THE IMPACT OF KEYING, QR CODES AND PORTAPORTAL ON THE SPEED OF
ACCESSING URL ADDRESSES BY ELEMENTARY STUDENTS

By

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ABSTRACT

Accessing websites on the Internet can be a daunting task for students of varying ages and capabilities, especially in the elementary classroom. With the onset of one-on-one technology implementation in many schools efficiency and productivity for students and teachers with technology requires new methods. This study seeks to investigate three methods of accessing websites to determine a timely way of getting elementary students to the correct URL address. Keying the URL address, QR code scanning and bookmarking through the Portaportal website, will be used in the study. Third grade students with limited computer experience were timed using all three methods to access the same URL address. Two methods, QR codes and Portaportal, were close in times for quickest method with keying being the slowest, data analysis shows . As technology changes even more, new methods will be required for both for computers and other devices that are easier to use and faster than the methods studied here. Future studies will be needed to determine which new method for website acquisition is the most efficient.

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CHAPTER ONE

INTRODUCTION TO THE STUDY

*Background, Issues and Concerns*

With the advent of the use of technology such as computers, laptops, tablets and other mobile devices in classrooms, teachers have added using the Internet in lectures and assignments. URL addresses to websites and other places on the Internet can be long and difficult for elementary teachers and students to access quickly. Teachers have found that getting the whole class to a specific website within a certain amount of time is problematic. Typing or keying the URL address takes some students much longer than others. Mistakes are made, typing speeds differ and some students simply don't notice the details of a URL address like a back slash or an underline or upper versus lower case letters. Computer proficient students get to websites and have to wait while struggling students require help from the teacher or a student partner. This scenario has resulted in frustration for teacher and students, wasted instructional time and creates discipline problems.

Having witnessed this problem on several occasions, there was motivation to find a solution that would be a faster, more synchronous way for all students to access a website and in return ease frustration in the classroom and contribute to the productivity of the instructional time.

*Conceptual Underpinnings for the Study*

"The need for quality management in e-learning has risen since the use of e-learning has expanded." (Schreurs, Husson, Merison, Morin, Van Hysbroeck, & Van Oost, 2007) Classroom management techniques change as new methods of teaching are

used. Technology brings a new set of issues that require new techniques. Accessing websites is more and more a part of assignments with students using mobile devices and computers during school. Many teachers have begun flipping the classrooms (Bergmann & Sams, 2012) which requires students to watch the lecture on a website. The information is then applied during class time on what used to be called homework. Regardless of the application of the technology in the classroom, a simple, efficient method of accessing URL addresses is needed.

*Definition of Terms*

The three methods chosen for this study were keying, scanning QR codes and Portaportal. Keying or keyboarding simply refers to typing the URL address in the address line. Scanning QR codes is the use of a camera and QR code reader on a laptop or mobile devices to scan a 2-D barcode similar to scanning the UPC symbols on items for purchase in a store. Portaportal is a bookmarking tool that saves URL addresses chosen by the teacher that she arranges according to function or topic.

*Statement of the Problem*

A lack of an efficient method to access URL addresses on the Internet has been exhibited by elementary students. The productivity of the classroom declines and classroom management problems develop when all students do not reach a website within a reasonable amount of time of each other. If all students are able to quickly reach a website, valuable instruction time will not be wasted and the level of frustration that sometimes prevents students and teachers from being successful in the classroom will be lowered. This will help all involved to focus on the content of the lesson and not distracted by a problem with technology.

*Purpose of Study*

The purpose of the study is to identify a quick, efficient way to access URL addresses in elementary classrooms. Three independent variables will be used in the study, keying, scanning QR codes and an online bookmark organizer called Portaportal. The dependent variable is speed.

*Research Questions*

*RQ 1.*Is there a significant difference in the time it takes to access URL addresses by keying versus QR Codes?

*RQ 2.* Is there a significant difference in the time it takes to access URL addresses by keying versus Portaportal?

*RQ 3.* Is there a significant difference in the time it takes to access URL addresses by scanning QR codes versus Portaportal?

*Null Hypotheses*

$H_o$ 1. There is no significant difference in the time it takes to access URL addresses between keying and QR codes.

$H_o$ 2. There is no significant difference in the time it takes to access URL addresses between keying and using Portaportal.

