

Student and Teacher Survey Results for Woot Math Following A Randomized Controlled Trial, Spring 2014

Executive Summary

Woot Math is an adaptive learning environment for mathematics that focuses on helping students in grades 3-8 master core math concepts, beginning with rational numbers. The supplemental software delivers a personalized progression of interleaved video instruction and scaffolded problems to mimic the natural give and take between a student and a tutor.

In the spring of 2014, we conducted a multi-site randomized controlled trial, with support from a grant by the National Science Foundation, to establish the efficacy of certain adaptive capabilities. That trial enrolled 358 students in grades 3-8, and did indeed show that the adaptive capabilities resulted in improved learning and retention – details can be found in a separate white paper at wootmath.com/research. At the end of that trial, the participating students and teachers were surveyed about their experience with Woot Math.

Highlights:

- 95% of students found Woot Math helpful (“somewhat helpful” or “very helpful”), with 67% rating it “very helpful.”
- 94% of teachers thought “Woot Math may have improved their students’ attitudes or self confidence about math.”
- 96% of students said they would recommend Woot Math to another student.
- 88% of teachers thought “Woot Math increased their student’s motivation to learn.”
- 90% of students said they learned new things about fractions, understood some things better, and felt more confident about math after using Woot Math.
- 100% of teachers said it was easy to “get their students started with Woot Math,” and 88% said it was “very easy.”

Selected Quotes from the Teacher Interviews:

“I liked that the concepts were challenging for kids and that they were excited about it. I loved having access to smaller groups in my class. This totally changed the way we did math.”

“My feelings reflect the feelings of my students: they love Woot Math.”

“I’ve never seen the kids all saying [about a program], ‘I want to do it!’”

“It also built a lot of confidence in students. Students didn’t think fractions were scary anymore. When we were doing other fraction work, students would say, ‘we learned that in Woot Math.’”

“I liked that they were able to work independently. That it adapts to each students needs was flabbergasting to me... Fractions are really hard for students to grasp and for teachers to teach. I think Woot Math is not only transformative for the students, it is also transformative for the teachers.”

“I was actually really taken aback at the impact it had, and the difference between the class that used Woot Math and the class that didn’t.”

“All of my kids but 2 got all of the fraction questions correct on the year end assessment. I’ve never seen that before in all of my years teaching, and I think it was because of Woot Math.”

“Our principal observed our class one day, and he said it was the best math lesson he had ever seen taught at our school. This would not have been possible without something like Woot Math.”

“I liked that whenever we did it the students’ attitude wasn’t ‘Ugh we’re doing math again’, but instead, ‘Woohoo we’re doing math again’.”

Methodology

The survey data we report here was collected at the end of a study (a multi-site randomized controlled trial) that measured whether certain experimental adaptive software capabilities resulted in better learning and retention in an online intervention for rational number instruction. Results from that study are reported in a separate white paper available at wootmath.com/research. In this study, the test and control groups both received nearly identical online treatment interventions, each using Woot Math, with the only small difference between the groups being the enabling of certain adaptive features

The software used by all students (both the control and test group) consisted of a version of Woot Math with a sequence of 29 lessons (or “levels”) that were presented in a predetermined order as established by our content experts. On average, the students used Woot Math for a total of 3.0 hours prior to the administration of the survey. All responders to the survey are included in the sample reported here, regardless of how little they may have previously used Woot Math.¹

The study was conducted at four sites in geographically and demographically diverse settings. One of the sites was in the northeast region of the U.S. and the other three in the southwest region. Two sites were in urban settings in large metropolitan cities; the other two in small cities. At three of the sites, the study was conducted during class at public schools and as implemented by the classroom teacher. At a fourth site, it was conducted in a non-profit-sponsored after school program at public schools that offered tutoring sessions.

	Site 1	Site 2	Site 3	Site 4
Free or Reduced Lunch	70%	95%	36%	98%
White	22%	4%	58%	1%
Hispanic	69%	88%	35%	63%
Black	2%	3%	1%	34%
Asian	4%	5%	1%	1%

Table 1. Demographic data for underlying population at the study sites.

For the study, we did not collect information on participants other than gender and English Language Learner (ELL) status (as reported by the teachers) – we did not collect information on race, free or reduced lunch status, or special education status. Demographics for the school populations underlying the samples at each of the four sites is given in Table 1. Note that these

¹ Typically the students used Woot Math over three or four weeks prior to taking the survey, and most students in the sample used it for between 2.0 and 4.0 total hours, but usage varied by each teacher’s chosen implementation – there were no requirements around use.

sites are listed in no particular order (i.e., randomly relative to the discussion in the preceding paragraph), and these demographics do not necessarily reflect those of the sample.

