RESEARCH ARTICLE

Visual acuity demands of different language mediums in modern primary school classrooms in Malaysia [version 1; peer review: 1 approved, 1 approved with reservations]

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Abstract

Background: Good visual acuity is important for children's learning but the actual visual acuity (VA) demands of classrooms are not well defined.

Methods: In total, 61 classrooms from eight primary schools were included in this study. Classrooms were divided into lower and upper primary which reflect different stages of learning. Three types of national schools were included in the study, which were National, National Types Chinese (C) and Tamil (T). Each type of school utilizes different language as the medium of teaching. The measurements conducted in each classroom were: dimensions, maximum distance a student is seated and vertical height of the distance and near target. Near working distance of 28cm was assumed. Distance and near visual acuity demands (VA) were then calculated.

Results: The distance and near VA demands were 0.11 ± 0.26 logMAR and 0.24 ± 0.10 logMAR for lower primary, and 0.09 ± 0.20 logMAR and 0.24 ± 0.09 logMAR for upper primary classrooms respectively. Distance and near VA demands between both stages were not significantly different ($p > 0.05$). The distance and near VA demands for National schools were 0.24 ± 0.17 logMAR and 0.31 ± 0.04 logMAR, National Type (C) were 0.16 ± 0.11 logMAR and 0.13 ± 0.03 logMAR, National Type (T) were 0.09 ± 0.10 logMAR and 0.12 ± 0.03 logMAR respectively. There were significant differences for both distance and near VA demands between types of schools, $F(2, 58) 42.19$, $p = 0.00$; $F(2, 58) 208.35$, $p = 0.00$ respectively.

Conclusions: High levels of visual acuity for distance and near are required to meet the demands of modern classroom environments. Both National Types schools require higher VA demand compared to National schools. These findings suggest current vision screening protocols and cut off points for schools might require revision.

Keywords

visual acuity, demand, classroom

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Good vision has always been integral to proper education development in children^{1,2}. In Malaysia, students are required to spend at least 752 hours per year in school³. Varying visual tasks such as viewing whiteboards, near work (reading and writing), copying from a whiteboard to workbook, and computer based classes present varying visual demands on the visual system of a student. Eye screenings are often conducted in primary schools to detect students with visual problems, however, these screenings mainly measure distance visual acuity only³⁸. Students with uncorrected refractive errors are then referred to an eye care specialist for further assessment and management^{4,5}. However, there is a paucity of information and guidelines for referrals. Eye screenings often do not adhere to any official guidelines⁶⁻⁹. Most current vision screening protocols and reference criteria use 0.20 logMAR as the cut-off point for distance visual acuity^{4,35}. This could possibly lead to other visual issues being overlooked, such as hyperopia. Hyperopia causes symptoms such as difficulty in maintaining clear and comfortable vision when viewing at near distance, as well as headaches and visual fatigue following sustained near work³⁶. As children usually have high accommodation⁴³, they do not face difficulties when it comes to distance visual acuity. Hence, measuring distance visual acuity will not be sufficient in identifying refractive error^{37,38}. Therefore, there is an urgent need to properly understand the visual demands in classrooms, especially for primary school students. It has been reported that reduced vision impacts students negatively in terms of social skills, struggling with school tasks demands, and economic survival^{31,32}. Vision disorders in childhood may be carried into adulthood, thus affecting future education³³. Guidelines for proper screening protocols needs to be set in place to reduce the number of students with visual problems being overlooked as early detection will reduce the chances of the students' visual acuity impacting their educational success.

A literature search found that only 3 studies evaluating the visual demands in primary school students have been conducted. Table 1 illustrates the distance and near VA demand for each country included in these studies.

