

Videos for Parents and Child Performance

Fiona M. Lee
Department of Psychology
University of Pennsylvania
Philadelphia, PA, USA
mcfiona@sas.upenn.edu

Ryan S. Baker
Graduate School of Education
University of Pennsylvania
Philadelphia, PA, USA
rybaker@upenn.edu

Pradip Singh Tomar
Humanitus Learning Sciences and
Consulting Services Pvt. Ltd.
Guragon, Haryana, India
pradip@humanitus.in

Krishna Kumari
NudgeD Trust
Chennai, Tamil Nadu, India
krishna@nudget.org.in

Qimu Liang
Graduate School of Education
University of Pennsylvania
Philadelphia, PA, USA
qimu@upenn.edu

Zhanlan Wei
Graduate School of Education
University of Pennsylvania
Philadelphia, PA, USA
zw2754@tc.columbia.edu

ABSTRACT

This paper investigates parental engagement with videos within the mobile app Top Parent in lower-income families in India, focusing on the relationship between parental engagement and students' learning progress. The app provides educational content in local languages for both parents and children (aged 3 to 8), aiming to improve foundational literacy and numeracy skills. Our analysis of data from 1,451 learners shows a positive link between parents watching educational videos and their children's academic performance and learning progress within the app. We also find that parents who watch videos have children who start the app with more initial knowledge than their peers. These results highlight the app's potential to support educational equity by engaging parents in their children's learning process.

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for components of this work owned by others than the author(s) must be honored. Abstracting with credit is permitted. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee. Request permissions from Permissions@acm.org.

L@S '24, July 18–20, 2024, Atlanta, GA, USA

© 2024 Copyright is held by the owner/author(s). Publication rights licensed to ACM. ACM 979-8-4007-0633-2/24/07... <https://doi.org/10.1145/3657604.3664678>

CCS CONCEPTS

• Human-centered computing; • Applied computing → Education; E-learning; Interactive learning environments;

KEYWORDS

Parental engagement, Early childhood education, Mobile learning platform, Gamification in education

ACM Reference format:

Fiona M. Lee, Ryan S. Baker, Pradip Singh Tomar, Krishna Kumari, Qimu Liang, Zhanlan Wei. 2024. Videos for Parents and Child Performance. In *Proceedings of the Eleventh ACM Conference on Learning @ Scale (L@S '24)*, July 18–20, 2024, Atlanta, GA, ACM, New York, NY, USA, 4 pages. <https://doi.org/10.1145/3657604.3664678>

1 Introduction

Parents and other caregivers play a vital role in early childhood education, and their involvement and engagement can profoundly impact students' educational outcomes across multiple dimensions [5]. Not just whether but how parents engage can impact the child's success [7]. Positive parental engagement can foster the growth of a child's autonomy in learning, motivation, attitudes towards learning, and academic outcomes [2, 15]. Activities such as shared book reading have been shown to produce increases in children's motivation and language growth, and reading achievement [4].

Parental engagement can be particularly important when a child does not have access to a high-quality preschool education. Many children, particularly in less wealthy countries and in rural regions do not have the same level of access to preschool education as those in urban and regional areas [17, 22]. Even when access is available, many parents cannot afford to send their children to preschool [23].

Over the past three decades, technological progress has considerably altered the landscape of teaching and learning methodologies [20], a transformation that extends into the realm of early childhood education as well [3]. While much of the rising utilization of learning apps during early childhood has been seen in wealthier countries [8], learning apps have become available worldwide, providing children with more resources to access knowledge, particularly in lower-income families in United States where the emergence of educational apps for mobile devices has increased access and learning opportunities [9].

However, the vast majority of these learning apps focus solely on the student, overlooking the potential involvement of parents in mobile learning, beyond perhaps notifying parents on progress. In this provision of learning apps, parents are predominantly seen as consumers who search out resources, rather than as active participants in the learning process itself [21]. Only a limited number of online educational platforms, like PBS KIDS, afford parents the opportunity to actively participate in their children's mathematical learning process [16]. The lack of support for parents reinforces existing trends, where parents with lower income levels and prior educational background tend to spend less time at home

with their children on homework and other educational activities compared to their higher income counterparts [10]. Early childhood is the most critical period for the impact of family economic conditions, and it appears that family income has a greater effect on educational attainment for children from low-income families than for those from high-income families [6]. In addition, many online educational platforms require high quality internet, which may be less available in the Global South, as well as in rural areas in wealthier countries [12, 14, 18]. Online learners situated in Asia, Asia, and Latin America tend to exhibit lower course performance and persistence, scoring significantly lower grades than students in Europe, Oceania, and North America [13]. This challenge is being addressed by a growing number of learning apps which work with low-bandwidth smartphones [11]. However, these apps typically focus only on learners.