Within the baseline sample, 53% of participants were female and 40% were reported as English Language Learners by their teachers as summarized in Table 2.

The recruitment effort focused on enrolling student subjects from grades 4-7 for the study period (April-May 2014). Subjects from grades 3 and 8 were also allowed to participate when teachers from those grades requested that they be allowed to join the study. A total of 16 teachers and 524 student subjects were recruited into the study at the four study sites; 358 of these student subjects met the per-site requirements for assent and parental consent and were enrolled into the study. The study was conducted during the last six weeks of the school year, so the participating students had nearly completed the grade for which their results are reported.

	Overall
<i>N</i>	358
Female	52.8%
English Language Learner	39.7%
Grade 3	6.7%
Grade 4	44.4%
Grade 5	36.3%
Grade 6	11.2%
Grade 7	0.6%
Grade 8	0.8%

Table 2. Participant background characteristics.

At the end of the trial period, all student participants were given a summative assessment followed by a student survey as two final Woot Math levels. The student survey consisted of 12 questions, 11 of them multiple choice, and one asking for a list of grades in which students would enjoy Woot Math the most. Appendix A gives the wording for each of the student survey questions and response options (most of which were Likert-style).

In the event that the student exited early and did not complete all of the survey, (or left multiple blank responses at the end of the survey), we only counted the first unanswered question as “no response”. Only one survey response per student was included in the analysis, and data were excluded for students who responded to all multiple choice prompts without variation (e.g. A,A,A,...). Seven completed surveys were excluded under this criterion. This left us with a sample size of 313 student survey responses, or 87% of the 358 students enrolled into the study.

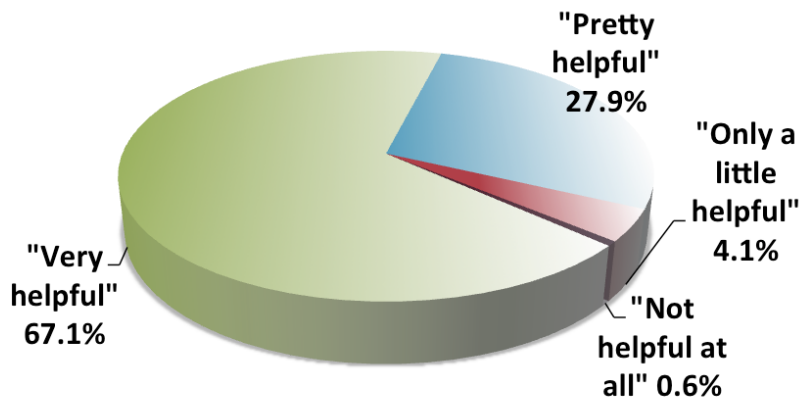
At the conclusion of the study, participating teachers were surveyed and interviewed to measure their sentiment about Woot Math. The teacher survey questions are given in Appendix B and the teacher interview script is given in Appendix C. All 16 teachers who participated in the study agreed to also participate in the follow-up survey and interview. During the study period, we were also contacted by a teacher who had run an independent controlled trial, using Woot Math with one class and comparing outcomes against a second class with a similar student

composition. That teacher also agreed to participate in our survey and interview, bringing the total sample of teachers to 17.

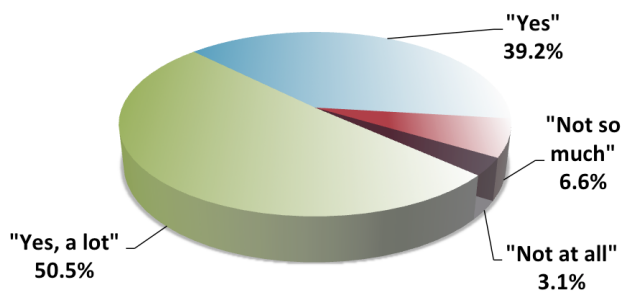
Student Survey Results

The distribution of student responses to all of the survey questions are shown in the graphics below. Of the 358 subjects, 313 (87%) completed the student survey. In the graphics below, we do not show the percentages for “no response” on any of the questions, as these numbers were never significant (the max was $n = 3$ (1%) for “no response” on question #5). Where the illustrated percentages sum to less than 100%, that is due to the no-responses.