The Malaysian education system (Ministry of Education — MOE) for primary schools provides 3 different types of primary schools, which are MOE National Primary Schools, Private Institutions Primary Schools and Primary Schools in Institutions under Other Government Agencies. MOE National Primary Schools are chosen for this study as it has the highest level of enrolment compared to the other 2 institutions¹³, with 2,693,318 students enrolling in MOE National Primary Schools in 2018¹⁶. For the purpose of this study, the 3 schools chosen were the

National (Sekolah Kebangsaan), National Type (Chinese) (Sekolah Kebangsaan Cina) and National Type (Tamil) (Sekolah Kebangsaan Tamil) as these 3 schools are the top 3 nationwide in terms of enrolment. These schools use different languages for teaching; National schools use Malay as their primary language, which uses Latin letters as the medium of language, while National Type (C) uses Chinese (Mandarin) and National Type (T) uses Tamil¹⁴.

There are 2 stages of learning for MOE National Primary Schools, Stage 1 (Tahap 1) are for year 1, 2 and 3 (7 to 9 year olds), and Stage 2 (Tahap 2) are for year 4, 5 and 6¹⁵ (10 to 12 year olds). It is known that Stage 1 students spend fewer hours at school as compared to Stage 2 students, 752 hours and 800 hours each respectively¹⁷. While there is a difference in hours spent in school, MOE National Schools use the same textbooks for all subjects¹⁸. Although the same syllabuses are used, different languages are used for National Type schools, which are Mandarin and Tamil¹⁸. As previous studies only focused on Latin letters, this multicultural setting of using differing mediums of language for education could lead to differing VA demands.

Mandarin is used as the official medium of teaching for National Type (C) schools¹⁴. It is known to be a non-alphabetical language¹⁹. Chinese characters are either pictographs (single-body) or compounds of pictographs²⁰. Therefore, these do not always have the regularities of Latin letters²¹. A character may consist of 1 stroke, will others involve more than 60 strokes, leading to wide spatial complexities²².

Tamil is used as the official medium of teaching for National Type (T) schools²³. Tamil is one of the commonly spoken South Indian languages. Tamil script is syllabic, not alphabetic, thus are comprised of a variety of strokes, curves and dot patterns unlike Latin alphabets²⁴. Current Tamil script consists of 12 vowels, 18 consonants and one special character, the āyām.

The aim of this study was to (1) determine the distance and near visual acuity demands of Malaysian national primary school classrooms, (2) compare the visual acuity demands between Stage 1 and Stage 2 and (3) compare between different types of national schools.

Methods

This was a cross-sectional study conducted at schools located within Klang Valley from the month of January 2019 till April 2019. Three types of national schools were selected, namely the National, National Type (C) and National Type (T). A list of all

Table 1. Previous studies on visual acuity demand in classrooms.

Study	Distance VA demand (LogMAR)	Near VA demand (LogMAR)	Age range
Langford & Hug ¹⁰	0.35 ± 0.10 (6/13)	0.96 ± 0.34	5 – 11 years old
Narayanasamy <i>et al.</i> ¹¹	0.33 ± 0.13 (6/12)	0.72 ± 0.09	11 and 12 years old
Negiloni <i>et al.</i> ¹²	0.31 ± 0.17 (6/12)	0.83 ± 0.14	9 – 17 years old

the national schools located in Klang Valley was obtained from the Ministry of Education directory. Eight different schools were then selected from the list using the RANDBETWEEN function in Microsoft Excel 2010. Classes representing each year were also selected within each school using the RANDBETWEEN function in Excel from the list of all classrooms within each school. Year 6 student classrooms were excluded from this study as they usually stayed longer than other years. This is due to the preparation for the Primary School Achievement Test, which is a national examination taken by all students in Malaysia at the end of their sixth year in primary school before they leave for secondary school. All data was collected right after school ends.