$H_o$ 3. There is no significant difference in the time it takes to access URL addresses between scanning QR codes and Portaportal.

*Anticipated Benefits of Study*

The results of this study will provide a choice as to which method is faster for elementary students to access URL addresses and give teachers a tool for more efficient classroom management. Teachers and students will have a decreased level of frustration

when accessing websites, instructional time will be preserved and discipline problems

from bored or disengaged students will decrease.

*Summary*

As more and more school districts in this country and the world implement

technology for their students, new problems arise with how to manage that technology in

the classroom. This study hopes to find a solution for the classroom management

problem of the lag in time that exists between students when connecting to specific

websites. Using three different methods, keying, QR codes and bookmarking through

Portaportal, the researcher will determine which if any of the methods have an impact on

the speed of students' ability to access websites.

CHAPTER TWO

REVIEW OF LITERATURE

The last two decades have changed dramatically in the way we exchange information, the sources of information and how we interact with information. (Davidson & Goldberg, 2009) With the rise of e-learning, experts are projecting that by the year 2015 users will spend 7.1 billion dollars on e-learning products. (Weiss, 2011) As classrooms and the way students find information change, educators need to employ a quick, efficient method in accessing websites.

Research into the study of technology and classroom management is focused on the way technology is integrated in the classroom (Tucker, 2011) or lesson ideas for using technology to enhance student engagement (Miller, 2011), but not on how accessing URL addresses impacts classroom management. The problem has been noted as evidenced by the development of methods to deal with accessing URL addresses. Bookmarking tools and QR codes are just two ways educators have found success with solving the problem of Internet accessibility in their classrooms. The lack of keyboarding and/or reading skills by elementary students is another contributing factor to the difficulty of accessing URL addresses. If students are able to scan a QR code or click a hyperlinked bookmark to get to a website, the keyboarding and reading problem is solved and every grade level has the opportunity to use the Internet to enhance learning.

In her article on QR Codes in the classroom, Sampson (2012) addressed the classroom management problem of keeping students engaged and on task in the classroom when they have the latest ipods, tablets, and cell phones. The problem being that students were occupied with those devices instead of focused on the instruction in the

classroom.  She advocates harnessing those devices that are potential distractions and turning them into powerful learning tools.

The potential for QR codes in the classroom is just beginning to be discovered. Educators have found many inventive ways to use them. From polls and feedback to a virtual scavenger hunt to an interactive periodic table, QR codes have made themselves very useful in the classroom.  (50 ways to use technology, 2012)

Miller's (2011) article states:

QR codes are a great arsenal for the teacher tool belt. Just remember, this technology is a tool and needs to fit a purpose. It can help create engagement in a lesson, manage your classroom, be part of student work or facilitate inquiry in a project.

The library community has embraced the use of QR codes in particular as an electronic finding aide for print materials. (Kane, 2011)  One public high school library has incorporated QR codes cards in books that when scanned lead to student-created podcasts of a review and summary of that book. (Jacobs, 2010)

Bookmarking tools have become very popular in organizing URL addresses for educators and businesses alike.   Finding a way to manage and share a specific list of websites among the millions of websites available with students and employees can be problematic. Bookmarking tools like Portaportal, Diigo, Symbaloo, Google Bookmarks, Delicious and others have been developed as aids to literally keep everyone on the same page. (Fitzpatrick, 2010)  Each bookmarking tool has its supporters and critics based on ease of use and basic functionality.  In particular Portaportal has been roundly criticized

as being too antiquated and ugly. (Woodward, 2009), but it has been praised by others as being the best bookmarking tool for their elementary students. (Lanning, 2010)

The problem of classroom management and using technology as it pertains to students accessing URL addresses quickly and within a few seconds of each other has not been researched. There is a need as seen from the new methods that have been developed in response to the problem of getting students to websites, but no formal research or articles were found specifically about this topic.

CHAPTER THREE

RESEARCH METHODOLOGY

*Field Study Methods*

*Research Design*

A third grade class with very limited computer experience participated in the study. Students were partnered with the student next to them at the desks in their home classrooms. Laptops were used for all three methods and basic computer skills were taught before the study began. The laptops were equipped with a QR code scanner and were prepared for Portaportal access by bookmarking the researcher's Portaportal homepage that held the URL to be accessed. The music website URL address www.musictheory.net/exercises/note/beoyryyyy was accessed in all three methods. The research period was limited to two-40 minute class periods in their home classroom on consecutive days. The first period was used to teach basic computer skills and how to use the three methods being researched. The second period was used for the actual timed study.

