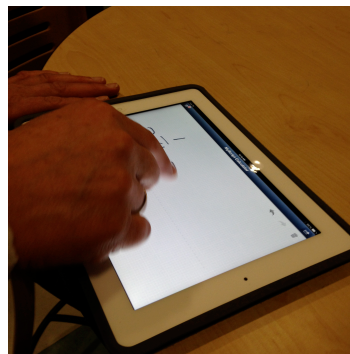


Using the iPad for Peer Review with Rational Exponents

Writing math text on an iPad with figures is fun for students and teachers alike. After everyone gets past the “that is cool” factor of the *MyScript Calculator* app on the iPad, both teachers and students find this interactive medium helpful. The *MyScript Calculator* iPad app can be used to check open-ended student responses. Student can show mathematical understanding by writing a math expression or equation of their choosing with their finger and see if the app interprets their notation and solution as intended.



The *MyScript Calculator* app is free from the iTunes AppStore and it enables the user to write mathematical statements or equations with their finger on the tablet; the app translates the handwriting into math typescript; and finally the app evaluates the math statement. What the user observes is the math statement being converted into a correct equation. To create and solve an equation rather than evaluating a math statement, you create a place holder for the variable by writing empty parentheses. For example, to represent and solve $3x + 4 = 13$, with your finger you would write the equation to the right, three multiplied by the placeholder add 4 is equal to thirteen. The user’s input is in black and the iPad’s responses in blue, making the equation true.

$$3^2 + 4 = 13$$

$$3 () + 4 = 13$$
$$3 \times (3) + 4 = 13$$

Using Responses from the *MyScript Calculator* to Guide Student Learning

The formative assessment processes usually uses either the teacher or peers to interpret evidence and the learner then uses this information to revise their thinking. The iPad app *MyScript Calculator* interprets both the syntax and solution of mathematical statements expressed through finger writing. The teacher must teach students how to use the iPad app’s mathematical interpretation of what they wrote. The *MyScript Calculator* app becomes an interactive participant in helping the students make sense of writing, evaluating, and solving mathematical statements. Students can try novel examples instead of teacher prescribed examples and develop a more personal understanding of the algebra concepts and procedures. Let’s look at an example of how teachers can use this app to enhance teaching of the Common Core State Standard for Mathematics:

CCSS.Math.HSN-RN.A.1 *Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. For example, we define 5 to the 1/3 power to be the cube root of 5 because we want (5 to the 1/3 power) to the power of 3 to equal 5, so $(5^{1/3})^3 = 5$.*

The following math activity illustrates how the *MyScript Calculator* can be used to provide feedback to students in an open-ended modeling activity. To meet this standard students must be able to explain how properties of integer exponents can be applied to make sense of rational exponents. To meet this standard students must be able to express math statements using correct math syntax and evaluate math statements using properties of exponents.

Math Activity:

Each student is given a worksheet and asked to write three examples that model the following integer exponent properties $(a^m)^n = a^{mn}$, $a^m a^n = a^{m+n}$, and $\frac{a^m}{a^n} = a^{m-n}$. Each

pair of students will test one of their examples for each of exponential properties by writing each expression on the iPad. At first the teacher will model the process on the iPad and board by saying and writing, “to model the property

$(a^m)^n = a^{mn}$, I chose the example $(4^3)^{\frac{1}{3}} = 4^1$ because the property states the exponents can be multiplied which in this case will result in an exponent of 1.” The teacher will then write $(4^3)^{\frac{1}{3}} = 4$ on the iPad

and explain, “this shows that the inverse operation of 4 to the 3rd power is the cube root of 4.” Students will then work in pairs to test their rational exponent examples. After students finish writing the rational exponent examples on their worksheet, partners will check the other person's examples by writing their partner's example on an iPad with their finger. Students must discuss why the app translated their example as intended or not intended. The teacher will facilitate this discussion by explaining, that if there is a discrepancy in the iPad translation, you need to suggest an alternative syntax on the iPad and if you still do not understand why your example is not working, raise your hand for help. The teacher will also give the following directions, “Do not try the examples on the iPad before writing them on the worksheet, because we are testing our understanding of exponent properties and we learn both from what works and doesn't work.”

Reason for using the iPad:

I know the students will want to play with the iPads so let them practice writing math statements for 5 minutes before beginning the activity. For this activity the iPad acts as a teacher or peer interpreting math syntax and evaluating math statements. The MyScript Calculator app is the third partner in the group, the student suggesting the example will interpret and apply the feedback from the app to write mathematically correct statements and the student writing the examples on the iPad will interpret and apply the feedback from the app to write math statements with the correct syntax. Students can improve their math syntax and thinking about rational exponents through feedback from the iPad app. The teacher's role is to help the students understand how the *MyScript Calculator* app is interpreting their examples.