



Measurement and Comparison of Reader Self-Perceptions of Teacher Board Passers and Non-passers: An Application of Factor Analysis and Rasch Model

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Abstract - – *The Reader Self-perception Scale (RSPS) is used to measure one's reading self-efficacy. Although, the instrument was originally intended for young learners, this study showed evidence of the appropriateness of the constructs measured by items. Using factor analysis, it was found that the observational comparison (OC) and social feedback (SF) constructs represent the same construct for older readers. Furthermore, using Rasch model analysis, few items in the RSPS were found to be needing review for possible improvement of the instrument for use in measurement of reader self-efficacy among adult readers. The RSPS scores of the licensure examinees showed significant mean differences between the passers and non-passers. It is assumed that this difference can potentially be used to predict future board performance by using their reader self-perception as prior information and without directly assessing their reading comprehension skills.*

Keywords – *reader self-perception, reading, self-efficacy, predictor*

I. INTRODUCTION

In the Philippines, teacher board exams are critical evaluations that have the authority to influence the education sector by establishing the standards and qualifications of future teachers. Conducted with the oversight of the Professional Regulation Commission (PRC), the Licensure Examination for Teachers (LET) is an important requirement for those who want to start a career in teaching particularly those seeking permanent teaching positions in public schools. By conducting this type of board exam, a benchmark is established for candidates' competence, confirming their understanding, abilities, and preparedness to address the complex obstacles present in various educational settings.

The reading ability of preservice teachers is a potential predictor of performance in LET, given the substantial number of items on reading comprehension within the assessments, particularly in professional education part of test. Aspiring educators should be able to correctly respond to situational questions encompassing educational theories, pedagogical methodologies, and curriculum frameworks, and a good reading comprehension skill is required to pass this part of the test. Previous studies have demonstrated a significant correlation between reading comprehension skills and performance in licensure examinations among preservice teachers, highlighting the predictive validity of reading ability (Bansiong & Balagtey, 2020; Amanonce & Maramag, 2020). Thus, the assessment of preservice teachers' reading competencies can be considered as an important focus in the management of teacher education programs, serving not only as indicators of academic preparedness but also as an area that necessitates curricular attention.

The utilization of indirect measures of reading comprehension, such as the assessment of reader self-perceptions, underscores a pragmatic approach to gauging preservice teachers' proficiency in

understanding situational questions in the LET. While traditional reading comprehension tests serve as direct assessments of individuals' ability to comprehend written passages, they often necessitate considerable time and effort to administer, conduct grading, and interpret. In contrast, self-perception measures offer a more efficient alternative, providing insights into individuals' beliefs, attitudes, and perceptions regarding their own reading abilities. Studies by Marsh et al. (2009) and Wigfield & Guthrie (1997) have demonstrated the utility of self-perception measures in capturing individuals' subjective assessments of their reading competencies, offering valuable insights into their motivation, engagement with text, and self-efficacy beliefs. By employing self-perception measures as indirect indicators of reading comprehension, educators and researchers can glean valuable information about individuals' perceived strengths and areas for improvement in reading, facilitating targeted interventions. However, this study found limited studies on the use of reader self-perceptions as measures in indirectly assessing preservice teachers' reading abilities.

In this research, we utilized self-perception as a construct that may be related to reading comprehension skill. Four factors were employed to gauge the self-perception of student readers, namely progress, observational comparison, social feedback, and physiological state. This approach is based on RSPS 2 (Henk, Marinak, & Melnick, 2012), a revised version of the RSPS (Reader Self-Perception Scale) commonly used to assess the perceptions of elementary-level students from grades 4 through 6. It serves as a valuable tool for assessment, instruction, and research, offering a comprehensive evaluation of both individual and group reading perceptions.

The study focused on the assessment of the reader self-perceptions of secondary preservice teachers. Although the RSPS was developed using a target population of young learners, we intend to provide evidence that the reader self-perception scale could be used even for older student populations like preservice teachers.