*Study Group*

The third grade class was chosen purposefully because the students had very limited computer exposure. Many of the students had no basic computer skills and needed to be instructed on how to move the cursor, how to use the mouse to click on an area, and where to type in the URL address to access a website. They also had no biases on which method if any would be faster than the other. The class was in a Title I school and was made up of 12 girls and six boys ages eight and nine from varying ethnic and socio-economic groups.

*Independent variable*

Three different methods were used to test the independent variable of accessing URL addresses; keying, QR code scanning and bookmarking through Portaportal. The first method was keying or typing in each letter, number or character in the URL address. After being instructed on where and how to key in the URL address of a music website, they were allowed to practice. Their partner practiced timing them by watching a large timer projected on a screen and writing down the time when the website was accessed. The students changed places and their partner got to practice keying while being timed.

The second method was QR or quick response codes. QR codes are black and white matrix barcodes that were designed by Japanese automobile manufacturers to track car parts in their factories. (Wikipedia, 2012) Scan the code with a mobile device and find the location of the part needed. The codes are more useful than a standard UPC barcode because they can store more data, including URL links, geo coordinates, and text. (Lyne, 2009) Plus, they don't require a large scanner. Cell phones and other mobile devices can scan the code and access websites and other information. The laptops used by the students were equipped with a QR code reader and a camera. Large 4" x 4" QR code cards were made containing the URL address of a music website and students were taught how to scan the card. Again, both partners were allowed to practice and time each other.



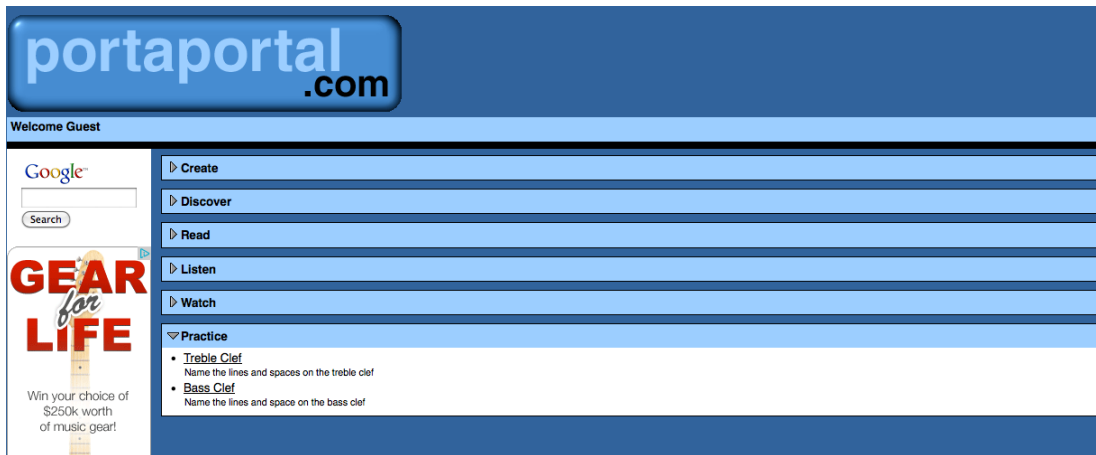*Figure 1.* QR Code of Music Website Used in Study.

*Figure 2.* Ms. West's Portaportal Homepage.

The third method, Portaportal, is a bookmark-organizing tool. Many bookmarking websites are available, but Portaportal seemed better suited to the skill set of the students in this study. The look is outdated and the use is very simple. However, because of that simplicity, elementary students are able to use it without a lot of training. Accounts and login are not required by the student to use Portaportal. The teacher must create an account and add the bookmarks and categories. Students are not able to add or delete any part of the teacher's Portaportal page. All students also practiced this method before the actual study began.

### Dependent Variable

Students were asked to access the same website with a URL address with 44 characters. The dependent variable was the speed or length of time it took them to arrive at that website.