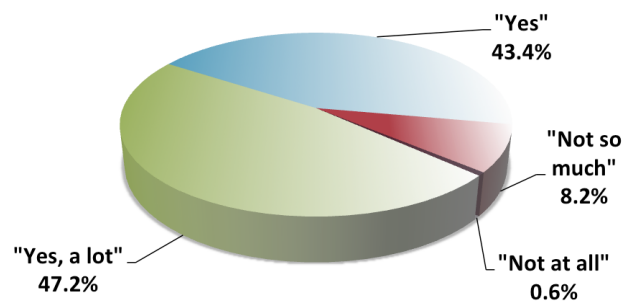
How helpful did you find Woot Math?



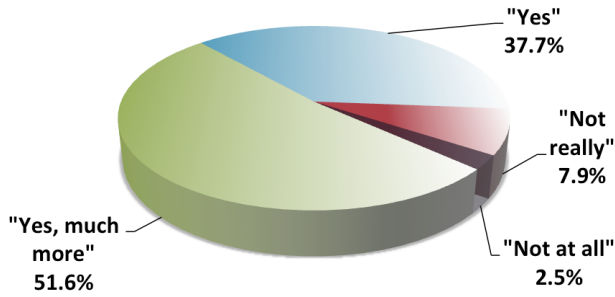
Did you learn new things about fractions?



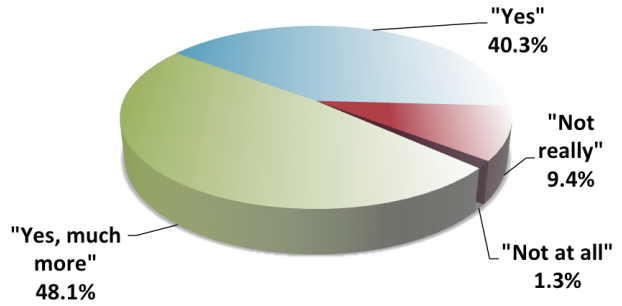
Did Woot Math help you understand some things better?



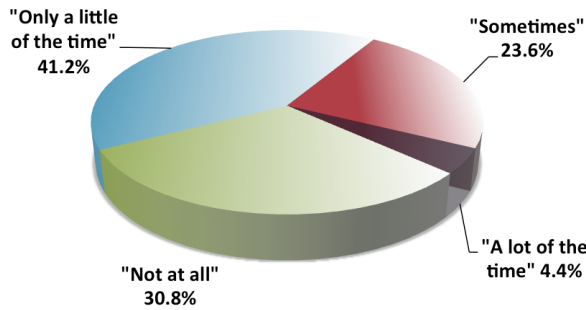
Do you feel more confident about math after using Woot Math?



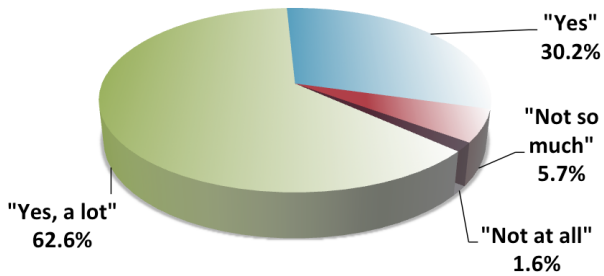
Do you feel more confident about fractions after using Woot Math?



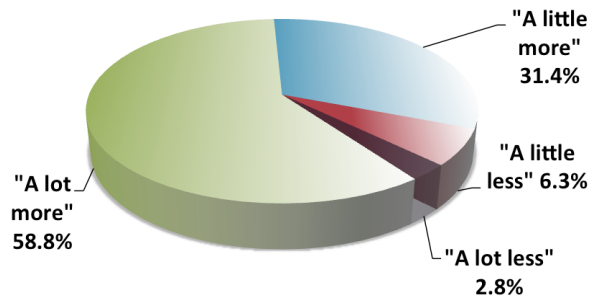
Did you find Woot Math confusing?²



Did you enjoy using Woot Math?

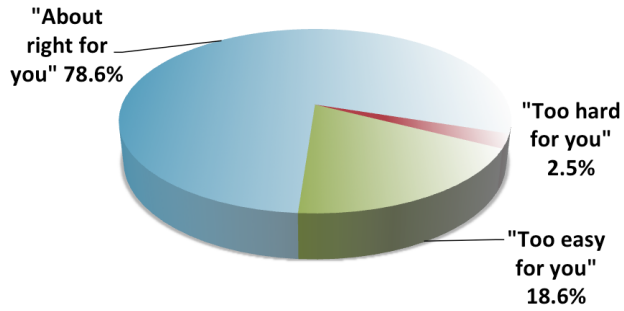


Did you enjoy learning about fractions more than you expected?