The study was approved by the Malaysian Ministry of Education (Kementerian Pendidikan Malaysia) [reference: KPM.600-3/2/3-eras(2429)], the Education Department of the Federal Territory of Kuala Lumpur (Jabatan Pendidikan Wilayah Persekutuan Kuala Lumpur) [reference: JPNWP. 900-6/1/7 Jld 21(42)], and the UKM Ethics Committee (UKM PPI/111/8/JEP-2019-209). Written informed consent was obtained from each of the school principal prior to the study. As data collection was done after classes, there was no contact with the students. Hence, consent from students & parents were not required.

The distance VA demand in logMAR was calculated using the smallest vertical height of the teachers' writing on the whiteboard (measured using a millimetre scale) in each classroom and its furthest viewing distance (furthest student table from the whiteboard). Smartboards were not included as majority of the schools did not have such teaching tools. Due to the variability of the handwriting on the whiteboards, a minimum of 10 samples was measured in each classroom and the average was used for the demand calculation. As letter optotypes usually have a stroke width that is one fifth of the letter height, the critical detail of the smallest vertical height of the target was arbitrarily taken as one fifth of the target height³⁹. This means that the value of the vertical height of the target will be one fifth of its original height. An example is illustrated below:

A 10mm letter is viewed at a distance of 5m. The critical detail on a letter is arbitrarily taken as 1/5 of the letter height, which will be 2mm in this example³⁹ (Figure 1).

Figure 1. Diagram demonstrating the calculation of distance visual acuity (VA) demand in logMAR.

$$\tan \theta = 2/5000$$

$$\theta = 0.0229 \text{ degrees}$$

$$\begin{aligned} \text{Minimum angle of resolution (MAR)} &= \text{degrees} \times 60 \\ &= 0.0229 \times 60 \\ &= 1.375 \text{ minutes of arc} \\ &= 0.14 \text{ logMAR} \end{aligned}$$

Therefore, a 10mm target viewed at a distance of 5m corresponds to a threshold acuity demand of 0.14 logMAR.

The same method was adopted and used by Hug *et al.*¹⁰, Narayanasamy *et al.*¹¹ and Negiloni *et al.*¹². This calculation method was also used for the calculation of near visual acuity demand. For National schools, only the height of the smallest lowercase letter was measured, excluding the ascenders and descenders. For National Type (C), the height of the smallest stroke was measured as Chinese optotypes consists of variable numbers of strokes¹⁹. As for National Type (T), the smallest height for dots, curves or lines were measured as Tamil script consist of a mixture of these three attributes²⁴.

Similar method was used for calculating the near VA demand, using the smallest vertical height of near learning materials and the near working distance. As ethical restrictions prevented direct interaction with the children in the school classroom, a fixed near working distance of 28cm was used. This was obtained from a pilot study that was conducted on 30 students, aged 7 to 11 years old. Each student was given reading material of N5.0 in size and their viewing distance was measured. The mean viewing distance was calculated and used as a standard distance for near VA demand calculation in this study. Previous studies have reported that in children with normal vision, the near acuity reserve varies between 2.5:1 and 8:1^{25,42}. Visual acuity reserve, which is the ratio between habitual best corrected visual acuity and the acuity demand of the visual task⁴¹ is important in enabling comfortable and fluent reading especially during sustained near tasks⁴². Hence, a child's habitual near visual acuity needs to be at least 2.5 times greater than the minimum required demand for comfortable sustained performance. Using this guideline, the near VA demand values were then converted to actual near VA demands, which means that the value in logMAR will be even less.

Statistical analysis

All data was entered in Excel (Microsoft Office 2010) and statistical analysis was done using IBM Statistical Package for Social Sciences (SPSS) version 25. Descriptive analysis was performed for the distance and near visual acuity demand. Comparisons of visual acuity demands between Stage 1 and Stage 2 students and between types of schools were performed using Independent t-tests and One Way ANOVA respectively. A p-value of less than 0.05 was considered as statistically significant.