### Data Collection and Instrumentation

Student partners collected the data used in the study. Each student had a partner who determined the amount of time it took their partner to arrive at the specified website

by watching a stopwatch-type timer projected on a screen in the front of the room.  Times were recorded on a form.

Name - Partner 1

_____

Typing Time_____

QR Code Time_____

Portaportal Time_____

*Figure 3.* Data Collection Instrument for URL Access Study.

*Data Analysis Methods*

The statistical analysis used is a t-test pairing the independent variable methods used for collecting data on accessing URL addresses.  The three methods; Keying, QR Codes and Bookmarking with Portaportal are paired as written in the research questions.

CHAPTER FOUR

FINDINGS AND RESULTS FROM DATA ANALYSIS

The difference is notable in Figure 4 between the average speeds of one method,

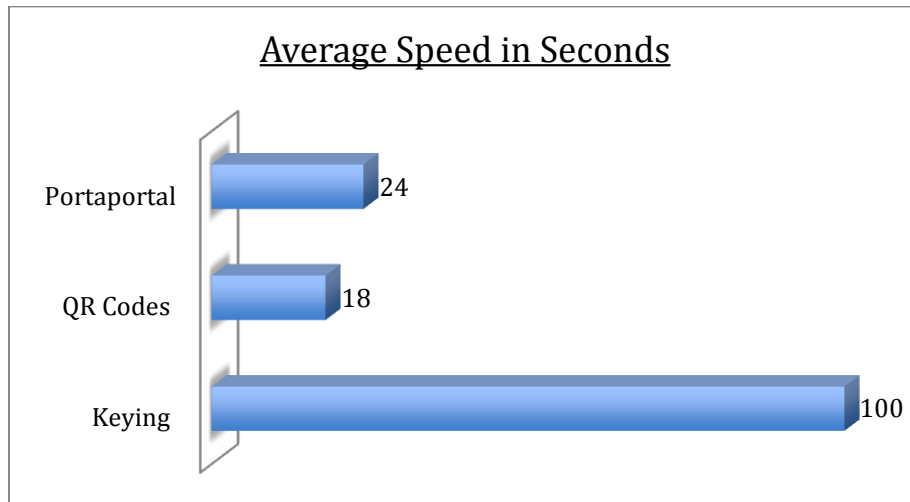keying and the other two methods, QR code scanning and bookmarking with Portaportal.



*Figure 4.*  Comparison of Three Methods of Accessing URLs.

| Data Summary | | | |
|---|---|---|---|
| | A | B | Total |
| n | 18 | 18 | 36 |
| $\Sigma X$ | 1792 | 322 | 2114 |
| $\Sigma X^2$ | 199146 | 6152 | 205298 |
| SS | 20742.444 | 391.7778 | 81159.222 |
| mean | 99.5556 | 17.8889 | 58.7222 |

| Results | | | | | |
|---|---|---|---|---|---|
| Mean$_a$—Mean$_b$ | t | df | | one-tailed | <.0001 |
| 81.6667 | +10.2 | 17 | P | two-tailed | <.0001 |

*Figure 5.* Summary of t-Test Analysis Results of Speeds of Independent Variable

Methods Keying and QR Codes.

*RQ 1.* Is there a significant difference in the time it takes to access URL addresses by keying versus QR Codes?

*H$_o$ 1.* There is no significant difference in the time it takes to access URL addresses between keying and QR codes.

The data summary in Figure 5 shows a significant difference in speed between Keying in the A column and QR Codes in the B column. Findings are highly significant when the p-value is less than .05. The results for this pair of methods show a p-value of less than .0001. *H$_o$ 1* was rejected.

**Data Summary**

|  | A | B | Total |
|---|---|---|---|
| n | 18 | 18 | 36 |
| $\Sigma X$ | 1792 | 428 | 2220 |
| $\Sigma X^2$ | 199146 | 11048 | 210194 |
| SS | 20742.444 | 871.1111 | 73294 |
| mean | 99.5556 | 23.7778 | 61.6667 |

**Results**

| Mean$_a$—Mean$_b$ | t | df | P | | |
|---|---|---|---|---|---|
| 75.7778 | +9.68 | 17 | | one-tailed | <.0001 |
| | | | | two-tailed | <.0001 |

For independent samples, these results pertain to the "usual" t-test, which assumes that the two samples have equal variances.

