

Selecting Teachers in Indonesia: Predicting Teacher Performance using Pre-Employment Information

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IRSA - 13 July 2021

INDONESIA'S EDUCATION REFORMS HAVE YET TO ADDRESS LEARNING CRISIS

The results of the **2018** Program for International Student Assessment (**PISA**) show that Indonesian students' **reading scores** are at the **lowest** point during PISA since 2000. Students with low basic **Mathematics competence** (below Level 2 on the PISA scale) are 71.9 percent – rank 7 the **lowest** of 77 countries surveyed.

The Government of **Indonesia** assessed the subject knowledge and pedagogical skills of nearly three million **teachers** with a **competency test** in 2015 and found that the teachers **scored** significantly **below the passing threshold**.

Source: Rosser (2018)

Studies of RISE programme in Indonesia show the causes of low teacher quality

The teacher recruitment system lacks a mechanism to ensure quality

Source: Huang et al. (2020)



The teacher in-service training has not been effective

Source: Revina et al. (2020)



SELECTION OF INDIVIDUALS WHO WILL BECOME TEACHERS IS A POTENTIAL WAY TO IMPROVE THE POOL OF TEACHERS



Teacher selection is necessary to identify effective and motivated teachers who may improve learning outcomes.

Identifying teachers with such potential is relatively more cost-effective than other policies applied after the teachers have teaching jobs

Source: Klassen and Kim (2019); Hobson et al. (2010)

STUDIES ON TEACHER SELECTION

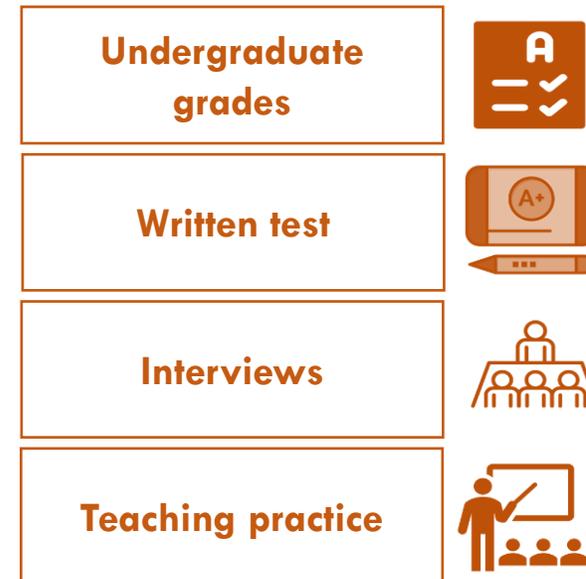
Many studies focus on selecting teachers based on the **information collected at the time of hire** to predict student outcomes

(Jacob et al., 2018; Hill et al., 2012; Staiger and Rockoff, 2010).

Other studies identify potentially effective teachers even before they become teachers. Those studies use **information from teacher education programme admission criteria** to predict teacher candidates' success in the programme

(Heinz, 2013; Casey and Child, 2011; Caskey et al., 2001).

The information or criteria used to select teachers that can predict their subsequent performance include:



