Respect anyone,	5
4	Not on his own	2

The awareness instrument items are then analyzed using the Partial Credit Model (PCM) using the eRm package based on the R Program. The following are the steps;

```
> library(eRm)
> A<-read.table("kesadaran.txt")
> summary(PCM(A))
Results of PCM estimation:
Call:  PCM(X = A)
Conditional log-likelihood: -558.3396
Number of iterations: 120
Number of parameters: 41
```

From this command it produces Item Difficulty parameters with 0.95 CI and Item Easiness Parameters with 0.95 CI.
Then to test the compatibility of the items with the model, continue the analysis with the command to generate a table as follows;

```
> itemfit(person.parameter(PCM(A)))
```

The following is a table of the results of the analysis

Table 5. Itemfit Statistics Awareness of OTK Sarpras Subjects

	Chisq	df	p-value	Outfit MSQ	Infit MSQ	Outfit t	Infit t	Discrim
V1	69.536	83	0.854	0.828	0.912	-0.698	-0.601	0.454
V2	42.543	83	1.000	0.506	0.808	-0.737	-1.289	0.532
V3	101.893	83	0.078	1.213	1.191	1.112	0.932	0.170
V4	77.465	83	0.651	0.922	0.897	-0.190	-0.309	0.428
V5	62.882	83	0.951	0.749	0.794	-0.987	-1.157	0.537
V6	71.638	83	0.809	0.853	0.841	-1.062	-1.274	0.548
V7	72.064	83	0.799	0.858	0.905	-0.845	-0.612	0.314
V8	49.609	83	0.999	0.591	0.928	-0.403	-0.052	0.238
V9	86.139	83	0.385	1.025	1.126	0.189	0.900	0.335
V10	49.253	83	0.999	0.586	0.848	-0.356	-0.189	0.320
V11	63.310	83	0.947	0.754	0.866	-0.948	-0.543	0.432
V12	27.963	83	1.000	0.333	0.782	-0.703	-0.320	0.435
V13	57.182	83	0.986	0.681	0.834	0.145	-0.236	0.363
V14	28.870	83	1.000	0.344	0.865	-0.443	-0.103	0.398

From table 5 it is known that it has a p value of more than a significant level so that the item fits or behaves consistently with what the model expects.
The Outfit MSQ and Infit MSQ values of all items are also known to be in the interval from 0.5 to 1.5 so that all items can be stated according to the model.

Thus the instrument can be used as a measuring tool for "Aspects of Student Awareness of OTK Sarpras Subjects are as follows.

Table 6. Research Instruments for "Aspects of Student Awareness of OTK Sarpars Subjects"

	STATEMENT	LEVL OF DIFFICULTY		
		C1	C2	C3
1.	I don't play cellphones when learning OTK Sarpras	**1.111**	2.241	2.537
2.	I don't make noise during class	3.990	4.396	2.379
3.	When the teacher explains, I chat with friends	0.690	-2.276	-0.394
4.	I do other tasks while the teacher is explaining	0.605	-1.579	-1.445
5.	I study hard to get good grades	-1.429	-1.379	-1.209
6.	I write down what the teacher explains	-2.457	-1.507	0.110
7.	I immediately ask the teacher when I don't understand the material	-0.460	2.223	3.915
8.	I have to understand and obey the school rules	-0.132	-0.027	-1.853
9.	When the teacher raised his hand when giving a question I realized that students were asked to raise their hands before answering	-1.105	0.091	0.387
10.	I have to do assignments or homework from the teacher	0.554	-0.043	-1.891

STATEMENT	LEVL OF DIFFICULTY		
11. I am active in doing group assignments	-0.476	-1.586	-1.334
12. I respect the opinions of other group members when doing group assignments	0.551	0.238	-1.915
13. I have to study hard for a happy future	-0.142	1.337	-1.927
14. I was at school before the bell rang	0.548	0.636	-1.940

Afektif / sikap

The affective operational definition or student attitude is limited to the tendency to act in a like or dislike way towards the OTK Sarpras subject. The attitude of the students is explained in table 5.