In this paper, we investigate a learning app designed for lower-income families in India, providing learning activities both for children and to their parents. In specific, we investigate whether parental engagement in learning activities is associated with better learning by the child.

2 Platform

2.1 Top Parent V3

Top Parent is a free mobile learning platform that promotes parental engagement to support their young children in learning Math, English, and Hindi at home. Our interface is in the vernacular language for the local regions of use (Hindi and Marathi), with audio support for parents and children with low textual literacy. Top Parent has been tested on low end mobile devices and uses less than 3Mb storage so that all children can learn anywhere, anytime. The app deploys multimedia content (mapped to the National Curriculum), livestreaming and gamification to provide accelerated learning that is level and competency based, personalized, and scaffolded, with demonstrated evidence for positive learning outcomes [25]. When using the platform, students first take a computerized adaptive pre-test for placement, and then receive videos (for both children and parents) and online gamified worksheets (for the child to complete).

Top Parent is designed for children aged 3 to 8 years old, and provides educational materials aligned with Pre-Primary through Grade 3 levels, so that children can receive content appropriate to their developmental stage and grade level. The majority of our users are low-income and low-literacy populations in rural India, semi-urban outskirts, and large cities—our primary target audiences. Our app has been downloaded 947,976 times across all versions.

2.2 Computerized Adaptive Pre-Test

A student using Top Parent V3 first completes a computerized adaptive pre-test [24], to accurately assess the child's skill level. Any child receives a maximum of 9 items, and all items are multiple-choice, to minimize the time spent by the student before receiving learning content. When students start the pre-assessment, they answer questions designed for their age. They start at a middle difficulty for their age, and then receive harder or easier items based on their performance. If they repeatedly obtain either correct or

incorrect performance, the system provides them with items intended for older or younger children to optimally place them within Top Parent's multi-year curriculum. A child can be placed at different levels for different content areas. Items are chosen for inclusion in the test based on data on past difficulty (using ELO [19]) as well as curricular progressions and teacher perspectives. Following the pre-test, the system selects content for each competency based on the child's performance, selecting content within their Zone of Proximal Development (ZPD) [1].

2.3 Videos: Parent, Student

Videos are provided within Top Parent for both children and their parents. Within any given week of content, the same content is taught in the videos and activities for both children and parents. The child-facing videos provide children with content in bite-sized (3 to 4 minutes in length) contextually and linguistically relevant videos designed to directly address the gaps in children's emergent and foundational literacy and numeracy.

In addition, videos are provided to parents and caregivers with resources, language, and strategies to support their child's learning journey. Provided in both Hindi and Marathi, with audio support wherever possible (for parents with low literacy), two types of parent videos are provided. First, "view and do" videos contain Math, English, or Hindi content and parents are given a model (activities) for working on these topics with their child. These activities are designed to support children in learning content while strengthening relationships between caregivers and children. Second, there are also videos to provide knowledge and information about a broader range of early childhood domain areas, including social and emotional learning, nutrition, well-being, and more.

2.4 Worksheets

Age-appropriate content is delivered through engaging activities and colorful, gamified worksheets. These worksheets are structured to support the development of foundational literacy and numeracy skills. All worksheets are supported by audio to ensure accessibility for children who are not yet proficient readers. Worksheets give automated feedback for each answer, providing textual feedback for incorrect answers where appropriate. Students can attempt a worksheet multiple times. In addition, a family quiz and a reward system uses gamification to incentivise app use and engagement.

3 Analyses and Discussion

3.1 Sample

We analysed data from initial usage of a new version of the platform (V3), released July 1, 2023, for the first three months of the new platform's availability. There were 17,501 students who ever logged into the Top Parent platform during the study period. Of them, 1,451 students completed the pre-assessment and started at least one worksheet and one child OR parent video; we focus on these learners in our analysis. Among this sample, 837 accounts watched at least one child-facing video, and 924 accounts watched at least one parent-facing video. On average, each account within this sample completed 37.83 worksheets, 6.61 parent-facing videos, and 3.46 child-facing videos. The average correctness on worksheets across all 1,451 students was 80.58%, in line with our goal difficulty level.