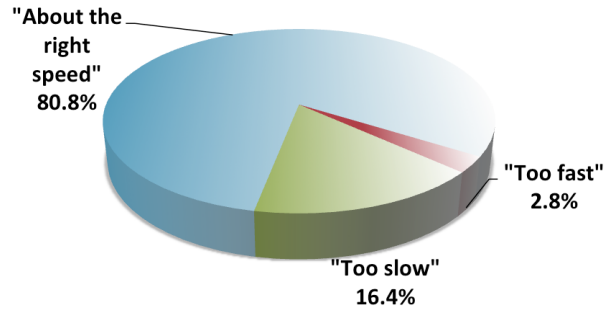


² Note that the prompt did not distinguish between confusion related to the subject matter (ordering and equivalence of rational numbers), the UI, or the instructional materials; we assume that the student-reported confusion level was a combination of these potential sources.

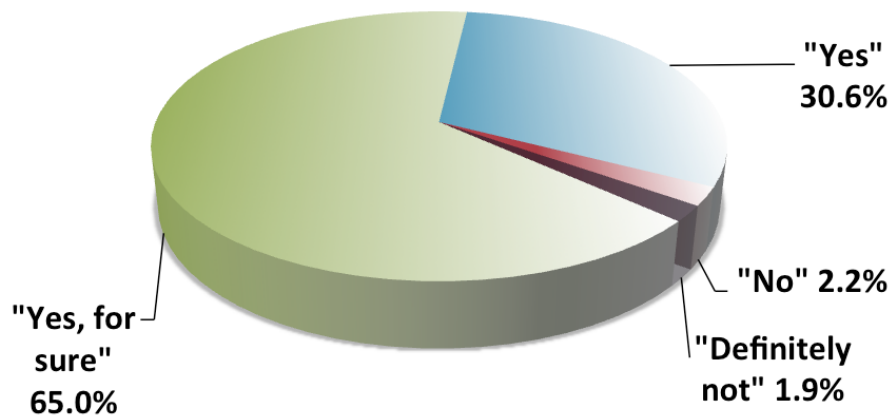
Would you say the problems were:



Would you say the levels went:



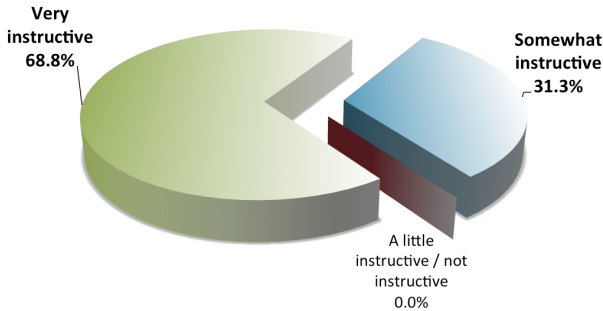
Would you recommend Woot Math to another student?



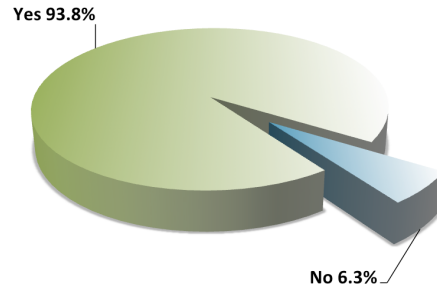
Teacher Survey Results

The distribution of teacher responses to most of the teacher survey questions are shown in the graphics below, and responses for the handful of questions better suited to summarizing in tabular form are reported in the two tables that follow.

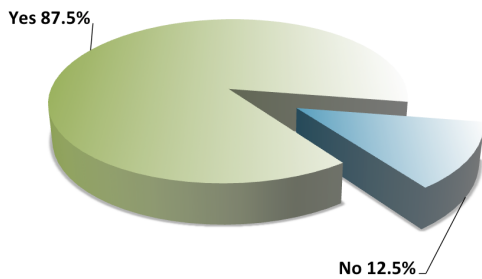
How instructive did you find Woot Math to be for your students?



