Internal structure validation of a teacher autonomy scale through confirmatory factor analysis

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Abstract

Purpose: Teacher autonomy is defined as the freedom of teachers to organize the learning and teaching process at school. The teaching autonomy scale measures teacher autonomy (Pearson & Hall, 1993). This study was conducted to identify whether the measuring instrument of teacher autonomy meets the validity and reliability requirements of a measuring instrument.

Method: The number of respondents in this study was obtained using a proportional sampling technique involving 170 respondents. The teacher autonomy measuring instrument produced from this study consists of 17 items that measure two dimensions; curriculum autonomy and general teaching autonomy. The quantitative data analysis techniques used were content-based validity tests through CVR and readability tests, validity evidence based on internal structure through CFA, and reliability tests based on homogeneity (internal consistency) through CR and AVE.

Result: Shows CVR value with a minimum value of 0.78; loading factor ≥ 0.4, except for item 7 and item 8, as well as fit model fit with RMSEA = 0,077; RMR = 0,030; GFI = 0,847; CFI = 0,858; TLI = 0,797; NFI = 0,805; and p-value < 0.05. reliability test through CR value (0.944) > 0.7 and AVE (0.544) > 0.4.

Conclusion: The adaptation of the teacher autonomy measurement tool for female junior high school teachers met good validity and reliability values.

Keywords: adaptation; autonomy; CFA; female teacher

INTRODUCTION

The Teaching Autonomy Scale, created by Pearson and Hall (1993), aims to measure the level of teacher autonomy. We use Pearson and Hall's definition of teacher autonomy because it is conceptually closer to teacher practice in Indonesian schools than other theoretical studies and does not ignore curriculum policy as part of teacher autonomy. We will use Pearson and Hall's (1993) dimensions of curriculum autonomy and general teaching autonomy, as they are conceptually closer to the practice of teacher autonomy in Indonesia. However, with consideration and input from the supervisor and expert judgment, there are some terms in the statement items that are not suitable for the context of Indonesian junior high school teachers. The concept of teacher autonomy in Indonesia still has limitations and challenges, despite efforts to improve it, such as a centralized curriculum system and centralized examination standards (Leonangung et al., 2017; Riowati & Yoenanto, 2022). With these limitations, the researcher will adapt the measuring instrument on the teacher autonomy variable to fit the cultural and educational context of junior high school teachers in Indonesia.

The concept of teacher autonomy is the extent to which teachers can decide how they perform their job duties (Rau & Hyland, 2002). The development of teacher autonomy in educational settings refers to the roots of the term job autonomy, which was long discussed by Hackman and

Oldham in 1976 in organizational/industrial settings, and is one of the dimensions of the job characteristics model.

Things that can be antecedents of teacher autonomy can be viewed in terms of the personal domain and the work domain. Some previous researchers stated that in terms of the personal domain, autonomy will arise due to personal achievement in employees (Choi & De Gagne, 2016; Shobe, 2018), a sense of work meaningfulness and employee satisfaction that is considered a personal standard, which is needed by the organization to be successful (Dewi, 2021; Gözükara & Çolakoğlu, 2016). While other researchers state that teacher autonomy will arise due to several things in the work domain such as consideration of the number of classes taught, the number of students to be supervised (Prichard & Moore, 2016); teacher collaboration, decision-making, and updating teacher knowledge (Amini & Kruger, 2022); higher social support (Choi & De Gagne, 2016); and educational policy factors.

Teachers who have autonomy tend to be able to schedule their own work and make decisions regarding their teaching duties independently. This allows teachers to flexibly manage their duties with other roles. Workers, as well as teachers, who do not or lack autonomy in their work, will be more vulnerable to stress from the demands of their tasks at work because individuals cannot manage their work.