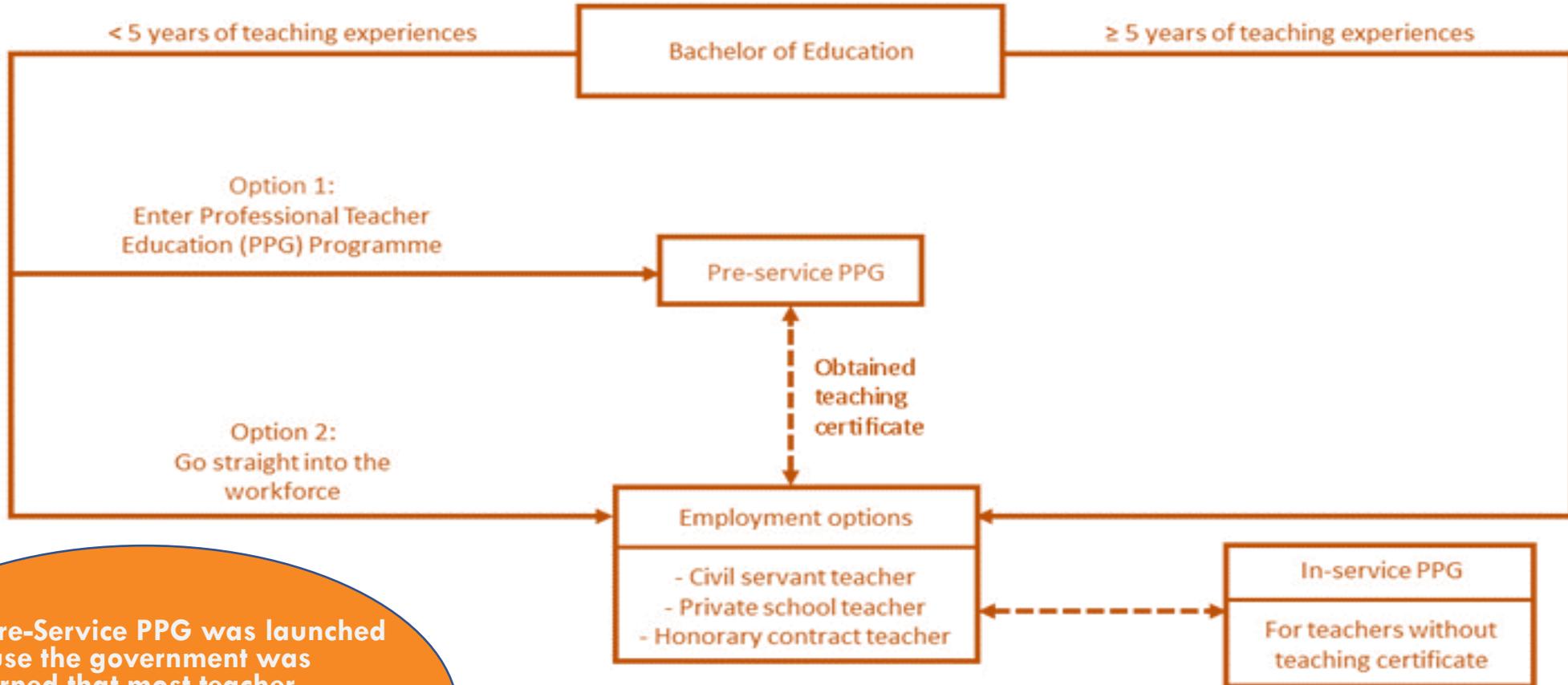
STUDIES ON TEACHER SELECTION IN DEVELOPING COUNTRIES ARE SCANTY



We examine whether teacher candidates' screening tests into Pendidikan Profesi Guru (PPG) or Teacher Professional Education, a postgraduate education programme in Indonesia, can predict their performance at the end of the programme and in a real classroom situation at the beginning of their teaching career.

The PPG Programme

Pathways to PPG and Teaching



The Pre-Service PPG was launched because the government was concerned that most teacher colleges were producing subpar graduates

Source: Direktorat Jenderal Pembelajaran dan Kemahasiswaan (2018)

Selection and exit procedure of the Pre-Service PPG programme

Selection

1. **Administrative requirements:**
 - less than five years of teaching experience
 - undergraduate degree with a minimum GPA of 3.0 out of 4.0 from an accredited university
 - younger than 31 years old
 - single and committed to remain unmarried until completion of the programme
2. **Online Tests:**
 - academic aptitude
 - English skill, and
 - Pedagogical knowledge