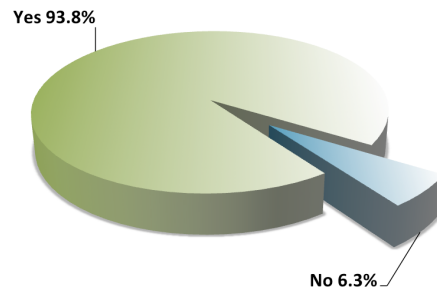
Do you think it may have improved their attitudes or self confidence about math?



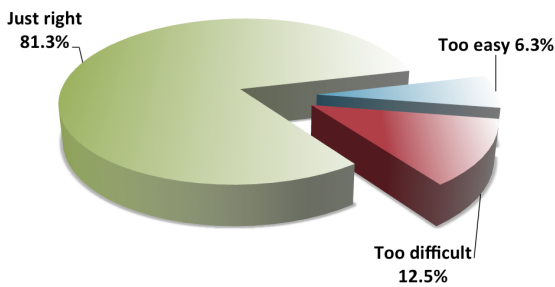
Do you think Woot Math increased your students' motivation to learn?



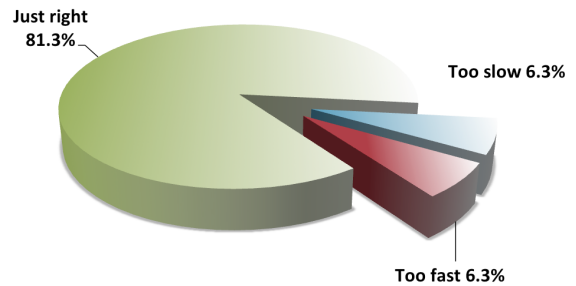
Do you think it increased their confidence for working and learning independently?



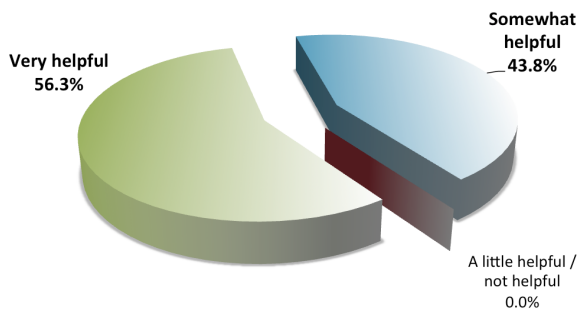
For your students, would you say the material was:



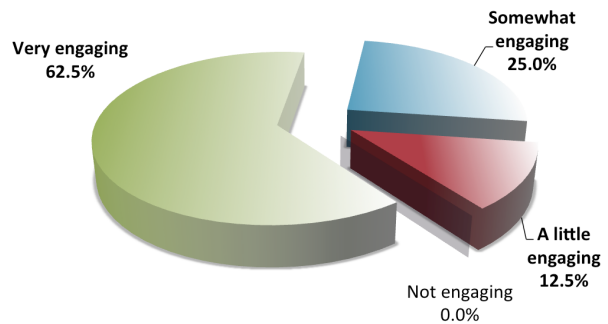
For your students, was the pacing:



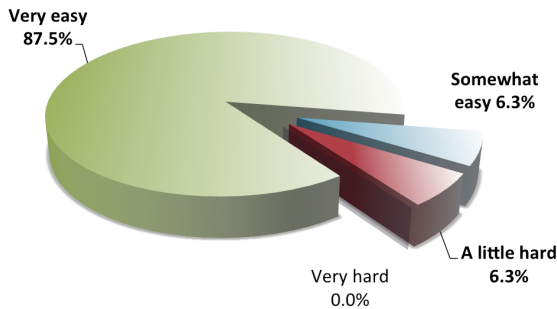
How helpful was Woot Math for students who were struggling with fractions before starting the program?



How engaging was it for students who were already pretty good with fractions?



How easy was it to implement the program with your students?



How easy was it to get your students started with Woot Math?

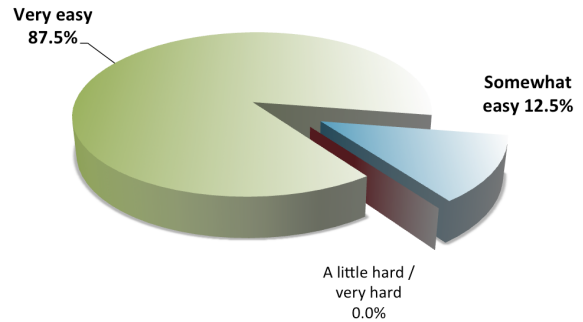


Table 3 summarizes the teachers responses for the three questions that asked “what portion of your students...” with response options of “0%-10%,” “10%-30%,” “30%-50%,” “50%-70%,” “70%-90%,” “90%-100%.” Table 4 reports on two questions for which the teacher response was completely uniform.