The various roles performed by a teacher have not fully received the right solution from the authority/government. Policies have not provided affirmation of inconsistent implementation at the field level. Education policies related to teacher autonomy in Indonesia have limitations; namely, teacher autonomy is that teachers have more authority in managing the learning process in the classroom, and teachers are still limited to face-to-face teaching schedules in the classroom. Autonomy aims to give teachers more freedom in designing and managing learning according to the needs and characteristics of students in the classroom. The concept of teacher autonomy in Indonesia still faces various limitations and challenges, despite efforts to improve it.

The above description shows that several studies have proven the importance of teacher autonomy, namely bringing about better performance motivation, commitment, and satisfaction from the existence of high motivation, teachers feel they have the freedom to make decisions related to the learning process and have a sense of satisfaction with their work and tend to stick to it. However, researchers have not found research on validating the measurement of teacher autonomy. The researcher used the TAS scale by Pearson and Hall (1993). Researchers need to adapt the measuring instrument so that it can be used to reliably and validly measure the construct of teacher autonomy in accordance with the context of junior high school teachers in Indonesia.

METHOD

The research sample was obtained using a proportional sampling method. Proportional sampling provides a more accountable basis for generalization than sampling that does not take into account the size of each sub-population. Respondents were 170 female junior high school teachers in 3 cities (Surabaya, Sidoarjo and Malang). The researcher used a questionnaire method containing closed and open questions. The questionnaire was distributed through a google form given to female junior high school teachers in the 3 cities.

Research Instruments

The scale used to measure the teacher autonomy variable was Pearson and Hall's (1993) Teaching Autonomy Scale (TAS). The TAS scale consists of 18 items consisting of 2 dimensions, namely curriculum autonomy and general teaching autonomy. The statements are divided into (1) 11 items reflecting high autonomy (favorable), (2) the remaining 7 items reflecting low autonomy (unfavorable). The scoring range used is 1 to 5, i.e., No autonomy (1), Little autonomy (2), Moderate autonomy (3), High autonomy (4), and Full autonomy (5). The higher the autonomy score, the greater the autonomy obtained; otherwise, the lower the autonomy score, the lower the level of teacher autonomy. The teacher autonomy scale will be adapted first to adjust the context of junior high school teachers in Indonesia. The following is a blueprint of the teacher autonomy measuring instrument scale distributed to respondents.

Table 1
Work Autonomy Blueprint

Dimension	No Favorable Aitem	No Unfavorable Aitem	Aitems
Curriculum Autonomy (CA)	1, 3, 4, 5, 6	2	6
General Teaching Autonomy (GTA)	7, 8, 9, 11, 13, 17	10, 12, 14, 15, 16, 18	12
Total	11	7	18

Based on Table 1, it can be seen that the items on the initial TAS scale consisted of 11 favorable items and 7 unfavorable items.

Indonesian Version of TAS Adaptation Procedure

In this study, an adaptation process was carried out on the TAS measuring instrument because it was still in English. The adaptation process was carried out through several stages. In the first stage, the researcher asked permission via email to use the teacher autonomy measuring instrument developed by Pearson and Hall (1993) to Marshall (2019) as one of the users of this measuring instrument for research purposes. The autonomy scale used is still in its original English format.

Translation. In the second stage, the researcher translated the teacher autonomy measuring instrument into Indonesian. In the next stage, the researcher conducted a process of testing the accuracy of the translation results as well as adjusting each item to the context of education in Indonesia from the supervisor and one educational practitioner with a background of involvement in the teaching and learning process at the junior high school level for more than 10 years. Researchers did not do back translation because from the beginning of the preparation of the scale, the supervisor was directly involved in reviewing each item so that differences in the meaning of each word in the scale could be minimized.

Expert Judgment. Furthermore, researchers conducted raters to test the content validity of the teacher autonomy scale by expert judgment with the aim of ensuring aspects of relevance and aspects of clarity. Researchers asked for the willingness of a team of experts (expert judgment) to check the suitability of the scale content with the constructs measured on the teacher autonomy scale. The expert team consisted of 9 panelists with the criteria of having competence in the field of Psychology, and preferably being able to understand the construct under study and its indicators. In addition, experts (expert judgment) also provide suggestions for improvement (evaluation) of statement items.

