RESEARCH REPORT

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The Impact of IXL on Maths Learning in a Queensland School

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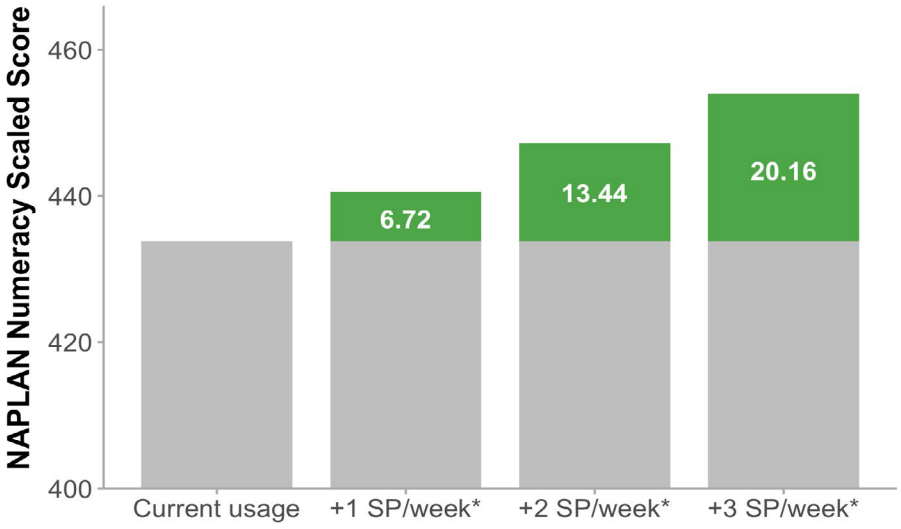
Executive Summary

IXL is an end-to-end teaching and learning solution that engages learners in Kindergarten (Pre-Prep) through Year 12 with a comprehensive curriculum and personalised recommendations for meeting learning goals. Previous research has shown that IXL can have a significant positive impact on students' academic performance (Bashkov, 2021; Copeland et al., 2023; Empirical Education, 2013).

The goal of this study was to examine the impact of IXL usage on numeracy achievement among Year 3 and Year 5 students in one school in Queensland, Australia, as measured by the National Assessment Program – Literacy and Numeracy (NAPLAN). Using a pretest-posttest design, we found[1]:

- **Higher IXL Maths usage was associated with better NAPLAN numeracy performance.** Students performed better on the NAPLAN assessment when they reached proficiency in more skills on IXL Maths.



[1] *Note.* In all figures, * indicates statistical significance at the $p < .05$ level. SP = skills proficient (i.e., SmartScore of 80+).

The Impact of IXL on Maths Learning in a Queensland School

Background

IXL is an end-to-end teaching and learning solution that engages learners in Kindergarten (Pre-Prep) through Year 12 with a comprehensive curriculum and personalised recommendations for meeting learning goals. IXL provides adaptive skill practice in both mathematics and English. As of this writing, IXL is used by more than 100,000 students in Australia. IXL is deeply rooted in learning science research (see Bashkov et al., 2021) and engages each student in a personalised learning experience tailored to their working level. As a result, students work through problems that are neither too easy nor too difficult, which in turn supports their self-efficacy and motivation for continued learning.

In numerous previous studies, including in an independent randomised control trial, IXL has been shown to benefit academic performance (An, 2023; Copeland et al., 2023; Empirical Education, 2013; Hargis, 2023; Schonberg, 2023). The goal of the present study was to examine the impact of IXL usage on maths achievement among students in Years 3 and 5 in one school in Queensland, Australia. Specifically, we examined the relationship between the amount of IXL Maths usage and student performance on the Australian National Assessment Program – Literacy and Numeracy (NAPLAN).

RESEARCH QUESTION
In this study, we aimed to answer the following research question:

- **Usage effects of IXL Maths:** Controlling for baseline performance and student year level, how did the amount of IXL Maths usage (i.e., skills proficient per week) relate to students' NAPLAN numeracy scores?

Study Design and Methodology

DATA SOURCES

Assessment and Demographic Data
The participating school in Queensland shared student-level 2021 and 2023 NAPLAN scaled scores in numeracy[2]. 2021 NAPLAN performance was used as the pretest to control for students' baseline performance in numeracy. Students' performance on the 2023 NAPLAN test served as the posttest in order to examine the impact of IXL. NAPLAN scaled scores range approximately from 0 to 1000. Students' average numeracy score in the original sample was 524.61 (*SD* = 128.66). For more information about the assessment, see the Australian Curriculum, Assessment and Reporting Authority's NAPLAN website.

[2] To address missing pretest data, multiple imputation was used via the mice package in R (R Core Team, 2022; van Buuren & Groothuis-Oudshoorn, 2011).

IXL Usage Data

IXL Maths usage data from the time period between pretest and posttest NAPLAN administrations (i.e., June 2021-April 2023) were obtained from IXL's database. We included data from students with any amount of IXL usage during this period, resulting in a sample of 101 students. When students use IXL, they complete practice problems organised within "skills," or specific topic areas within a subject. IXL uses a proprietary *SmartScore* to indicate a student's proficiency within a skill. The SmartScore ranges from 0-100 and increases as students answer questions correctly. However, it is not a percent correct score; a SmartScore of 100 is always possible. A SmartScore of 80 indicates proficiency in a skill, and a SmartScore of 100 indicates mastery. IXL recommends that students should aim to reach proficiency in at least two skills per week (SP/week; An et al., 2022). Students' average IXL Maths usage during the study period is presented in Table 1.