Teacher Survey Question	% of Teachers Selecting 0%-10%	% of Teachers Selecting <30%	% of Teachers Selecting >70%	% of Teachers Selecting 90%-100%
What portion of your students found Woot Math enjoyable to use?	0%	0%	93%	69%
For what portion of your students was it helpful?	0%	0%	97%	47%
What portion of your students found it confusing?	60%	93%	0%	0%

Table 3. Teacher Survey results for the three questions: “What portion of your students...” The third column shows what percentage of teachers selected either “0-10%” or “10-30%” and the fourth column shows what percentage of teachers selected either “70-90%” or “90-100%.”

Teacher Survey Question	Yes	No
Did you find the student assessment data presented in your teacher dashboard informative?	100%	0%
Did you find the teacher dashboard easy to use?	100%	0%

Table 4. Teacher Survey results for the two “teacher dashboard” questions.

Teacher Interview Results

During our interviews (mostly conducted by telephone; a few were in person), the teachers expressed extremely positive sentiments about their experience with Woot Math, and did so with much uniformity. This result can also be inferred from the overall survey results, but their interview responses convey a higher intensity of sentiment than the survey could capture. The complete set of interview transcripts is posted at wootmath.com/research. Below we have included a categorized selection of highlight quotes.

Student Outcomes

“All of my kids but 2 got all of the fraction questions correct on the year end assessment. I’ve never seen that before in all of my years teaching, and I think it was because of Woot Math. That certainly made me feel that Woot Math was worth using!”

“In general, I have very limited time with the students, and I don’t like to use iPads. But I believe Woot Math was very worthwhile. At the end of the year I talk to my kids about what they learned. My kids said, ‘we understand fractions better after using Woot.’”

“I gave all students a set of problems from the 6th grade version of AIMSweb, a timed test of 8 minutes with 40 questions. For many of my students, I get back a blank test or a test where they have skipped the fraction problems. The students that used Woot Math, didn’t skip the fractions problems and were more likely to try all problems. It was clear that their math confidence went up. They still got problems wrong, but that they were trying was a big change. I was actually really taken aback at the impact it had, and the difference between the class that used Woot Math and the class that didn’t.”

“It also built a lot of confidence in students. Students didn’t think fractions were scary anymore. When we were doing other fraction work, students would say, ‘we learned that in Woot Math.’”

“I feel like Woot Math did have an impact. One of my students that has been struggling all year, was able to explain equivalence to me, which was huge. Even though they used it at the end of the year when they’re really ready for summer, they were still excited to have Woot Math at the stations. When we stopped the program, they were kind of bummed. That shows me a lot in terms of effectiveness, and I’m definitely planning to use it next year.”

“I do believe it was helpful, because when I was covering other material, I would have students speak up and say, ‘I learned in Woot Math...’”

“It was absolutely helpful to my students. It cleared up some misconceptions - especially around ordering fractions. I could really see the difference it made reflected in the test scores between the students that used Woot Math and those in the class that didn’t.”

“My students felt a lot more confident after using Woot Math – now they are saying ‘Oh yeah, I can do fractions’.”

Student Motivation

"I've never seen the kids all saying [about a program], 'I want to do it!'"

"I really found it good for the kids. At first it was difficult, because I'd never used technology with the them, but the kids really wanted to do it. I loved the bonus problems at the end of each level. It worked very well and made my students work harder. It also let me see where some of them were getting stuck."

"Everyday the kids asked to do Woot Math. They liked it, and that is important because that motivates them to learn more. I also think exposure to technology and various manipulatives in lots of forms is very important."

"I also had two girls, that anytime they had intervention, they would get upset and HATED missing their Woot Math time. I had to promise to make the time up to them after they got back from intervention."

"I liked the look-and-feel and the game component of Woot Math. I liked that whenever we did it the students attitude wasn't 'Ugh we're doing math again', but instead, 'Woohoo we're doing math again'. I liked the instant feedback."

"When the 20 minutes were up, I had a hard time getting them to quit. And it is so visual. They loved getting the cute Woot! when they got a problem right - they liked that feedback a lot. I didn't really see a difference in engagement between the three grades."