Readability Test. The readability test was given to 8 junior high school teachers who had the same criteria as the research subjects. This readability test was carried out for the entire questionnaire (identity, scale, and open questions), to find out whether the measuring instrument was understood by the subject who was the target of measuring the scale or not, so that it was in the context of junior high school teachers. From the results of the readability test, all teachers claimed to have no difficulty and could understand what was meant by the entire contents of the questionnaire. Furthermore, the questionnaire was prepared in google form and paper-based version and used to collect pilot test data.

Data Analysis Technique
This research uses AMOS software for Structural Equation Model-Confirmatory Factor Analysis (SEM CFA) analysis Indicators that show the fit or not of the measuring instrument are indicated by the Goodness-of-fit (GOF) value. This index provides the most basic indication of how well the proposed theory fits the data. Included in this category are the Chi-Squared test, p, GFI, AGFI, RMSEA, RMR, CFI, TLI, and NFI.

RESULT

Results of Confirmatory Factor Analysis (CFA) of Teacher Autonomy Scale (TAS)
The results of testing the measurement model of the teacher autonomy scale without making any modifications resulted in calculations that showed the measurement model was not fit with a GFI index of 0.709 (cut off ≥ 0.90), AGFI 0.623 (cut off ≥ 0.90), RMSEA 0.135 (cut off ≤ 0.08), CFI 0.717 (cut off ≥ 0.90), TLI 0.674 (cut off ≥ 0.90), NFI 0.661 (cut off ≥ 0.90). The measurement model results are shown in the following figure.
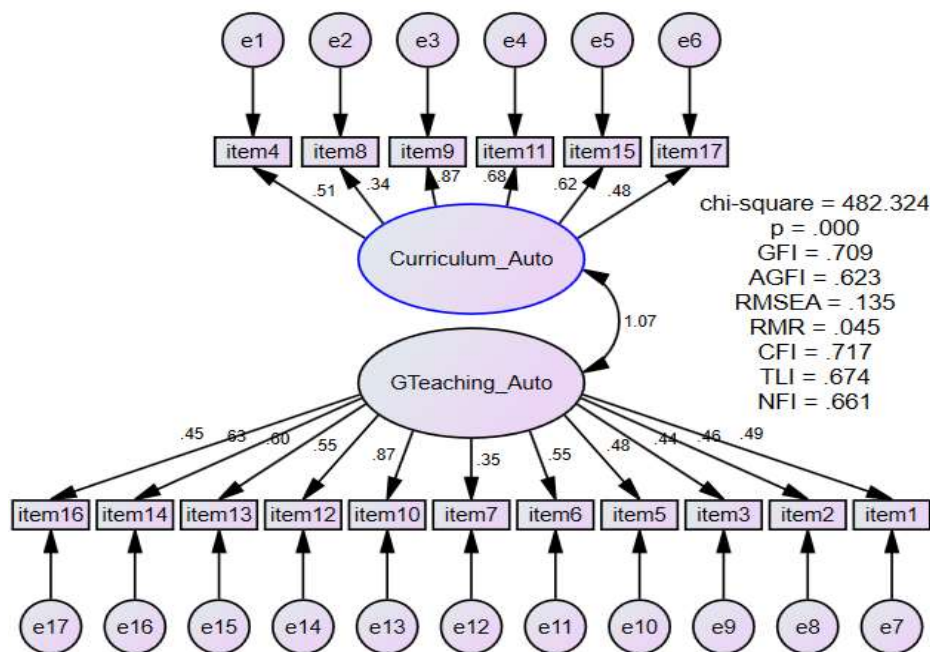

