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Addressing the poor reading performance of Filipino learners: Beyond curricular and instructional interventions

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Summary of Policy Recommendations

- Beyond efforts to improve the curriculum and instruction, the Department of Education's and other stakeholders' interventions should address the negative psychosocial experiences of students in their schools.

- These interventions need to be contextualized and localized to the experiences of the learners both in their school and communities, instead of prescribing one-size-fits-all interventions.

- Localized school-based and community-based programs should address the improvement of social connectedness and cooperation among students in the schools to promote a climate of inclusiveness and foster a sense of belonging among learners.

- Parents, teachers, and other educational stakeholders should engage in programs to encourage the development of positive self-beliefs, stronger learning and achievement motivations, and higher educational and occupational aspirations.

- School-based teacher development programs should be developed to enable teachers to create classroom environments and instructional practices that nurture achievement motivations and positive learning self-beliefs in reading, particularly among children identified as likely to have low reading proficiency.

- The interactive web PISA Key Variable Visualization Tool (PISA-KVVT) application that was developed can be used to visualize and analyze variables-related risks from a regional perspective, which can be used to explore the specific scores related to the high impact variables across the different regions of the country.

In the 2018 Programme for International Student Assessment (PISA), 15-year old Filipino students ranked last in reading proficiency among all countries/territories, with only 19% meeting the minimum (Level 2) standard. It is important to understand the different factors that contribute to the low reading performance and proficiency of these students, specifically the interventions that may help address this learning problem. Based on the result of a study using machine learning approaches, specifically binary classification methods, to identify the variables that best predict low (Level 1b and lower) vs. higher (Level 1a or better) reading proficiency using the Philippine PISA data, 20 variables that discriminated low reading proficiency students were identified. The results reflect aspects of the students' psychosocial experiences at home, the classroom, and in the schools that relate to their poor reading proficiency. The results point to how interventions to address poor reading proficiency need to go beyond the curriculum and instructional interventions. What is needed are localized interventions that try to improve the psychosocial experiences of students in school, and that involve stakeholders from the local communities.

Analysis of PISA Reading Proficiency Data

Reading proficiency is considered an important competency for academic learning. High reading proficiency is especially important in the development of higher reading skills, where students need to access and process text information in different domains of learning in school (Kern & Friedman, 2009) and in other aspects of adult life (Coulombe et al., 2004). In the PISA 2018, around 80% of Filipino students who participated did not reach the minimum Level 2 of proficiency in reading (Organisation for Economic Co-operation and Development [OECD], 2018). This is because of various non-cognitive factors related to the Filipino learners' home backgrounds, learning beliefs and motivations, classroom and school experiences, to mention a few. Using the machine learning approach, the proposed model may guide policy and intervention decisions to improve the reading proficiency of our low reading performing learners.

The data from the Philippine sample in the OECD PISA 2018 database were used in the study. The data are publicly accessible at https://www.oecd.org/pisa/data/2018database/. The sample comprised 7,233 15-year-old Filipino students, selected using a two-stage stratified random selection system. Stratified sampling was used to select 187 schools from the country's 17 regions, and then students were randomly sampled from each school (Besa, 2019). The data were grouped into the low and high reading proficiency groups to determine which predictors or variables best discriminate between low and high-performing students. Low proficiency students are those with poor proficiency at reading levels 1b and below; high

proficiency students are those with better reading levels 1a and better. For the students' proficiency levels, we referred to the Plausible Value 1 (PV1READ) for the reading domain in the PISA dataset. The distribution of students based on their reading level and group are summarized in Figure 1.

Figure 1
Distribution of Reading Levels of Students (a) and the Distribution of Students per Proficiency Group (b)
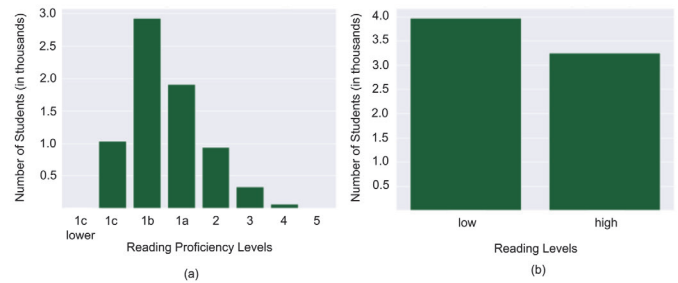
Note: Distribution in (b) shows that 55% and 45% of the students belonged to the low and high-performing groups, respectively.