Results

A total of 61 classrooms from 8 schools were included in the study. All classrooms were rectangular in shape, using only whiteboards. There was great variation in terms of students'

desk arrangement in each classroom. The mean, standard deviation (SD) and range for the classroom dimensions (length x width), furthest table away from the whiteboard, smallest distant and near material size, distance and near VA demands for all the classrooms are presented in Table 2 (see underlying data⁴⁵ for values for each classroom).

One-Sample T-Test was conducted to compare VA demands between Stage 1 and Stage 2 students. Comparisons of VA demands between stages of learning are presented in Table 3. There was no significant difference between Stage 1 ($M = 0.11$, $SD = 0.26$; $M = 0.24$, $SD = 0.10$) and Stage 2 ($M = 0.09$, $SD = 0.21$; $M = 0.25$, $SD = 0.09$) for both distance and near VA demands; $t(59) = 0.34$, $p = 0.74$ and $t(59) = -0.33$, $p = 0.75$.

The mean of the distance and near demands for each type of school were compared and presented in Table 4. One way ANOVA

showed significant difference for both distance ($F(2, 58) = 42.19$, $p = 0.00$) and near ($F(2, 58) = 208.35$, $p = 0.00$) VA demands between schools. A Games-Howell post hoc test revealed that there was significant difference for distance VA demand between National (0.24 ± 0.17 logMAR, $p = 0.00$) and National Type (C) (-0.16 ± 0.11 logMAR, $p = 0.00$) schools, and between National and National Type (T) (-0.09 ± 0.10 logMAR, $p = 0.00$) schools. However, there was no significant difference in distance VA demand between National Type (C) and National Type (T) schools ($p = 0.353$). Similar results were reported for near VA demand. Post hoc test revealed there was a significant difference between National (0.31 ± 0.04 logMAR, $p = 0.00$) and National Type (C) (0.13 ± 0.03 logMAR, $p = 0.00$) schools, and between National and National Type (T) (0.12 ± 0.10 logMAR, $p = 0.00$) schools. No significant difference was reported between National Type (C) and National Type (T) schools ($p = 0.411$).

Table 2. Summary of the descriptive analysis for the dimensions, working distance, VA demands for distance and near.

Variables	Mean	SD	Range
Classroom dimension: Length (cm)	864.02	50.30	630.00 – 933.80
Classroom dimension: Width (cm)	737.06	21.46	650.00 – 761.30
Furthest table from whiteboard (cm)	675.77	8.53	400.00 – 762.70
Smallest distant material size (cm)	1.42	0.08	0.50 – 3.00
Smallest near material size (cm)	0.22	0.01	0.10 – 0.50
Distance VA demand (logMAR)	0.10	0.03	-0.56 – 0.52
Near VA demand (logMAR)	0.24	0.01	0.09 – 0.44

Table 3. Comparison of visual acuity demands for distance and near between stages of learning.

Variables		Mean (SD)	Range	p value
Distance VA demand (logMAR)	Stage 1	0.11 (0.26)	-0.56 – 0.52	0.74
	Stage 2	0.09 (0.21)	-0.29 – 0.42	
Near VA demand (logMAR)	Stage 1	0.24 (0.10)	0.09 – 0.34	0.75
	Stage 2	0.25 (0.09)	0.09 – 0.44	

Table 4. Comparison of distance and near visual acuity demands between types of schools.

Variables		Mean (SD)	Range	F (2, 58) (p values)
Distance VA demand (logMAR)	National	0.24 ± 0.17	-0.56 – 0.52	42.19 (0.00)
	National Type (C)	-0.16 ± 0.11	-0.30 – 0.04	
	National Type (T)	-0.09 ± 0.10	-0.26 – 0.08	
Near VA demand (logMAR)	National	0.31 ± 0.04	0.22 – 0.44	208.35 (0.00)
	National Type (C)	0.13 ± 0.03	0.09 – 0.16	
	National Type (T)	0.12 ± 0.10	0.09 – 0.16	

Discussion

This study may be the first of its kind to be done in Malaysia that evaluated the distance and near visual acuity demand for different types of national primary schools. According to the International Bureau of Education³, Malaysian primary school students spend around 80.00% to 81.25% of their weekly education in school that involves visually based tasks (education of core subjects).