3.2 Analysing Performance

We first separated students into three groups by their initial placement on the pre-assessment: learning loss, on level, and accelerated. After completing the pre-assessment, students in the learning loss group were placed more than 0.25 grade levels below their stated grade level. Students in the accelerated group were placed more than 0.25 grade levels above their grade level. The remaining students were placed in the on level group. This each student’s initial placement before they proceeded to worksheets.

Then we investigated the video watching behaviors of both parents and students within each group. We find that the parents of students at different levels of initial placement watch different proportions of videos on average, $F(2, 2671) = 27.46, p < .001$. The parents of the students in the learning loss group watched the fewest parent-facing videos, whereas the accelerated group watched the most parent-facing videos (Figure 1).

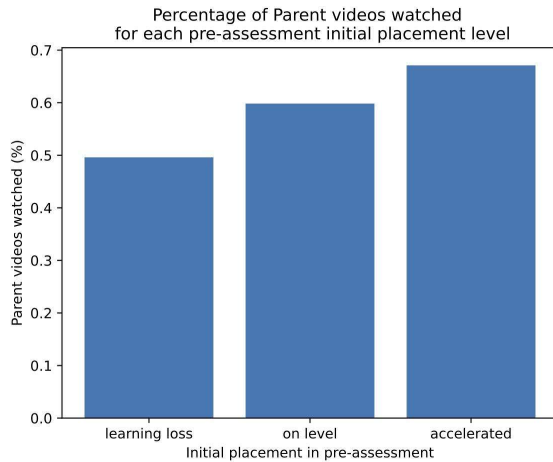


Figure 1. Percentage of parent-facing videos watched by parents of students in each initial performance group. Learning loss group students watched the smallest proportion of parent-facing videos, and students in the accelerated group watched the most.

Next, we examine the relationship between parents’ video watching behavior and childrens’ worksheet performance. We find that students are more likely to perform well in worksheets when their parents have watched more parent-facing videos ($r(1,001)=0.11, p < .001$; Figure 2). The biggest difference is when parents go from watching less than 10% of the videos, but there is still some overall improvement after that point. This highlights the importance of parent engagement in students’ learning.

We then re-split students into two groups, only considering their progress within the system after completing the pre-assessment. Within this comparison, we divide students into a group that made progress, advancing an average of at least 0.25 grade levels beyond their initial placement levels, and a group with less progress,

advancing less than that (the minimum advancement possible at this phase was 0). We find that students who advanced had parents who watched 7% more videos, a marginally significant difference, $F(1, 1553) = 2.68, p = .102$.

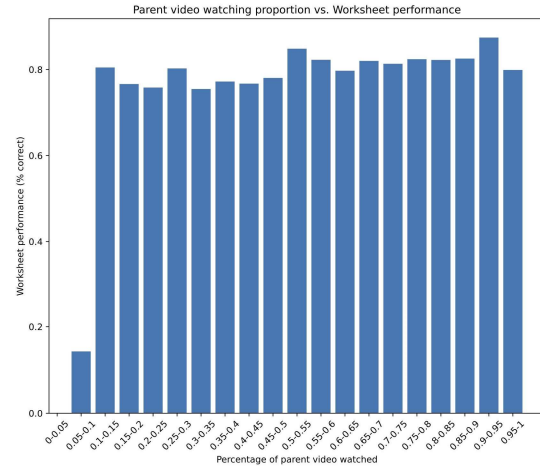


Figure 2. Students worksheet performance and the proportion of parent-facing videos their parents watched.

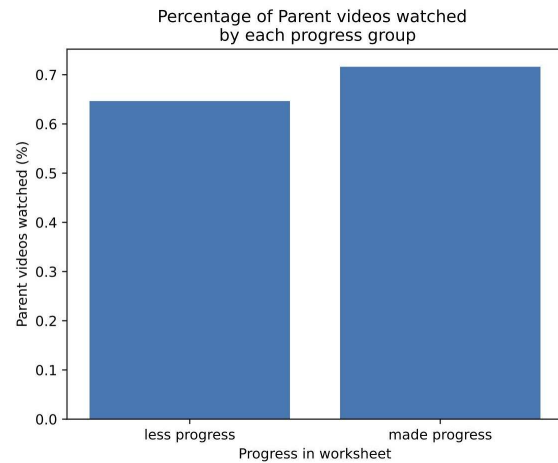


Figure 3. Percentage of parent-facing videos watched by parents of students in each progress group.