Figure 1. *CFA results of teacher autonomy scale.*

After several modification actions (4 modifications) following the suggestion of modification indices, the results of the autonomy scale measurement model are more fit although still lacking fit with Goodness of Fit Index (GFI) = 0.847; RMSEA = 0.077; RMR = 0.030; Comparative et al. (CFI) = 0.858; Tucker-Lewis Index (TLI) = 0.797 and Normo Fit Index (NFI) = 0.805) meaning that a model is said to be fit if the value of CFI, TLI, NFI shows a cut-off value> 0.90 and RMSEA ≤ 0.08.The results of the CFA analysis above show that there are 5 indexes of fit (GFI, RMSEA, RMR, CFI, and NFI) that have met the fit on the model criteria, both good fit and marginal fit. The following is a picture of the results of the measurement model carried out. The following presents the results of the calculation of factor loading of all items of the teacher autonomy scale in the table below.
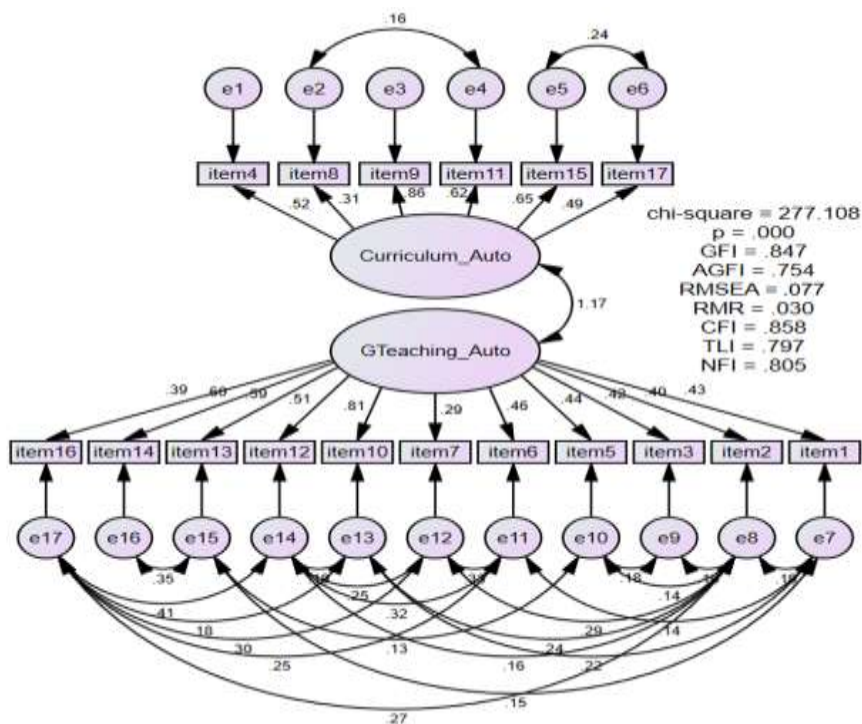

Figure 2. CFA results of teacher autonomy scale after modification.

Table 2
Factor Loading of Teacher Autonomy Scale Items

Item Number	Factor Loading	Description
Curriculum Autonomy		
4	0.522	Items functioning well
8	0.314	Weakly functioning items
9	0.860	Items functioning well
11	0.623	Items functioning well
15	0.647	Items functioning well
17	0.492	Items functioning well
General Teaching Autonomy		
16	0.394	Items functioning well
14	0.604	Items functioning well
13	0.589	Items functioning well
12	0.508	Items functioning well
10	0.814	Items functioning well

Item Number	Factor Loading	Description
7	0.294	Weakly functioning items
6	0.461	Items functioning well
5	0.437	Items functioning well
3	0.418	Items functioning well
2	0.404	Items functioning well
1	0.431	Items functioning well

The CFA results on the teacher autonomy scale show that the valid items in the curriculum autonomy dimension are items 4,9,11,15,17 with a range of FL values of 0.492 to 0.860. There is one item that is declared invalid, namely item 8 with FL 0.314. In the general teaching autonomy dimension, the valid items are 1,2,3,5,6,10,12,13,14,16 with an FL value range of 0.404 to 0.814. There is one item that is declared invalid, namely item 7 with an FL value of 0.294.