Overall online tests score (weighted)
3. **Interview**



One-year of PPG Program

1. In-class workshops
2. Internships (*Praktik Pengalaman Lapangan /PPL*)

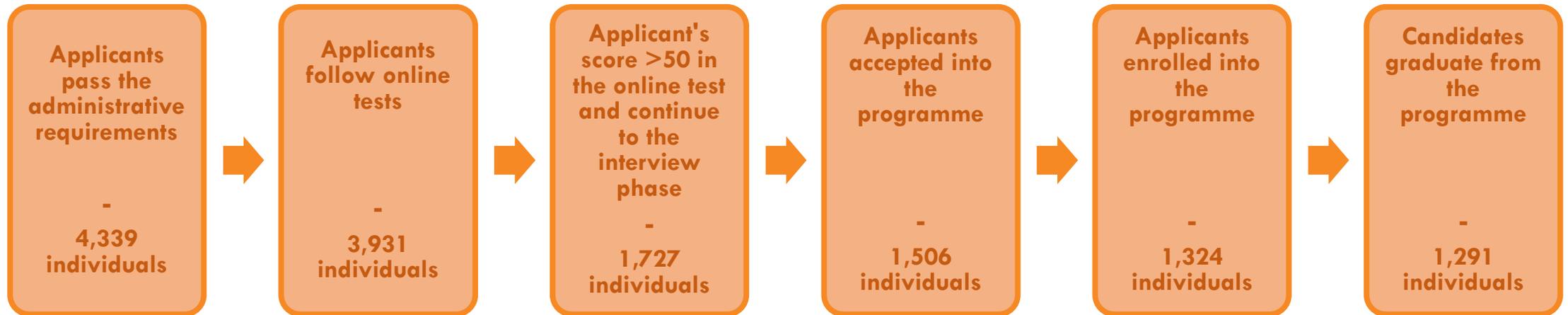


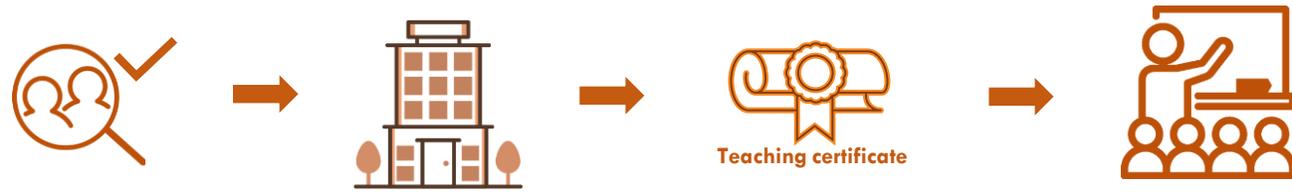
Exit Examination

1. knowledge test (*Uji Pengetahuan*)
2. teaching practice test (*Uji Kinerja*)

Data and Methodology

The Pre-service PPG Programme for Primary School Teacher





Datasets	Brief Description of Data	Number of Observations	Number of Universities
Admission and Exit examination scores data	<p>Data includes</p> <ul style="list-style-type: none"> • applicants' undergraduate university, undergraduate GPA, online test scores (academic aptitude test, English test, pedagogical knowledge test), and interview score. • knowledge test score, performance test score, and passing status. 	1,291 teacher candidates	29
Survey data on teacher candidates in seven universities	Data includes teacher candidates' characteristics, such as their motivation to join the PPG programme, their teaching experience before joining the PPG programme, their parents' education attainment, and whether they have close relatives who work as teachers or principals.	363 teacher candidates	7
Student learning outcomes and classroom observation after six months of being a homeroom teacher in the 2019/2020 academic year	<p>At the student level, the data includes student learning scores in numeracy and literacy tests taken at one time. There is also information on gender, age, and whether the students take private lessons or not.</p> <p>At the teacher level, the classroom observation data includes the frequency of teaching practices in one-time lessons.</p>	32 homeroom teachers graduated from PPG and 820 students taught by the teachers	5**

Tools for measuring teacher performance

Student Learning Assessment (SLA)

- CERMAT by Rarasati et al. (2020)



Numeracy



Literacy

Classroom Observation

- CERDAS by Yusrina and Bima (2020)



	Proportion of Teaching Practices
a.	Whole-class setting
b.	Group work setting
c.	Seatwork setting
d.	Teacher uses learning media
e.	Teacher is making connections between lessons
f.	Teacher asks open-ended questions

Notes: Aspects a+b+c should add up to 1 of the total observation intervals. The gap between 1 and (a+b+c) means a proportion of instructional time used by the teacher to transition between class settings.