Table 7. Instruments List For "Affectionate Aspects / Attitudes of Learners Against Office Automation and Governance Subjects"

NO	INDIKATOR	SUB INDIKATOR	TOTAL ITEM
1	He tendency to act with likes and dislikes towards an object	Read the OTK Sapras Book's	**1**
		Learn OTK Sarpras	**2**
		Interaction with the Sarpras OTK teacher	**2**
		Carrying out OTK Sarpras tasks	**6**

The affective/attitude instrument items were then analyzed using the Partial Credit Model (PCM) using the eRm package based on the R Program, the following are the steps;

```
> library(eRm)
> A<-read.table("kesadaran.txt")
> summary(PCM(A))
Results of PCM estimation:
Call:  PCM(X = A)
Conditional log-likelihood: -558.3396
Number of iterations: 120
Number of parameters: 41
```

From this command it produces Item Difficulty parameters with 0.95 CI and Item Easiness Parameters with 0.95 CI.

Then to test the compatibility of the items with the model, continue the analysis with the command to generate a table as follows;

```
> itemfit(person.parameter(PCM(A)))
```

The following is a table of the results of the analysis.

Table 8. Itemfit Statistics of Afektif

	Chisq	df	p-value	Outfit MSQ	Infit MSQ	Outfit t	Infit t	Discrim
V1	74.171	85	0.793	0.862	0.859	-0.999	-1.038	0.486
V2	53.502	85	0.997	0.622	0.635	-1.480	-2.263	0.717
V3	61.685	85	0.973	0.717	0.786	-1.860	-1.492	0.572
V4	41.481	85	1.000	0.482	0.700	-1.588	-1.219	0.576
V5	84.398	85	0.498	0.981	0.987	0.172	0.098	0.216
V6	125.880	85	0.003	1.464	1.134	1.907	0.674	0.179
V7	33.054	85	1.000	0.384	0.717	-1.141	-0.677	0.455
V8	48.922	85	0.999	0.569	0.668	-2.154	-1.914	0.692
V9	128.243	85	0.002	1.491	1.360	2.267	1.718	-0.109
V10	59.786	85	0.983	0.695	0.710	-0.832	-1.199	0.591
V11	79.932	85	0.635	0.929	0.876	-0.363	-0.792	0.358

From table 8 it is known that the p value of item no 6 is 0.003 which is less than the significant level of 0.05. So it can be concluded that point 6 does not match the proposed modeling. While items 1 to 5, 7 to 11 have a p value of more than a significant level so that these items fit or behave consistently with what the model expects. The Outfit MSQ and Infit MSQ values of all items are also known to be in the interval from 0.5 to 1.5 so that all items can be stated according to the model. Thus the instrument can be used as a measuring tool for affective aspects or attitudes are as follows.

Table 9. Research Instruments "Affectionate Aspects / Attitudes of Learners Against Mata Pelajaran OTK Sarpras"

	STATEMEN	LEVEL OF DIFFICULTY		
		C1	C2	C3
1.	Carrying out OTK Sarpras tasks	-2,366	-1.451	1.349
2.	I like learning to practice Sarpras' OTK	**-1.413**	**-1.259**	**-0.838**
3.	I enjoy learning the theory of Sarpras' OTK	**-1.729**	**-1.649**	**-0.008**
4.	I like Sapras' OTK teacher's teaching method	**-0.531**	**-1.141**	**-1.283**
5.	I like Sarpras' OTK teacher ramah dan menyenangkan	**0.478**	**-0.612**	**-1.647**
6.	I like to discuss during OTK sarpras lessons	**0.478**	**-0.612**	**-1.647**
7.	I enjoy participating in the OTK Sarpras lesson	**-0.959**	**-1.589**	**-0.767**
8.	I don't like the OTK Sapras homework	**1.943**	**7.703**	**9.418**
9.	I tried my best to do the OTK Sarpras questions.	**-0.526**	**-1.200**	**-1.251**
10.	I prepare questions before being given the opportunity to ask questions during the discussion	**-0.852**	**1.890**	**4.742**

4. Conclusion

To get a measuring tool in research on perception, awareness of students and attitudes in the OTK Sarpras subject can be used the Rasch Model. After being analyzed with the application of the Rasch model, it is known that 16 of the 17 perception instruments tested had a p value above the 0.005 significance level. All 14 items of the awareness instrument have a p value above the significance level of 0.05. The attitude instrument of 10 of the 11 items also has a p value above a significant level of 0.05. The results of this analysis provide a recommendation that a valid and reliable measurement tool can be used to measure the perceptions, awareness and attitudes of students in learning OTK Sarpras, maybe even other subjects. Items that do not match or do not fit the model will not be used or discarded.

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