Table 3
Teacher Autonomy Scale FL Summary

No	Dimension	Valid Item	Total	FL Range	Dropped items	Total	FL Range
1	Curriculum Autonomy	4, 9, 11, 15, 17	5	0.492-0.860	8	1	0.314
2	General Teaching Autonomy	1, 2, 3, 5, 6, 10, 13, 14, 16	10	0.404-0.814	7	1	0.294
	Total		15			2	

On the teacher autonomy scale of 17 statement items, there are 2 items that are declared canceled because the FL value is below 0.4. The fallen items are listed in the table below.

Table 4
Description of Teacher Autonomy Scale Failed Items

Dimension	No.	Item
Curriculum Autonomy	8	In teaching, I am involved in developing the syllabus/ATP (Alur Tujuan Pembelajaran).
General Teaching Autonomy	7	I do not understand the time scheduling system in class

Reliability Test Results
The reliability test is used to test whether the research instrument can show its ability to measure without error and whether the results are always consistent. even though it is used by other people or in other places to measure the same thing (Sugiyono, 2007). The reliability test in this study was carried out by looking at the composite reliability (or it can also be called construct reliability abbreviated as CR) and to ensure the CR also looked at the value of discriminant reliability (AVE-average variance extracted) in SEM using the Excel application. A research instrument is declared reliable if the limit value of the acceptable level of reliability is construct reliability greater than or equal to 0.7 and the AVE value is greater than or equal to 0.5 (Ghozali, 2014). CR and AVE calculations are presented in the table below.

Table 5
Calculation Results of CR and AVE of Teacher Autonomy Scale

Item	Loading	Loading^2	Error	AVE	AVE Root	CR
4	0.522	0.272484	0.212	0.544	0.737	0.944
9	0.86	0.7396	0.079			
11	0.623	0.388129	0.241			
15	0.647	0.418609	0.158			
17	0.492	0.242064	0.206			
1	0.431	0.185761	0.246			
2	0.404	0.163216	0.623			
3	0.418	0.174724	0.247			
5	0.437	0.190969	0.236			
6	0.461	0.212521	0.307			
10	0.814	0.662596	0.101			
12	0.508	0.258064	0.371			
13	0.589	0.346921	0.19			
14	0.604	0.364816	0.182			
16	0.394	0.155236	0.606			
Total	8.204	4.776	4.005			

Based on the calculation results in the table above, it can be concluded that the CR value of teacher autonomy above is fulfilled because it has a value greater than or equal to 0.7, namely 0.944. Likewise, the AVE value on teacher autonomy is fulfilled, with a value of 0.544.

DISCUSSION

Given that teachers are crucial actors in the education improvement reform process, it is important to examine how teachers assess their autonomy. The purpose of this measurement was to establish the factor structure of the TAS. The importance of this study stems from the fact that the concept of teacher autonomy has not been thoroughly researched in our country, and the TAS has not been validated. The structure of the instrument consists of 2 factors with 18 items, according to the recommendations of the first authors, Pearson and Hall (1993) which were further validated by Marshall (2019). The first factor is called Curriculum Autonomy, and it includes autonomy in selecting teaching activities and materials as well as autonomy related to planning and programming teaching content (Pearson & Moomaw, 2006). The second factor is related to general teaching autonomy, which includes the decision-making freedom that teachers have in the classroom, according to the two-factor structure obtained in the original version (Pearson & Moomaw, 2006). By using expert judgment on this teacher autonomy scale, the number of items from 18 to 17 was reduced, but still following the two-factor solution described here. This was more due to cultural differences and hence the reduction of 1 item that was feared to be poorly understood and led to different interpretations in the junior high school setting.