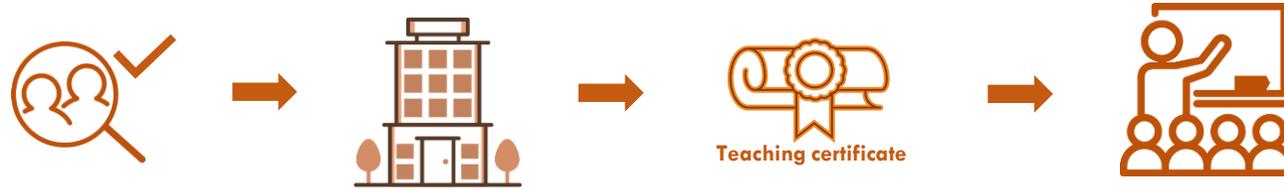
$$Y_i = \alpha_0 + \beta \cdot S_i + \gamma \cdot X_i + \varepsilon_i \quad (1)$$

Y : the exit examination scores of teacher candidates i

S : a vector of undergraduate GPA, online test scores and interview score

X : a vector of covariates

ε : an error term



$$Z_{si} = \alpha_0 + \beta_1 \cdot S_i + \gamma_1 \cdot X_i + \gamma_2 \cdot W_{si} + \gamma_3 \cdot \bar{Z}_i + \varepsilon_i \quad (2)$$

$$Z_{si} = \alpha_0 + \beta_1 \cdot S_i + \varepsilon_i \quad (3)$$

Z : the learning outcome in numeracy and literacy of student s of teacher i

S : either the admission criteria or the exit examination scores of teacher i

X : teacher-level controls

W : student level controls

\bar{Z} : the classroom average learning score of the students and school quality index

Z : the proportion of instructional time of specific teaching aspects of teacher i ,

S : either the admission criteria or the exit examination scores of teacher i

Results

Regression Results between Admission Criteria and Exit Examination

	(1)	(2)	(3)	(4)	(5)	(6)
	Standardized Score on Knowledge Test			Standardized Score on Teaching Practice Test		
Standardised Score on Academic Aptitude Test	0.22 ^{***} (0.03)	0.18 ^{***} (0.03)		0.01 (0.03)	0.04 (0.02)	
Standardised Score on English Test	0.08 ^{***} (0.03)	0.06 ^{**} (0.03)		0.00 (0.03)	0.01 (0.02)	
Standardised Score on Pedagogical Knowledge Test	0.29 ^{***} (0.03)	0.24 ^{***} (0.03)		-0.03 (0.03)	0.01 (0.02)	
Standardised Overall Online Test Score			0.30 ^{***} (0.03)			0.04 (0.03)
Standardised Interview Score	0.06 ^{**} (0.02)	0.02 (0.03)	0.03 (0.03)	0.10 ^{***} (0.03)	0.07 ^{***} (0.03)	0.07 ^{***} (0.03)
Standardized Undergraduate GPA		0.15 ^{***} (0.03)	0.17 ^{***} (0.03)		0.07 ^{***} (0.02)	0.06 ^{***} (0.02)
Constant	-0.00 (0.03)	0.41 ^{**} (0.21)	0.42 ^{**} (0.21)	-0.00 (0.03)	0.42 ^{***} (0.15)	0.43 ^{***} (0.15)
LPTKs dummy	No	Yes	Yes	No	Yes	Yes
Observations	1291	1291	1291	1291	1291	1291
R ²	0.16	0.32	0.30	0.01	0.53	0.53

- The overall online test score predicts a candidate's success in the knowledge test, whereas the interview only predicts their success in the teaching practice test.
- The undergraduate GPA predicts the performance of a teacher candidate on both exit exams.