Figure 2
Visualization Showing the Top 20 Important Variables in Descending Order
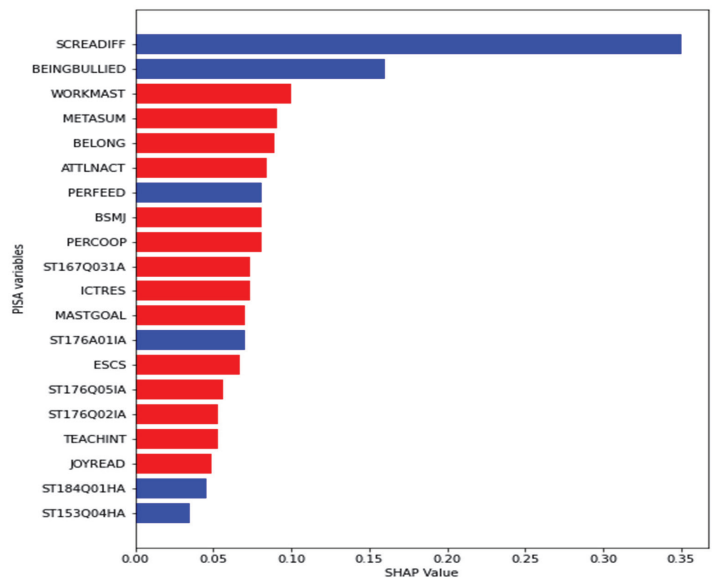
Using the SVM model for classifying low and high-performing students, the top 20 variables that are impactful to the prediction of student reading performance were identified and are shown in Figure 2. The x-axis shows the strength of the variable's influence in the prediction model. Blue colored variables tend to be higher for the low reading proficiency students, whereas red-colored variables tend to be lower for the low reading proficiency students. These non-cognitive variables characterize the beliefs, motivations, experiences, and resources that distinguish the Filipino readers with the lowest proficiency in reading

from the rest of the students. Using socioecological theoretical approaches on human development and learning (Bronfenbrenner, 2009), we identified three interrelated social environments or contexts that link together most of these variables (refer to Table 1) and strongly impact the student's poor reading performance. These contexts are: (a) the socioeconomic context of family/home, (b) the reading classroom context, and (c) the school's social context, and are briefly explained in Table 1.

Table 1

List of Selected PISA Variables That Identified the Important Variables in Discriminating Low and High Performing Students and Associated With the Identified Social Environments

Students' social environments	PISA variables associated with lower reading proficiency
Socioeconomic context of family/home	• ESCS: low economic, social, and cultural status of family • ICTRES: low ICT resources at home • ST176Q05IA: low use of online searches for learning • ST176Q02IA: low use of online chat for learning • WORKMAST: low persistence in mastering work tasks • MASTGOAL: low mastery learning goals • ATTLNACT: low value for schooling • BSMJ: low expected occupational status • ST184Q01HA: high fixed intelligence mindset
Reading classroom context	• PERFEED: high teacher feedback on poor performance • SCREADDIFF: high negative self-concept in reading • TEACHINT: low perceived teacher enthusiasm • JOYREAD: low enjoyment of reading • ST167Q03IA: low interest in reading fiction • METASUM: low metacognitive awareness of reading strategies
School's social context	• BELONG: low sense of belonging • BEINGBULLIED: high report of being bullied • PERCOOP: low perceived cooperation among students

First, low socioeconomic status (SES) is clearly associated with access to ICT at home, which limits the active engagement of students to learn. SES has also been shown to be associated with Filipino high school students' motivations, including mastery goals, valuing for schooling, a sense of purpose, and belief in the growth mindset. It can be gleaned that the disadvantaged socioeconomic environment of Filipino learners may influence their reading performance and academic success.

Secondly, the learners' experiences in the classroom and school involve teacher-related factors that may influence the students' sense of self. Teachers' feedback seems to aggravate the students' poor self-concept in reading and belief that their intelligence cannot be improved. Similarly, their lack of enthusiasm seems to reinforce the learners' lack of intrinsic motivation to read. Language teachers do not engage their learners to develop the skills needed for reading, which may explain why students do not develop metacognitive awareness of reading strategies.

Lastly, we found that the school social environment becomes a breeding ground for negative experiences that may affect the students' attitude towards learning and, more specifically, learning to read. Students with low reading proficiency are found to be socially disconnected from school, have a very low sense of belonging, perceive their fellow learners as unhelpful, and are frequently exposed to bullying. This feeling of social disconnection limits the influence of school as an important venue for learning where students can achieve their goals and where they can experience holistic development.

Conclusions and Recommendations

The analysis of PISA data using machine learning approaches identified 20 non-cognitive variables that discriminate the low reading proficiency of Filipino learners. The identified variables go beyond the usual targets of educational interventions such as curriculum, instruction, and learning resources. The proposed model can be applied in developing interventions that will address these variables. In particular, the interventions need to target the negative psychosocial experiences of students in school that are associated with lower reading proficiency. Moreover, as these experiences are embedded with the students' social environments, the interventions also need to be contextualized and localized instead of prescribing similar interventions across varied schools and communities.

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Details of the study can be read from: Bernardo, A.B.I.; Cordel, M.O.; Lucas, R.I.G.; Teves, J.M.M.; Yap, S.A., Chua, U.C. Using machine learning approaches to explore non-cognitive variables influencing reading proficiency in English among Filipino learners. *Education Sciences*. **2021**, *11*. (in press)