Previous studies in the US reported an increase in distance VA demand with increasing grade level, from 0.70 to 1.18 logMAR for grades Kindergarten (5 years old) to 2 (7 years old), and 0.48 to 0.70 logMAR for grade 3 (8 years old) to 5 (10 years old)¹⁰. A similar study conducted in Australia showed that grade 5 and 6 students require 0.33 logMAR of distance VA demand¹¹. While another study in India reported distance VA demand of 0.35 logMAR for grades 4 to 8 and 0.24 logMAR for grades 9 to 12¹². However, there was no significant difference in distance VA demand between Stage 1 and Stage 2 students for this study, 0.11 ± 0.26 and 0.09 ± 0.21 logMAR respectively. This could be due to the teachers' handwriting on the board being similar in size regardless of grade level. As whiteboards were the most widespread teaching medium in national schools, teachers possibly adopted similar writing sizes to reduce any visual discomfort while the students view the whiteboard.

The distance VA demand for this study was 0.10 ± 0.03 logMAR. This showed that the VA demand for Malaysian primary school students to be slightly higher compared to other previous studies. This could be due to the fact that this study included Chinese and Tamil schools, both using their respective mother tongue as the language medium for teaching, while other studies focused on Latin characters^{10–12}. As previously mentioned, Chinese and Tamil characters tend to be more complex in nature as compared to Latin characters^{19,27}. For Chinese characters, the dot is one type of stroke that makes up a single body character. This character could be a single body character or a compound character that is made up of multiple parts²¹. As for Indian characters, the aspect ratio is more than Latin characters^{26,28}. This is due to Tamil characters having more curves, number of strokes, holes and sliding characters²⁹. Currently, no complete hand written text recognition is available for Tamil due to the large character set, presence of vowel modifiers and compound character³⁰. Hence, the smallest vertical height measured for both languages included the dots and strokes. This could possibly lead to the higher distance VA demand for such schools.

Near VA demand for this study was reported to be 0.24 ± 0.01 logMAR. Previous studies in the US, Australia and India reported 0.96 ± 0.34 logMAR, 0.72 ± 0.09 logMAR, and 0.83 ± 0.14 logMAR each respectively for near VA demand. Again, this study showed higher near VA demand compared to other studies and could be due to the inclusion of National Type (C) and National Type (T) schools. The smallest vertical stroke measured was as small as 0.10cm, with a mean of 0.22cm. This resulted in a higher near VA demand compared to previous studies. For comparison between stages of education, both Stage 1 and Stage 2 students had demands of 0.24 ± 0.10 logMAR and 0.25 ± 0.09 logMAR and no significant difference ($p = 0.75$) were

found between both stages. This could be due to similar writing sizes in students' workbook writings and printing as all schools use the same textbooks but with different languages¹⁸.

However, there is a significant difference when it comes to the comparison between National and National Type (C) schools and between National and National Type (T) schools. Differences in the smallest stroke size in their workbook could lead to the significant difference. As previously stated, both Chinese and Tamil characters are more complex compared to Latin character, consisting of dots, strokes and curves. Hence the smallest print size for National Type (C) schools were 0.10cm, with a mean of 0.13cm, for National Type (T) schools, it was also 0.10cm, with a mean of 0.16cm, National schools measured at 0.15cm, but with a mean of 0.26cm, which produced a lower near VA demand compared to the other 2 schools. But between National Type (C) and (T), there were no significant differences ($p = 0.411$) in terms of near VA demand. This could possibly be due to similar print size as stated previously.