Using dataset of 363 teachers We include other variables as controls such as:

- Age
- Gender
- Candidates' motivation: Joined PPG to improve teaching competencies
- Teaching experience prior to PPG
- Parent's education attainment
- Family member with teaching job

but it does not alter the significance of the findings

Note: Standard errors in parentheses and robust. Note that GPA of the selected students ranges between 3 and 4 and we standardized within this group of 1291 individuals. * $p < .10$, ** $p < .05$, *** $p < .01$

Regression Results on Admission Criteria, Exit Examination Results, and Student Numeracy Skills

	(1)	(2)	(3)	(4)
	Standardised Score on Numeracy	Standardised Score on Numeracy	Standardised Score on Numeracy	Standardised Score on Numeracy
Standardised Score on Academic Aptitude Test	0.009 (0.022)	0.012 (0.027)		
Standardised Score on English Test	0.004 (0.010)	0.007 (0.016)		
Standardised Score on Pedagogical Knowledge Test	0.004 (0.009)	0.004 (0.009)		
Standardised Overall Online Test Score			0.017 (0.038)	
Standardised Interview Score	0.005 (0.012)	0.006 (0.013)	0.008 (0.019)	
Standardized Undergraduate GPA		0.004 (0.009)	0.002 (0.004)	
Standardised Score on Knowledge Test				-0.000 (0.002)
Standardised Score on Teaching Practice Test				0.002 (0.006)
Student's gender (1=female)	0.016 (0.087)	0.016 (0.087)	0.016 (0.087)	0.016 (0.087)
Student takes a private lesson	0.032 (0.076)	0.033 (0.078)	0.032 (0.076)	0.031 (0.075)
School quality index	0.000 (0.001)	0.000 (0.001)	0.000 (0.001)	0.001 (0.002)
Classroom average score in Numeracy	0.099*** (0.002)	0.099*** (0.002)	0.099*** (0.003)	0.099*** (0.003)
Constant	-4.984*** (0.068)	-5.069*** (0.154)	-5.020*** (0.059)	-4.955*** (0.121)
Grade dummy	Yes	Yes	Yes	Yes
Observations	778	778	778	773
R ²	0.121	0.121	0.121	0.121
Adjusted R ²	0.106	0.105	0.107	0.108

Note: Number of observations is 778 because some schools do not have data on the school quality index. Standard errors in parentheses and clustered at the teacher level. * $p < .10$, ** $p < .05$, *** $p < .01$

Regression Results on Admission Criteria, Exit Examination Results, and Student Literacy Skills

	(1)	(2)	(3)	(4)
	Standardised Score on Literacy	Standardised Score on Literacy	Standardised Score on Literacy	Standardised Score on Literacy
Standardised Score on Academic Aptitude Test	0.050 (0.038)	0.055 (0.043)		
Standardised Score on English Test	0.009 (0.017)	0.012 (0.021)		
Standardised Score on Pedagogical Knowledge Test	0.002 (0.017)	0.002 (0.018)		
Standardised Overall Online Test Score			0.047 (0.062)	
Standardised Interview Score	-0.005 (0.049)	-0.007 (0.045)	-0.001 (0.055)	
Standardized Undergraduate GPA		0.004 (0.012)	-0.001 (0.007)	
Standardised Score on Knowledge Test				-0.004 (0.007)
Standardised Score on Teaching Practice Test				0.012 (0.007)
Student's gender (1=female)	0.330*** (0.060)	0.330*** (0.060)	0.329*** (0.059)	0.329*** (0.059)
Student takes a private lesson	-0.041 (0.074)	-0.040 (0.076)	-0.039 (0.073)	-0.039 (0.072)
School quality index	-0.004 (0.004)	-0.005 (0.005)	-0.005 (0.005)	0.000 (0.004)
Classroom average score in Bahasa	0.099*** (0.002)	0.099*** (0.002)	0.099*** (0.002)	0.099*** (0.001)
Constant	-5.134*** (0.149)	-5.218*** (0.315)	-5.137*** (0.199)	-5.129*** (0.074)
Grade dummy	Yes	Yes	Yes	Yes
Observations	778	778	778	778
R ²	0.201	0.201	0.201	0.201
Adjusted R ²	0.187	0.186	0.188	0.189