Objectives

The main objective of this study was to assess the validity of RSPS in older student populations and how it can be used to characterize different groups of LET takers. The specific objectives of the study are as follows:

- To assess the appropriateness of the reader self-perception scale for a sample of preservice teachers or teacher education graduates using Rasch model and factor analysis;
- To measure the reader self-perception of the graduates; and
- To compare the mean reader self-perception scores of BSEd passers and non-passers.

II. MATERIALS AND METHODS

Research Design

This validation study employs a two-phase evaluative design to assess the psychometric properties of the Reading Self-Perception Scale (RSPS) among preservice teachers who took the Licensure Examination for Teachers (LET). Psychometric properties refer to the instrument's ability to measure a specific construct (reading self-perception) reliably and validly.

Phase 1 rigorously evaluated the psychometric properties of the RSPS within the context of preservice teachers who have taken the LET. This phase includes Exploratory Factor Analysis (EFA) to examine the underlying factor structure of the RSPS and assess whether it aligns with the theorized dimensions of reading self-perception originally extracted from the responses of young learners. Additionally, Rasch model analysis was used to investigate how well the individual item's function and if the scale effectively differentiates between various levels of reading self-perception among preservice teachers. The outcome of Phase 1 was used to determine if the RSPS demonstrates the necessary validity and reliability to

confidently compare reading self-perceptions among LET takers in Phase 2.

Phase 2 focused on the validated RSPS from Phase 1 to investigate potential differences in reading self-perceptions between distinct groups of LET takers. This phase employed comparative analyses to examine whether LET performance (pass/fail) correlate with variations in reading self-perception scores. The findings of Phase 2 could shed light on how self-perceived reading abilities might differ between subgroups of preservice teachers' board exam performance, potentially offering insights to support tailored reading instruction or professional development.

Participants and Instrumentation

The researchers used the RSPS2, an instrument for assessing the reader self-perceptions of the students (Henk, Marinak, & Melnick, 2012). This was validated for Filipino college graduate samples comprising 163 Bachelor in Secondary Education (BSEd) students in a state college in Masbate, Philippines. The scale consists of 47 items that address self-perceptions according to four dimensions of self-efficacy (Progress, Observational Comparison, Social Feedback and Physiological State). Items on Progress requires students to compare past and present performance, whereas Observational Comparison items ask students to think about how their performances match with those of classmates. Items representing Social Feedback address students' perceptions of the input they receive about their readings from teachers, parents, and peers. Lastly, Physiological States items require about how reading makes students feel internally. These four sources of information have an effect on one another. Students are instructed to indicate how strongly they agree or disagree with each statement using the five-point Likert scale ranging from Strongly Agree (5) to Strongly Disagree (1). The reliability coefficient of the RSPS2 was found to be 0.921.

Table 1. Table of Specifications

Factors	Item Number
Progress	2,3,7,9,18,19,21,24,31,33,35,38, 39,41,45,47
Observational Comparison	5,10,12,13,15,20,27,37,43
Social Feedback	4,8,11,16,28,29,36,40,46
Physiological States	1,6,14,17,22,23,26, 30,32,34,42,44

Scale: 5- Strongly Agree(SA); 4-Agree(A); 3-Undecided(U); 2- Disagree(D); 1-Strongly Disagree(SA)

Data Analysis

Since the ultimate aim of this study is to compare the reader self-perception of the LET passers and non-passers, data cleaning was used to remove from the list those students with unknown LET performance. Only those with confirmed status as either "passed" or "failed" were included in the analysis. Hence, the number of confirmed LET performances was 114 out of 163 students. However, in factor analysis the complete list was used in the analysis.

To determine the appropriateness of the RSPS to college students, factor analysis and Rasch model analysis were performed for test-level and item-level analyses, respectively. The responses of the BSEd graduates in all the items were analyzed using the exploratory factor analysis in SPSS and the Partial Credit Model (PCM) implemented in *eRm* package in *R* (Mair & Hatzinger, 2007). The factor analysis determined if the constructs used in measuring reader self-perception among young readers also apply to older readers like college graduates. On the other hand, Rasch analysis identified misfit items that are contributing to the errors in measurement. Rasch Outfit and Infit mean square (MSQ) statistics were used to detect misfitting items (e.g., Infit/Outfit MSQ < 0.7 or > 1.3; Bond & Fox, 2013).