What is obtained through our research from the results of CFA analysis shows that after several modification actions (4 modifications) following the suggestion of modification indices, the results of the autonomy scale measurement model are more fit although still lacking fit with Goodness of Fit Index (GFI) = 0.847; RMSEA = 0.077; RMR = 0.030; Comparative et al. (CFI) = 0.858; Tucker-Lewis Index (TLI) = 0.797 and Normo Fit Index (NFI) = 0.805) meaning that a

model can be said to be fit if the value of CFI, TLI, NFI shows a cut-of value> 0.90 and RMSEA ≤ 0.08. In addition, it is said to be a marginal fit if the cut-off value is 0.80 ≤ CFI, TLI, and NFI ≤ 0.90. There are 5 indices of fit (GFI, RMSEA, RMR, CFI, and NFI) that have met the fit on the model criteria, both good fit and marginal fit. So, judging from the RMSEA value that has been fit, it shows that Curriculum Autonomy and General Teaching Autonomy can jointly act as antecedent variables to junior secondary school Teacher Autonomy. This shows that the Curriculum Autonomy and General Teaching Autonomy factors are accepted and appropriate in our country, perhaps they can be adjusted in the future.

In testing the reliability of the teacher autonomy instrument, the coefficient value of the research instrument is> 0.7, so the Indonesian version of the teacher autonomy instrument is reliable. The psychometric properties of the teacher autonomy measuring instrument show that the Teacher Autonomy scale shows that out of 17 items, there are 15 valid items and 2 items that are canceled because they have a factor loading coefficient ≥ 0.4 (Hair et al., 2014). Aitem number 7 and aitem number 8, which were canceled, had factor loading coefficients with FL values of 0.294 and 0.314, respectively. These failed items made the researcher think why did this happen? Whereas in other studies there is no failure in loading factors (Marshal (2019). Cultural factors are the only possible reason, and researchers will make revisions or improvements to the failed items so that they can be reused because researchers consider the existence of teacher authority in regulating the use of teaching time in the classroom in the general teaching dimension. So item number 7, which reads "I lack understanding of the time scheduling system in class," becomes "I lack freedom in managing the use of time in class".

A further consideration is that this scale is also declared reliable because it has a CR coefficient of 0.944. The acquisition of discriminant validity indicates the extent to which the constructs on the teacher autonomy scale are truly unique and different from other constructs. The report on the results of the teacher autonomy scale reliability test qualifies as a scale that can be said to be reliable/reliable because it has a CR value greater than or equal to 0.7, namely 0.944. Likewise, the AVE value on teacher autonomy is fulfilled, with a value of 0.544.

In addition to cultural differences as well as normative foundations in the educational process, and consequently, teachers' frameworks also clearly differ across countries. The results of the TAS study conducted among Korean English teachers (Marshall, 2019) showed a clear two-factor scale structure, which corresponded with the results of the initial study (Pearson & Moomaw, 2006) as well as the results of the final study, as well as the results of the Serbian study. The same TAS scale was applied to the target population of 411 teachers from all Cluster Schools in Malaysia and the results (Varatharaj et al., 2015) also showed a two-factor structure. Possible limitations in analyzing teacher autonomy can be found in the research methodology itself; therefore, a combination of qualitative research and interviews would provide a more complex picture of the autonomy structure, as seen from a recent study involving a sample of Turkish teachers (Yolcu & Akar-Vural, 2021) and this was also conducted by the researcher. In addition, expanding the target population would be significant, but also to teachers working in diverse cultural and educational contexts and at various levels of education, using the newly proposed research model.

CONCLUSION

The conclusion of this study is that the Indonesian version of the teacher autonomy scale is a psychometrically reliable and trustworthy measuring instrument and can be used for female junior

high school teacher subjects. Teacher autonomy consists of two factors, namely curriculum autonomy and general teaching autonomy, which together can act as antecedent variables to teacher autonomy in junior high school teachers.

The importance of teacher autonomy appears in its contribution to the professional and personal aspects of a teacher's life and work (Malčić et al., 2023). Being an autonomous teacher means that teachers can self-evaluate, plan, implement, and evaluate actions in the school setting (Malčić et., 2023), so in job satisfaction and retention too (Worth & Van den Brande, 2020). The results obtained in this study can be important for all education stakeholders; teachers, principals, and policy makers. Future suggestions for the significance of generalizing the results of how teachers assess their own autonomy would be to expand the scope of the study to other levels of education (e.g., early childhood teachers, primary schools, high schools, and universities).

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