*Figure 6.* Summary of t-Test Analysis Results of Speeds of Independent Variable Methods Keying and Portaportal.

*RQ 2.* Is there a significant difference in the time it takes to access URL addresses by keying versus Portaportal?

*H$_o$ 2.* There is no significant difference in the time it takes to access URL addresses between keying and using Portaportal.

Figure 6 compares the speeds of Keying and using Portaportal. The data summary shows a significant difference between this pairing. The p-value is less than .0001 and therefore is highly significant. $H_o 2$ was rejected.

**Data Summary**

|  | A | B | Total |
|---|---|---|---|
| n | 18 | 18 | 36 |
| $\Sigma X$ | 322 | 428 | 750 |
| $\Sigma X^2$ | 6152 | 11048 | 17200 |
| SS | 391.7778 | 871.1111 | 1575 |
| mean | 17.8889 | 23.7778 | 20.8333 |

**Results**

| $Mean_a - Mean_b$ | t | df | P | | |
|---|---|---|---|---|---|
| -5.8889 | -3.67 | 17 | | one-tailed | 0.0009485 |
| | | | | two-tailed | 0.001897 |

*Figure 7.* Summary of t-Test Analysis Results of Speeds of Independent Variable Methods QR Codes and Portaportal.

*RQ 3.* Is there a significant difference in the time it takes to access URL addresses by scanning QR codes versus Portaportal?

$H_o 3$. There is no significant difference in the time it takes to access URL addresses between scanning QR codes and Portaportal.

The data analysis of pairing QR codes and Portaportal is shown in Figure 7. Although closer to each other in speed than comparing either method with Keying, the pairing of QR codes and Portaportal results still show a highly significant difference. The p-value is 0.0009 with a one-tailed t-test and 0.0019 with a two-tailed t-test. $H_o 3$ was rejected.

*Summary of Major Findings*

This study confirms that students are able to access URL addresses in a fast and synchronous way through scanning QR Codes and using Portaportal.  The raw data shows that students arrived at the specific website within a few seconds of each other using either QR Codes or Portaportal indicating that either method would help solve the problem of the lag in time between the fastest student and the slowest student.   The fastest method used by students in this study was QR Codes.
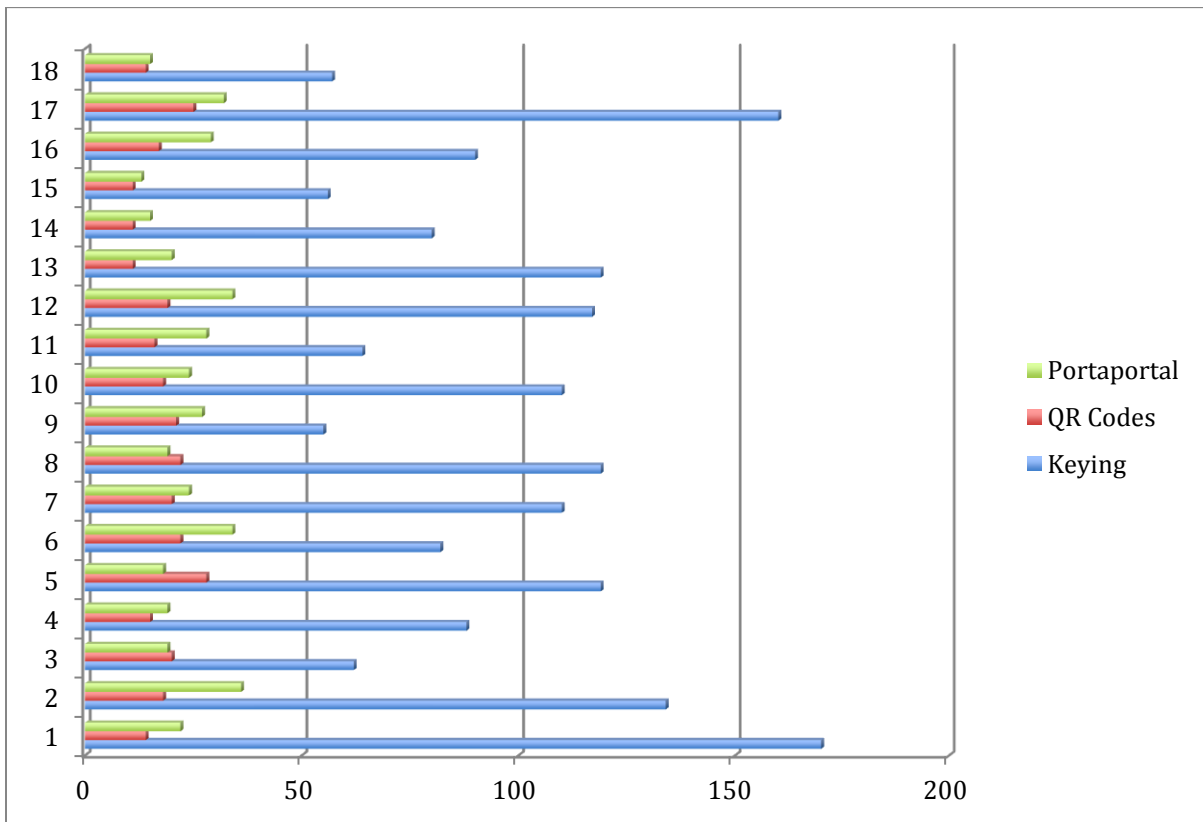