The original objective of this study was to correlate the RSPS scores and the LET ratings of the BSED graduates. But due to the unavailability of the LET ratings due to data privacy concerns, the data used was the LET performance categorized as “passed” and “failed”. Hence, mean comparison was conducted to determine if the RSPS mean scores of the passers and non-passers are equal. To determine if there is a difference between the reader self-perception mean scores of passers and non-passers, an independent samples *t*-test was performed after testing for the parametric assumptions for normality using Q-Q plots and equality of variances using Levene’s test.

III. RESULTS AND DISCUSSION

Appropriateness of the RSPS to College Students

Test level analysis. The results obtained from the exploratory factor analysis have provided valuable insights into the structure of student reader self-perception. This analysis revealed the existence of four distinct factors within this domain, shedding light on the underlying dimensions of this construct. After applying varimax rotation, the items comprising these factors exhibited robust and substantial loadings, underscoring the stability and reliability of the factor solution.

The first factor that emerged from this analysis was particularly intriguing as it encapsulated a combination of two distinct facets: observational comparison (OC) and social feedback (SF). This interesting finding suggests that among college students, the aspects of observational comparison and social feedback appear to be interconnected and converge into a unified construct. This stands in contrast to the characteristics observed among younger readers, where OC and SF are distinct and separate constructs. This intriguing distinction underscores the maturation and nuanced self-perception processes that evolve as students transition to the college level and the influence of various personal factors (Wigfield & Asher, 1996).

The second factor identified in the analysis pertained to the concept of progress (PR). It encompasses items related to how college students perceive their own progress in reading. The third factor, psychological states (PS), highlights the role of emotional and psychological factors in shaping students' self-perception regarding their reading abilities. These factors provide deeper insights into the emotional and psychological aspects of students' reading experiences.

Although the fourth factor had fewer items with high loadings, it is notable that the constructs of these items were found to align closely with the progress (PR) category. This suggests that even within this limited subset of items, the underlying theme revolves around students' perceptions of their progress in reading.

Table 2. Factor Loadings of RSPS Items after Varimax Rotation

Item	Factor				Item	Factor			
	1	2	3	4		1	2	3	4
PS1	-.014	-.014	.575	.041	PR24	.385	.295	.105	.182
PR2	.069	.070	.216	.606	PS25	.107	.205	.723	.264
PR3	.251	.318	.048	.543	OC26	.739	.079	.100	-.114
SF4	.542	.178	.046	.332	SF27	.155	.158	-.078	-.148
OC5	.285	.324	-.119	.378	SF28	.688	.264	.135	-.017
PS6	.165	.038	.581	.359	PS29	.067	.479	.611	-.108
PR7	.383	.222	-.138	.054	PR30	.111	.753	.177	.092
SF8	.612	.027	.139	.276	PS31	.109	.487	.652	-.018

Item	Factor				Item	Factor			
	1	2	3	4		1	2	3	4
PR9	.162	.384	.283	.594	PR32	.269	.556	.385	.018
OC10	.691	.083	.147	.175	PS33	.100	.404	.662	-.120
SF11	.733	.100	.059	.267	PR34	.174	.574	.124	.000
OC12	.729	-.001	.031	.174	SF35	.757	.160	.140	-.050
OC13	.740	.038	.063	-.022	OC36	.740	.234	.097	.127
PS14	.108	.088	.593	.257	PR37	.227	.672	.330	.167
OC15	.677	.125	.165	.102	PR38	.257	.696	.245	.146
SF16	.475	.119	.105	.044	SF39	.657	.356	.177	.074
PS17	.353	.216	.641	.174	PR40	.170	.654	.080	.226
PR18	.170	.412	.262	.585	PS41	.189	.644	.257	.049
PR19	.144	.643	-.067	.339	OC42	.641	.237	.188	-.002
OC20	.735	.261	.092	.006	PS43	.096	.512	.481	-.092
PR21	.123	.514	.300	.339	PR44	.188	.620	.243	.217
PS22	.158	.294	.696	.200	SF45	.561	.154	.129	.138
PS23	.293	.165	.453	.036	PR46	.271	.600	.220	.229