This study is limited to only schools in urban areas, future studies should expand into suburban areas to observe the VA demand as compared to this study. Private institutions should also be included as different syllabus are taught in these schools, namely the British, American, Australian, Canadian and International Baccalaureate³⁴.

Conclusion

The distance and near VA demands for this study was reported to be 0.10 ± 0.03 logMAR and 0.24 ± 0.01 logMAR respectively. There was no significant difference of VA demands between stages of learning. However, National Type (C) and National Type (T) schools had significantly higher VA demands compared to National schools. However, there was no significant difference between National Type (C) and National Type (T) schools. Current vision screening protocols and reference criteria of using 0.20 logMAR as the cut-off point^{36,37} should be revised and updated. This is to ensure that children with possible refractive errors that may impact on their school performance are not excluded for further reference to primary eye care professionals.

Data availability

Underlying data

Harvard Dataverse: Visual acuity demands of different language medium modern primary school classrooms in Malaysia. <https://doi.org/10.7910/DVN/BDX8ZU>⁴⁴

This project contains the following underlying data:

- Research Data – F1000 final.tab (Collected data from classrooms and visual acuity demand)

Data are available under the terms of the [Creative Commons Zero “No rights reserved” data waiver](#) (CC0 1.0 Public domain dedication).

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Rachapalle Reddi Sudhir

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The article is well written and relevant in view of identifying the minimum visual acuity demand in schools. Previous articles in this subject used only English language. The need for measurement of minimum visual acuity demand for different languages and its influence is well highlighted in this article.

Very high demand in these schools compared to published literature is a surprise and the authors attribute it to language, any other factors need to be reviewed.

Use of white boards and the width of the stroke on white boards are smaller compare to blackboards which would be one of the other important factor apart from the language. There is no literature available on the comparison of white board vs black board or smart boards (computer based class rooms) and it is missing in this paper also.

Sample size justification is not provided why did they choose randomly 8 schools only.

Authors conclude the need for revision of cut off for vision screening, they could use the data and suggest what could be the ideal cut off based on the study results. A discussion on the same and the implications of reducing the cut off like adding more burden on school screening and more students need refraction need to be highlighted.

Is the work clearly and accurately presented and does it cite the current literature?

Yes

Is the study design appropriate and is the work technically sound?

Yes

Are sufficient details of methods and analysis provided to allow replication by others?

Yes

If applicable, is the statistical analysis and its interpretation appropriate?

Yes

Are all the source data underlying the results available to ensure full reproducibility?

Yes

Are the conclusions drawn adequately supported by the results?

Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Public health Ophthalmology, Big data, epidemiology , artificial intelligence, cornea and refractive surgery, clinical trials

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Reviewer Report 14 February 2020

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Helle Kristine Falkenberg

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Main findings:

The authors investigate the acuity demands of three different languages (Malay, Chinese, Tamil) for distance (handwriting) and near (printed) optotypes at two different school levels. Their results show that the acuity demand was approx. 0.1 logMAR for distance and 0.24 logMAR for near for both school levels, but they did find a significant difference between the different languages, where Chinese and Tamil had higher acuity demands for distance and near demands compared to Malay. They conclude that the acuity demand is higher than the common vision screening criteria, and that vision screening protocols should revise their cut off points.

Abstract:

The abstract is a fair description of the findings, and the conclusion is supported by the results.

“Good visual acuity is important for children’s learning but the actual visual acuity (VA) demand” Move the abbreviation VA to first mention start of sentence.

Distance and near visual acuity demands (VA) were then calculated. Remove (VA) or substitute visual acuity with VA before demand. VA is not the abbreviation for VA demands...

Detailed comments

The central question raised in this clinical paper is not novel or original, but is of general interest internationally and specific interest to readers using Chinese and Tamil language, and within the scope of f1000.