*Figure 8.*  Comparison of Independent Variable Methods Speeds in Seconds Per Student.

Keying was by far the least efficient of the three methods with students' speeds ranging from 2 minutes 50 seconds to 55 seconds. Portaportal speeds were second in

speed with a range of 36 seconds to 13 seconds. Using QR codes was the fastest method

overall with a range of 28 seconds to 11 seconds.

CHAPTER FIVE

FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

*Restatement of the Purpose*

Technology can be a frustrating addition to the classroom if a management plan is not in place. One component of technology integration that has the potential to create frustration is accessing websites on the Internet. Instructional time is lost and productivity suffers when students with varying computer skills and comprehension levels are unable to find a specific website quickly.

*Summary of Research Methods*

Elementary students in the study group with limited computer skills were able to access a specific URL address with seconds of each other by scanning QR code cards prepared by the researcher and using a bookmarking tool, Portaportal. The widely used method for finding a website had been writing the URL address on the whiteboard and having students key or type in the address. All three methods were examined and the length of time needed by each method was recorded for comparison and analysis.

*Discussion of Findings*

The results of this study have shown that keying a URL address, especially an address that is lengthy, has a significant effect on the speed at which elementary students access the website. QR codes and Portaportal were much faster than keying and most students reached the website in question within seconds of each other with QR codes being the fastest of the three methods.

*Conclusions*

QR Code scanning and using the bookmarking tool Portaportal improved the students' success rate in regards to accessing the correct website and getting there within seconds of each other.  Keying the URL address took a significantly longer time and increased the frustration level of both the groups of students struggling with keyboarding skills or making mistakes and those who accessed the website more quickly.  This method takes too long in a classroom where discipline problems multiply with each passing second if students are not engaged.  During the study, waiting for students struggling to key in the URL address caused the quicker students to go off task by exploring other websites, talking with other students, and even throwing the pencils to be used in recording their student partners.  The playing field was leveled for students of all skill levels when QR codes or Portaportal was used.  The productivity of the instructional time increased, management problems decreased and the frustration level decreased using one of the two faster methods.

QR codes were the fastest of the three methods and it should be noted as an additional benefit not studied here that students with reading proficiency problems and younger students who cannot yet read were able to use QR codes to successfully access URL addresses.

*Policy Recommendations*

As a result of the research conducted and the literature reviewed, I would recommend that educators help themselves and their students by using one of the methods proven in this study to access URL addresses quickly and synchronously.  QR codes or Portaportal will assist both groups, teachers and students, with productivity and

eliminate classroom management problems caused by the gaps between individual

student's keyboarding proficiency and accuracy.

Teacher preparation time is required prior to using QR codes and Portaportal, but

developing a classroom management system is always part of a teacher's job. The

minimal preparation time needed by QR codes and Portaportal is a good investment of an

instructor's time considering the benefits of increasing students' success rate in reaching

the correct URL address and reaching it quickly thereby creating a good classroom

management tool.

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VITA

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