"They loved it! ALL my students wanted to do it. I break my class into three groups of seven and then rotate every 15 minutes. My students would fight over who got to be in the first group with Woot Math."

Differentiation

"It was most helpful for my students that still struggle with fractions. My students that know fractions still enjoyed using it. It paced well depending on what the kid needed."

"I liked that it adapted to their needs. Neither my low nor my high students complained. That is remarkable. It is really hard as a teacher to differentiate across the class."

"They liked it, some felt like they learned a lot. I really think that they got it. A lot of it is confidence, and all of them could do Woot Math. None of them got discouraged. They also didn't seem to need much help."

"I liked that it was really independent, and that students could go at their own speed and be directed. It gave them opportunity to really take ownership of their learning."

Hands-On Modelling

"Fractions are always a struggle and just the fact that they are so fully engaged while hands-on working with fractions and solving fraction problems was incredible. I think the understanding and increased confidence actually made some students start to enjoy math more."

"I loved Woot Math. First of all, student engagement is really high, and everyone wanted to do it. When they first started using Woot Math, I could see that they did not have a strong grasp of some of the fraction concepts being presented. But they would then model the problems using the fraction circle manipulatives, and I watched as they continued to try and retry the problem until they understood the concepts. That is hands on technology at its best because they really

want to use the technology and are excited about it. I really liked the number line and fraction pieces.”

“They liked the manipulatives, that they could move around pieces and erase. The tools are great. I really enjoyed watching them make mistakes and then figuring out how to fix them on their own.”

Engagement

“They loved it. I asked how many liked Woot Math and it was instantly all hands in the air. And they yelled ‘Woot!’”

“My feelings reflect the feelings of my students: they love Woot Math. It is hands-on, deeply engaging and appropriate for what they need academically. My students use multiple online programs [listed several] and by far, they like Woot Math best.”

“I think it was really engaging for all my students - in all three grades.”

“Engagement was high, and remained high. Usually engagement drops off at the end of the year, but not so with Woot.”

“We have other online programs – four or five of them. And my students always choose Woot Math. They were sad when they finished Woot Math, and I made them do another program.”

“I liked that it complimented our instruction. It worked great as one of my classroom centers..., and they really did the work on their own. Often centers that are suppose to be independent aren’t because the students talk to each other and are distracted.”

Classroom Transformation

“I liked that the concepts were challenging for kids and that they were excited about it. I loved having access to smaller groups in my class. This totally changed the way we did math.”

“I liked that they were able to work independently. That it adapts to each students needs. This was flabbergasting to me... Fractions are really hard for students to grasp and for teachers to teach. I think Woot Math is not only transformative for the students, it is also transformative for the teachers.”

“The kids appreciated being able to work at their own pace. Woot Math really really helped change what we are doing in math class. In my class the girls were silent and the boys dominated the conversation. By dividing the class by gender, half on Woot Math and half with me, the girls’ conversation became so much richer than before. They weren’t talking about their day, they were talking about math! Our principal observed our class one day, and he said it was the best math lesson he had ever seen taught at our school. This would not have been possible without something like Woot Math.”

“I loved Woot Math, the kids really loved it, and it made fraction concepts easier to understand. The extra video support and examples made it so much easier for the kids to understand their errors and correct them. I used the teacher dashboard to see misconceptions - and then could address them as a whole class.”

“Because the students were so engaged, I was really able to focus on a small group of kids - and it made my teaching much more effective – I could zoom in on seven kids at a time.”

Acknowledgements

This report is based upon work supported by the National Science Foundation under Grant No. IES-1345969. Any opinions, findings, and conclusions or recommendations expressed in this report are those of the authors and do not necessarily reflect the views of the National Science Foundation.

We are very grateful for the support of the participating schools and districts, the National Science Foundation, and most of all for the participating students and teachers, without whom this report would not have been possible.

Appendix A: Student Survey Prompts

The student survey consisted of twelve questions that were presented within the Woot Math online environment. The text for the questions and multiple choice responses are shown below in the order that they were presented to students.