4 Conclusions

Our investigation into the impact of parental engagement through video watching on child learning outcomes within the Top Parent app presents evidence that lower-income parents in India will actively participate in student learning, watching videos designed for them. Furthermore, we observed a positive correlation between parental engagement in watching videos, and student performance. This effect seemed to be bi-directional: students who performed better on the pre-assessment had parents who watched more videos afterwards, and students who had parents who watched more videos made more learning progress in the system. Even if parents

watched fairly few videos, students performed better, but watching more videos also had benefits.

These findings indicate both the willingness of parents to engage with educational resources and indicate that there may be benefits to doing so. Of course, these findings are correlational rather than causal, and thus are not conclusive. Future work should utilize survey instruments to gain more information about parents in order to facilitate sophisticated quasi-experimental analysis of the causal effects of video watching at different dosages. Nonetheless, the current findings provide initial support for the hypothesis that using video to engage lower-income parents in the Global South can contribute to more favorable educational outcomes.

Future studies should also investigate in closer detail how parent video watching impacts student performance and learning -- for example, do students perform better on topics their parents have learned (suggesting parental teaching)? Do they engage more (suggesting parental encouragement of participation)? Do they demonstrate better self-regulated learning strategies (suggesting parental coaching on SRL)? Additionally, there is a need to investigate the specific types of parental engagement that are most effective in supporting children's learning -- are videos the most effective way to engage these parents, or might other methods be even more effective? In doing so, it is of course important to consider the barriers parents face in engaging with digital educational resources, including technological and bandwidth limitations, literacy and linguistic fluency limitations, and time constraints from work and other necessary activities.

Overall, our research suggests that digital learning platforms may be able better support educational equity by providing resources to parents as well as children, with use of local vernacular language and audio support to address literacy issues. Parents are key to learning, an often untapped resource who can help us as developers to help all children learn and succeed.

Acknowledgements

We thank the developers of the Top Parent system for supporting this research. We thank funding from the Central Square Foundation, ACT Grants, and the Tools Competition 2021 for their support for this work. We thank Chelsea Porter for assistance in document preparation. ChatGPT was used as a writing support.