Table 1. Students' IXL Maths Usage (June 2021 – April 2023)

Weekly IXL usage	IXL Maths (*n* = 101)			
	M	*SD*	Min	Max
Time spent (in minutes)	22.52	29.48	1.19	190.04
Questions answered	71.10	90.00	3.87	533.58
Skills proficient	2.23	2.98	0.11	20.24

ANALYSIS

To assess the effect of using IXL Maths on students' NAPLAN numeracy scores, we specified and tested a linear regression model. Following What Works Clearinghouse (WWC) guidelines (WWC, 2022), this model regressed NAPLAN numeracy scaled score on the continuous IXL usage predictor (skills proficient per week) and dummy-coded student year level. Following WWC (2022) guidelines, each effect is accompanied by a test of statistical significance using a probability (*p*) value and a measure of effect size. The *p*-value is the probability of observing the current or more extreme data, assuming the effect is zero (Cohen, 1994). The smaller the *p*-value, the less likely it is that the result occurred at random, with *p*-values less than .05 considered statistically significant. For effect size, we report a standardised regression coefficient to gauge the practical significance of IXL usage in terms of relative predictive utility among the covariates.

Results

Controlling for baseline performance and year level, we found a positive, statistically significant effect of IXL Maths usage (as measured by SP/week) on NAPLAN numeracy performance (b = 6.72, p = .045, β = 0.20). That is, based on model coefficients and typical usage amounts, reaching proficiency in one additional IXL Maths skill per week is associated with roughly a 6.7-point increase in a student's NAPLAN numeracy scaled score (see Figure 1). Full model results are reported in Table A1 (Appendix).

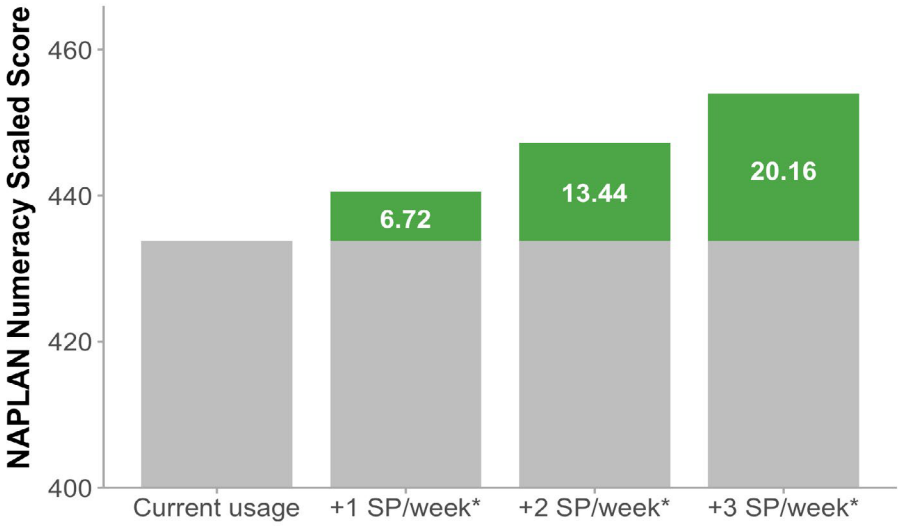


Figure 1. Expected usage effects of IXL Maths on NAPLAN numeracy scaled score
SP/week = skills proficient per week

Discussion and Recommendations

In this study, we investigated how IXL Maths usage among primary school students related to their performance on the NAPLAN numeracy assessment. Controlling for baseline performance and student year, we found that greater IXL usage was associated with larger performance gains. These results add to studies of thousands of students across multiple countries in which IXL has been shown to be a powerful solution that significantly benefits learning (e.g., An, 2023; Hargis, 2023; Schonberg, 2023; Xiong, 2022).

With its personalised guidance and Real-Time Diagnostic, IXL can play a key role in helping students and teachers close learning gaps. IXL recognises content areas where students may be struggling and engages them with material at the appropriate level. By meeting students where they are, IXL can help students "catch up" by providing support for relearning missed or forgotten material. This combination of personalised learning and remediation has been suggested as a highly effective approach for both recovering from pandemic-related learning loss as well as boosting subsequent learning gains (Kaffenberger, 2021).

To optimise students' personalised skill recommendations, we highly recommend that students regularly complete IXL's Real-Time Diagnostic, an interim assessment that pinpoints current knowledge levels in key strands of maths and English. The diagnostic integrates seamlessly with IXL's comprehensive curriculum: Upon completing the diagnostic, students receive personalised action plans based on their performance, providing them with a list of the exact skills they should practise next. With IXL's personalised support, students can confidently unlock their academic potential and fully prepare for every learning milestone along the way.

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Appendix

Table A1. Full Model Predicting 2023 NAPLAN Numeracy Scaled Score from IXL Maths Skills Proficient and Covariates

Predictor	*b*	*SE*	95% CI	β	*t*	*p*
(Intercept)	433.82	16.14	400.32 – 467.33	0.01	26.88	<.001
2021 NAPLAN Numeracy[1]	0.38	0.22	-0.13 – 0.90	0.29	1.72	.125
Grade: 5[2]	53.90	20.73	12.09 – 95.70	0.27	2.60	.027
IXL Maths: skills proficient	**6.72**	**3.30**	**0.14 – 13.30**	**0.20**	**2.04**	**.045**

Note. Dependent variable: 2023 NAPLAN numeracy score. *b* = unstandardised regression coefficient, *SE* = standard error, CI = confidence interval, β = standardised regression coefficient.
[1] Grand-mean centred. [2] Dummy coded; Grade 3 as reference group.