Introduction

The introduction covers relevant topics related to the study, but there are more citations that could be added in the first sentence *"Good vision has always been integral to proper education development in children"* (e.g. Quaid et al, 2013¹; Kulp et al, 2016², Basch et al 2011³) *"This could possibly lead to other visual issues being overlooked, such as hyperopia."* Is supported (e.g. Falkenberg et al., 2019⁴, Mayro, et al 2018⁵).

It is not evident the authors have performed a proper literature search, *"A literature search found ..."* as they do not mention any details of such a search (search words and combinations, databases...), I suggest re-writing to we have only identified 3 studies...

Methods and statistical analysis, and its interpretation appropriate?

The methods are well described and appropriate for the aim, there are some issues regarding the size of the sample sizes of the three schools –where there are 40 Malay (latin) classrooms, and only 10 of each Chinese and Tamil. Further, it would be useful to have all the raw data from each classroom, and not just the average for each classroom.

"The critical detail on a letter is arbitrarily taken as 1/5..." Remove arbitrarily –it is explained in the paragraph above.

The calculations could be tidied up by explaining MAR in the text. It should be earlier, as the term logMAR is introduced in the paragraph above the figure.

Statistics: When the sample sizes are so different between schools, it means that the one-way anova is not appropriate statistics.

Results

It is not clear that the VA demands for distance and near in table 2 is the overall mean for all three schooltypes – and this is problematic as the authors find a significant difference between the Malay and Chinese/Tamil schools both for distance and near. This means that for Malay (latin), the VA demand for distance really is 0.24, not 0.1 –this is on line significant difference in VA. For near VA is 0.3, a difference of approx. 2 lines. This means that for Malay schools, most pupils will probably have good enough vision – even taking into account the near VA reserve. I think it would add to the manuscript if the authors calculated and showed what the habitual near VA should be for comfortable near work for the three schools. (For Chinese and Tamil it is unlikely the children have the required VAs..., and most are probably working close to their VA thresholds) this should be elaborated.

There seems to be a significant difference between distance and near VA demands, even if there are no difference between stage 1 and 2. There is no need for a separate table 3, as this is stated

in the text. I suggest to remove.

The most interesting findings are the differences between type of schools, for both distance and near. However, there is a large difference in sample sizes, so authors should use more appropriate statistics for the analysis. Information that is in table 4 do not need to be repeated fully in the text.

Discussion:

The point that there is a different demand for distance and near should be included in the discussion. Further that there is significantly higher demands for the twenty Chinese and Tamil classrooms, compared to the 41 Malay classrooms for both distance and near VA.

"This could be due to similar writing sizes in students' workbook writings and printing as all schools use the same textbooks but with different languages". Is this relevant as the near VA demand was printed material? Rephrase.

Conclusion:

In my opinion, the authors should be careful to average the VA demands for distance and near across languages, as they clearly are different. The conclusion should reflect this, as the VA demands reported, are heavily influenced by the minority of the classrooms tested (the 20 Chinese/Tamil compared to the 41 Malay).

Tables:

Tables 1-3 could be adapted to fit in a column, and arranged more appropriately in the final version of the text for readability. significant differences should be marked in tables by e.g.*

Table 2: the VA demands should be taken out of the table, as this average do not reflect correctly the sample as it is the 20 Chinese/Tamil schools that pull the average down. This should also be commented in the results, as this is not really accurately representing the data.

Table 3: I suggest to remove as all information is stated in the text. If kept, the interesting thing is probably that there is a difference between distance and near –sig differences should be marked.

Table 4: This is the most interesting results, please redo statistics and mark out significant differences.

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Is the work clearly and accurately presented and does it cite the current literature?

Partly

Is the study design appropriate and is the work technically sound?

Yes

Are sufficient details of methods and analysis provided to allow replication by others?

Yes

If applicable, is the statistical analysis and its interpretation appropriate?

Partly

Are all the source data underlying the results available to ensure full reproducibility?

Yes

Are the conclusions drawn adequately supported by the results?

Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: vision science, optometry, knowledge translation

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

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