REFERENCES

- [1] Ryan Baker, Wei Ma, Yuxin Zhao, Shengni Wang, and Zhenjun Ma. 2020. The results of implementing zone of proximal development on learning outcomes. *Proc. of the 13th Int'l Conference on Educational Data Mining*, 749-753.
- [2] April D. Benner, Alaina E. Boyle, and Sydney Sadler. 2016. Parental involvement and adolescents' educational success: The roles of prior achievement and socioeconomic status. *Journal of Youth and Adolescence*, 45(6), 1053-1064. <https://doi.org/10.1007/s10964-016-0431-4>
- [3] Courtney K. Blackwell, Alexis R. Lauricella, and Ellen Wartella. 2014. Factors influencing digital technology use in early childhood education. *Computers & Education*, 77, 82-90. <https://doi.org/10.1016/j.compedu.2014.04.013>
- [4] Adriana G. Bus, Marinus H., van Ijzendoorn, and Anthony D Pellegrini. 1995. Joint book reading makes for success in learning to read: A meta-analysis on intergenerational transmission of literacy. *Review of Educational Research*, 65(1), 1-21. <https://doi.org/10.3102/00346543065001001>
- [5] Sandra L. Christenson, Theresa Rounds, and Deborah Gorney. 1992. Family factors and student achievement: An avenue to increase students' success. *School Psychology Quarterly*, 7(3), 178-206. <https://doi.org/10.1037/h0088259>
- [6] Greg J. Duncan, W. Jean Yeung, Jeanne Brooks-Gunn, and Judith R. Smith. 1998. How much does childhood poverty affect the life chances of children? *Am. Sociological Review*, 63(3), 406-423. <https://doi.org/10.2307/2657556>.
- [7] Xitao Fan and Michael Chen. 2001. Parental involvement and students' academic achievement: A meta-analysis. *Educational Psychology Review*, 13(1), 1-22. <https://doi.org/10.1023/A:1009048817385>
- [8] Kristy Goodwin and Kate Highfield. 2012. iTouch and iLearn: An examination of "educational" apps. Paper presented at the Early Education and Technology for Children Conference, March 14-16, 2012, Salt Lake City, Utah.
- [9] Shayl F. Griffith, Katherine G. Hanson, Benjamin Rolon-Arroyo, and David H. Arnold. 2019. Promoting early achievement in low-income preschoolers in the United States with educational apps. *Journal of Children and Media*, 13(3), 328-344. <https://doi.org/10.1080/17482798.2019.1613246>
- [10] Jonathan Guryan, Erik Hurst, and Melissa Kearney. 2008. Parental education and parental time with children. *Journal of Economic Perspectives*, 22(3), 23-46. <http://dx.doi.org/10.1257/jep.22.3.23>
- [11] Johanna Johansen, Josef Noll, and Christian Johansen. 2022. InfoInternet for education in the Global South: A study of applications enabled by free information-only internet access in technologically disadvantaged areas. *African Journal of Science, Technology, Innovation and Development*, 14(3), 642-654. <https://doi.org/10.1080/20421338.2021.1884326>
- [12] Monty King, Mark Pegrum, and Martin Forsey. 2018. MOOCs and OER in the Global South: Problems and potential. *The International Review of Research in Open and Distributed Learning*, 19(5). <https://doi.org/10.19173/irrodl.v19i5.3742>
- [13] René F. Kizilcek and Sherif Halawa. 2015. Attrition and achievement gaps in online learning. *Proceedings of the Second (2015) ACM Conference on Learning @ Scale*, 57-66. <https://doi.org/10.1145/2724660.2724680>.
- [14] Reg Leichty. 2021. Online learning for rural students. *State Education Standard*, 21(1), 12-17.
- [15] Katherine A. Magnuson, Marcia K. Meyers, Christopher J. Ruhm, and Jane Waldfogel. 2004. Inequality in preschool education and school readiness. *American Educational Research Journal*, 41(1), 115-157. <https://doi.org/10.3102/00028312041001115>
- [16] Betsy McCarthy, Linlin Li, Michelle Tiu, and Sara Atienza. 2013. PBS KIDS mathematics transmedia suites in preschool homes. *Proceedings of the 12th International Conference on Interaction Design and Children*, 128-136. <https://doi.org/10.1145/2485760.2485777>
- [17] Dana Charles McCoy, Carmel Salhi, Hirokazu Yoshikawa, Maureen Black, Pia Britto, and Günther Fink. 2018. Home- and center-based learning opportunities for preschoolers in low-and middle-income countries. *Children and Youth Services Review*, 88, 44-56. <https://doi.org/10.1016/j.childyouth.2018.02.021>
- [18] Andrew A. McReynolds, Sheba P. Naderzad, Mononito Goswami, and Jack Mostow. 2020. Toward learning at scale in developing countries: lessons from the global learning XPRIZE field study. In *Proc. of the 7th ACM Conference on Learning@ Scale* (pp. 175-183). <https://doi.org/10.1145/3386527.3405920>
- [19] Radek Pelánek. 2016. Applications of the Elo rating system in adaptive educational systems. *Computers & Education*, 98(C), 169-179. <https://doi.org/10.1016/j.compedu.2016.03.017>
- [20] R. Raja and P. C. Nagasubramani. 2018. Impact of modern technology in education. *Journal of Applied and Advanced Research*, 3(1), 33-35. <https://doi.org/10.21839/jaar.2018.v3iS1.165>
- [21] Tina Stratigos and Marianne Fenech. 2021. Early childhood education and care in the app generation: Digital documentation, assessment for learning and parent communication. *Australasian Journal of Early Childhood*, 46(1), 19-31. <https://doi.org/10.1177/1836939120979062>
- [22] Judy A. Temple. 2009. Rural gaps in participation in early childhood education. *Journal of Agricultural and Applied Economics*, 41(2), 403-410. <https://doi.org/10.1017/S107407080000287X>
- [23] Judy A. Temple and Arthur J. Reynolds. 2007. Benefits and costs of investments in preschool education: Evidence from the Child-Parent Centers and related programs. *Economics of Education Review*, 26(1), 126-144. <https://doi.org/10.1016/j.econedurev.2005.11.004>
- [24] Wim J. Van der Linden and Cees A. W. Glas (Eds.). 2000. *Computerized Adaptive Testing: Theory and Practice*. Springer Science & Business Media.
- [25] Central Square Foundation (2022). Understanding Improvements in Student Foundational Learning via Top Parent. Retrieved 4/2/2024 from <https://www.centralsquarefoundation.org/reports/edtech-evidence-factsheet-1-top-parent>