Standard errors in parentheses and clustered at the teacher level. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Regression Results of Admission Criteria Results on Teaching Aspects in Classroom Observation

	(1) Proportion of whole-class setting	(2) Proportion of group work setting	(3) Proportion of seatwork setting
Admission criteria			
Standardised score on overall online test	0.259 (0.247)	-0.555 (0.328)	-0.254 (0.262)
Standardised interview score	-0.232 (0.340)	0.038 (0.236)	0.155 (0.317)
Undergraduate GPA	0.007 (0.046)	0.059 (0.054)	-0.012 (0.043)
Constant	0.309 (0.903)	-0.683 (1.045)	0.506 (0.912)
Observations	32	32	32
R ²	0.041	0.139	0.036
Adjusted R ²	-0.062	0.046	-0.068

Standard errors in parentheses and clustered at the teacher level. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

	(4) Proportion of using learning media	(5) Proportion of making connection between lessons	(6) Proportion of asking open-ended question
Admission criteria			
Standardised score on overall online test	-0.126 (0.343)	0.158** (0.055)	-0.155 (0.223)
Standardised interview score	-0.238 (0.382)	0.037 (0.057)	0.528* (0.214)
Undergraduate GPA	-0.089 (0.294)	0.033 (0.045)	-0.170 (0.158)
Constant	0.883 (1.137)	-0.268 (0.239)	0.164 (0.709)
Observations	32	32	32
R ²	0.033	0.179	0.172
Adjusted R ²	-0.071	0.091	0.083

Standard errors in parentheses and clustered at the teacher level. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Regression Results of Exit Examination Results on Teaching Aspects in Classroom Observation

	(7) Proportion of whole-class setting	(8) Proportion of group work setting	(9) Proportion of seatwork setting
Exit examination score			
Standardised Score on Knowledge Test	-0.013 (0.050)	-0.070 (0.051)	-0.007 (0.051)
Standardised Score on Teaching Practice Test	0.021 (0.046)	-0.004 (0.054)	-0.042 (0.048)
Constant	0.331*** (0.050)	0.146* (0.063)	0.313*** (0.056)
Observations	32	32	32
R^2	0.008	0.060	0.037
Adjusted R^2	-0.061	-0.005	-0.030

Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

	(10) Proportion of using learning media	(11) Proportion of making connection between lessons	(12) Proportion of asking open-ended question
Exit examination score			
Standardised Score on Knowledge Test	0.012 (0.050)	0.035* (0.015)	0.034 (0.039)
Standardised Score on Teaching Practice Test	-0.058 (0.064)	0.000 (0.009)	0.073* (0.027)
Constant	0.187* (0.070)	0.026** (0.009)	0.078* (0.030)
Observations	32	32	32
R^2	0.062	0.225	0.220
Adjusted R^2	-0.003	0.171	0.166

Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Conclusions

While admission criteria are associated with success in the PPG programme, we find no correlation between those measures and teacher's performance in the classroom

Predicting teacher performance in the real classroom setting based on the pre-employment information (the PPG admission criteria) is difficult.



Tests can be improved to correlate with student learning outcomes, or a different selection method can be used to select teachers.

This study highlights the need for further research on the teachers' selection criteria that predicts teacher performance in real classroom settings

Thank You

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Stats	Overall online test score	Interview score	Knowledge test score	Teaching practice score
mean	56.94	88.46	82.37	87.49
sd	4.89	7.21	4.18	4.12
min	50.01	60.00	69.95	74.02
max	80.32	100.00	94.70	99.71

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