In summary, the exploratory factor analysis has not only delineated the structure of student reader self-perception but has also uncovered intriguing nuances in how these constructs manifest among college students. These findings contribute to a deeper understanding of how self-perception evolves with age and experience, offering valuable insights for educators and researchers working to enhance reading skills and self-efficacy among college students.

Item-level analysis. The analysis conducted at the item level yielded insightful findings. Rasch analysis revealed that three items in the RSPS fell outside the acceptable range for infit and outfit values, typically falling between 0.7 and 1.3. Among these items, Item 36, which pertains to the statement "*I know the meaning of more words than other students when I read*" in the context of the domain of Oral Comprehension (OC), exhibited an unusually low infit and outfit mean square value. Similarly, Item 39, which explores the statement "*My teachers think that I do a good job of interpreting what I read*" within the domain of Silent Fluency (SF), also displayed a very low infit/outfit mean square value. These two items, characterized by their predictability, did not align well with the Rasch measurement model, suggesting that they may not be suitable for accurately gauging the intended constructs.

Table 3. Outfit and infit mean square statistics of RSPS items

Item	Outfit MSQ	Infit MSQ	Item	Outfit MSQ	Infit MSQ
item13	1.274	1.205	item17	0.802	0.824
item12	1.034	1.035	item24	1.053	0.927
item35	0.876	0.872	item38	0.835	0.860
item20	1.020	1.033	item43	1.197	1.078
item8	1.043	1.046	item30	0.952	0.909
item36	0.656	0.675	item32	0.800	0.815
item11	0.824	0.799	item29	1.136	1.074
item26	1.042	1.073	item44	0.832	0.864
item39	0.568	0.587	item14	1.372	1.161
item10	0.940	0.932	item41	1.059	0.941

Item	Outfit MSQ	Infit MSQ	Item	Outfit MSQ	Infit MSQ
item28	0.908	0.895	item9	1.022	1.049
item7	0.917	0.929	item23	1.144	1.100
item4	1.084	1.052	item3	1.002	0.994
item15	1.001	1.000	item22	0.862	0.873
item42	0.921	0.903	item37	0.904	0.816
item16	1.355	1.349	item33	1.138	1.064
item27	1.065	1.052	item25	0.956	0.953
item45	1.027	1.045	item18	0.802	0.767
item5	0.765	0.743	item21	0.906	0.950
item34	1.266	1.270	item6	0.959	0.972
item46	0.778	0.813	item31	0.783	0.860
item40	0.972	0.986	item1	0.845	0.870
item19	1.035	1.048	item2	1.124	0.908

On the other hand, only one item, Item 16, related to the statement "*My teachers think that I try my best when I read*" within the domain of Silent Fluency (SF), exhibited notably high infit/outfit mean square values. This item revealed an unpredictability in the responses provided by students, indicating that it does not conform well to the Rasch model and may be considered a misfit within the assessment tool.

These findings underscore the importance of carefully examining and refining the items in the RSPS to ensure their alignment with the Rasch model, thereby enhancing the instrument's overall validity and reliability for measuring reader self-perception accurately.

Reader Self-perception Measures of BSEd Graduates

Using the complete list of BSEd graduates, the RSPS total scores were presented in a histogram whose distribution showed a bimodal center since larger proportions of the BSEd graduates had RSPS scores between 170 and 180 and between 190 and 210, with mean 184.82 (SD=18.33). But this type of distribution can be considered normal since the Q-Q plot resembles a straight line. The highest possible score is 235 and the lowest possible score is 47, with an expected median of 141. Hence, the mean score is about 43 points greater than the median, which means that the BSEd graduates have very satisfactory reader self-perception.