- 1. How helpful did you find Woot Math?**
 - a. "Very helpful"
 - b. "Pretty helpful"
 - c. "Only a little helpful"
 - d. "Not helpful at all"

- 2. Did you learn new things about fractions?**
 - a. "Yes, a lot"
 - b. "Yes"
 - c. "Not so much"
 - d. "Not at all"

- 3. Did Woot Math help you understand some things better?**
 - a. "Yes, a lot"
 - b. "Yes"
 - c. "Not so much"
 - d. "Not at all"

- 4. Do you feel more confident about math after using Woot Math?**
 - a. "Yes, much more"
 - b. "Yes"
 - c. "Not really"
 - d. "Not at all"

- 5. Do you feel more confident about fractions after using Woot Math?**
 - a. "Yes, much more"
 - b. "Yes"
 - c. "Not really"
 - d. "Not at all"

- 6. Did you find Woot Math confusing?**
 - a. "Not at all"
 - b. "Only a little of the time"
 - c. "Sometimes"
 - d. "A lot of the time"

7. Did you enjoy using Woot Math?

- a. "Yes, a lot"
- b. "Yes"
- c. "Not so much"
- d. "Not at all"

8. Did you enjoy learning about fractions more than you expected?

- a. "A lot more"
- b. "A little more"
- c. "A little less"
- d. "A lot less"

9. What grades would enjoy using Woot Math most?

Grade ____ to Grade ____

10. Would you say the problems were

- a. "Too easy for you"
- b. "About right for you"
- c. "Too hard for you"

11. Would you say the levels went

- a. "Too slow"
- b. "About the right speed"
- c. "Too fast"

12. Would you recommend Woot Math to another student?

- a. "Yes, for sure"
- b. "Yes"
- c. "No"
- d. "Definitely not"

Appendix B: Teacher Survey Prompts

The teacher survey consisted of fifteen multiple choice questions in an online web-browser-based survey. The text for the questions and multiple choice responses are shown below in the order that they were presented. The teachers could also provide open text comments at the end of the survey (not reported here).

1. How instructive did you find Woot Math to be for your students?

- a. Very instructive
- b. Somewhat instructive
- c. A little instructive
- d. Not instructive

2. For what portion of your students was Woot Math helpful?

- a. 90% - 100%
- b. 70% - 90%
- c. 50% - 70%
- d. 30% - 50%
- e. 10% - 30%
- f. 0% - 10%

3. What portion of your students found it confusing?

- a. 0% - 10%
- b. 10% - 30%
- c. 30% - 50%
- d. 50% - 70%
- e. 70% - 90%
- f. 90% - 100%

4. What portion of your students found it enjoyable to use?

- a. 90% - 100%
- b. 70% - 90%
- c. 50% - 70%
- d. 30% - 50%
- e. 10% - 30%
- f. 0% - 10%

5. For your students, would you say the material was:

- a. Just right
- b. Too easy
- c. Too difficult

6. For your students, was the pacing:

- a. Just right
- b. Too slow
- c. Too fast

7. **Do you think it may have improved their attitudes or self confidence about math?**
 - a. Yes
 - b. No

8. **Do you think it increased their motivation to learn?**
 - a. Yes
 - b. No

9. **Do you think it increased their confidence for working and learning independently?**
 - a. Yes
 - b. No

10. **How helpful was it for students who were struggling with fractions before starting the program?**
 - a. Very helpful
 - b. Somewhat helpful
 - c. A little helpful
 - d. Not helpful

11. **How engaging was it for students who were already pretty good with fractions?**
 - a. Very engaging
 - b. Somewhat engaging
 - c. A little engaging
 - d. Not engaging

12. **How easy was it to implement the program with your students?**
 - a. Very easy
 - b. Somewhat easy
 - c. A little hard
 - d. Very hard

13. **How easy was it to get them started?**
 - a. Very easy
 - b. Somewhat easy
 - c. A little hard
 - d. Very hard

14. **Did you find the student assessment data presented in your teacher dashboard informative?**
 - a. Yes
 - b. No

15. **Did you find the teacher dashboard easy to use?**
 - a. Yes
 - b. No

Appendix C: Teacher Interview Script

In our interviews of the 17 teachers, we used the following script. Questions 2 and 4 were only asked of teachers who had explored Woot Math prior to the study and/or discussed it with their students.

1. Having used Woot Math, what are your feelings about it?
2. What were your feelings about it prior to using it?
3. Having used Woot Math, what are your students feelings about it?
4. What were their feelings about it when they started?
5. How helpful do you think it was for your students?
6. Did you notice any changes in your students attitudes about the material or their self confidence during the program?
7. How engaged were they by Woot Math?
8. What aspects did your students like best?
9. What aspects did your students like least?
10. What aspects did you like best?
11. What aspects did you like least?