Reader Self-perception of LET Passers and Non-passers

After performing checks for person fit using Rasch analysis, only forty-seven BSEd graduates had infit/outfit mean square values that fall within the acceptable range (e.g., 0.7 to 1.3). Hence, the rest were excluded from the analysis since their responses were considered unpredictable or too predictable. The mean scores of these remaining BSEd graduates were analyzed using t-test for independent samples.

Table 4. Descriptive statistics for the RSPS scores LET passers and non-passers

Group	n	Mean	Std. Deviation	Std. Error Mean
Passer	33	127.7576	15.56444	2.70942
Non-passer	14	114.2857	15.90563	4.25096

Tests for normality using Q-Q plot and for equality of variance using Levene's test showed that the data met the assumption of the parametric t statistic. The Q-Q plot showed a nearly linear plot, and the null hypothesis for equal variances was accepted ($F = 0.078, p > 0.05$). The mean RSPS scores of LET passers is greater than the mean scores of non-passers; that is, 127.76 (SD=15.56) and 114.29 (SD=15.91), respectively. The mean comparison showed a significant difference ($t = 2.697, p < 0.01$). This means that the mean RSPS scores of passers and non-passers are different, with the passers as having better RSPS scores.

Table 5. Result of t -test comparing the RSPS mean scores of the passers and non-passers

t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
					Lower	Upper
2.697	45	0.01	13.47186	4.99602	3.40936	23.53436

The results of this study provide support for the relationship between reading self-perception, as measured by the RSPS, and performance on the Licensure Examination for Teachers (LET). Data analysis revealed significant differences in RSPS scores between LET passers and non-passers. Passers consistently demonstrated higher reading self-perception scores, indicating a potential link between positive self-beliefs about reading competency and success on this high-stakes examination.

These findings align with previous research by Rudio (2016), suggesting that reading skills hold predictive value for licensure performance. The current study strengthens this notion by specifically focusing on the role of reading self-perception. This suggests that how preservice teachers perceive their reading abilities might influence their approach to test preparation and performance on the LET's reading-related components.

While these results are promising, it is important to acknowledge limitations and considerations for interpreting the findings. Firstly, a correlational relationship does not imply causation. Other factors, such as general academic ability or test-taking strategies, could also contribute to both higher RSPS scores and successful LET performance. Further research using a longitudinal design would be valuable in isolating the predictive ability of reading self-perception specifically.

Despite limitations, this study offers valuable insights. It highlights the potential utility of the RSPS as a tool to help identify preservice teachers who might benefit from additional support in areas related to reading comprehension and analysis within the context of the LET. Pre-LET screenings using the RSPS could inform targeted interventions or specialized preparation strategies.

IV. CONCLUSION AND RECOMMENDATIONS

This study provides evidence supporting the use of the Reader Self-Perception Scale (RSPS) to assess reading self-efficacy among adult learners, specifically preservice teachers. While originally designed for younger students, our findings suggest the RSPS remains a valuable tool for this older population with some potential modifications. The observational comparison (OC) and social feedback (SF) constructs might be better represented as a single construct, and a review of certain items could further optimize the RSPS for measuring adult reading self-perception.

Furthermore, a significant difference in RSPS scores was observed between LET passers and non-passers. This finding suggests reading self-efficacy could be a factor influencing performance on this licensure exam. While further research is needed to explore the predictive power of the RSPS, it is possible that

assessing reading self-perception could help identify those who might benefit from additional support prior to taking the LET, thus increasing their chances of success.

Based on the results of this study, we recommend the following: 1) consider refining the RSPS for optimal use with adult learners, potentially combining the OC and SF constructs and revising items as needed; 2) incorporate the RSPS into pre-LET assessments to identify preservice teachers who might benefit from reading-focused support. This proactive approach could improve exam preparation and boost overall pass rates; and 3) offer targeted reading support to preservice teachers. This may involve workshops on reading strategies, comprehension skill-building activities, and strategies to boost reading confidence.

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