Video Re-Use in Mathematics Teacher Education

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Abstract

This study examines the *re-use* of existing video records of practice (VRPs) in preservice mathematics teacher education. The research is based on 34 interviews with mathematics teacher educators from 24 different institutions across the United States and three other countries, who are re-using VRPs from online repositories, books with accompanying videos, and other online and offline sources. In this paper, we report on three different types of VRP re-use raised by our interview participants. We discuss the instructional goals they described as well as the learning activities in which the VRPs were used. This paper addresses the question, how do mathematics teacher educators make use of existing VRPs to support the professional learning of preservice teachers? The paper concludes with a discussion of what these findings mean for teacher educators who re-use VRPs as well as for those who produce VRPs that can be re-used in preservice teacher education.

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Introduction

This study examines the *re-use* of existing video records of practice (VRPs) in preservice mathematics teacher education. The research is based on 34 interviews with mathematics teacher educators from 24 different institutions across the United States and three other countries who are re-using VRP from various sources: videos from online repositories, videos that accompany books, and VRPs from other online and offline sources. In this paper, we report on three different types of VRP re-use raised by our interview participants. We discuss the instructional goals they described as well as the learning activities in which the VRPs were used. This paper takes up the following questions: How do mathematics teacher educators make use of existing VRPs to support the professional learning of preservice teachers? What instructional goals do teacher educators try to achieve when re-using VRPs? In what types of activities did they re-use VRPs? The paper concludes with a discussion of what these findings mean for teacher educators who re-use VRPs, as well as for those who produce VRPs that can be re-used in preservice teacher education.

Background

"Records of practice" are classroom recordings and artifacts that capture detailed facets of teaching and learning – typically without analysis – that allow people to directly look at and study practice (Bass et al., 2002, p. 79). Educational researchers and teacher educators have long been interested in records of education practice, and particularly in video records of practice (e.g. Biberstine, 1971; Burleigh & Peterson, 1967), for their potential to help individuals and the profession as a whole better understand the complexities of teaching and learning. This interest has steadily grown over the years and VRPs are currently being used in many diverse efforts to improve teaching (Bacevich, 2010; Brophy, 2004; Brouwer, 2011; Gaudin & Chaliès, 2015; Janík, Seidel, & Najvar, 2009; Rook & McDonald, 2012; Sherin & Sherin, 2007; Villegas-Reimers, 2003). For example, videos have come to play an important role in preservice teacher education for helping novices learn professional skills and practices (e.g. Boerst, Sleep, Ball, & Bass, 2011; Sherin & van Es, 2005) and for assessing this growth (e.g. Pecheone & Wei, 2011; The American Association of Colleges for Teacher Education, n.d.).

Similarly, there has been increased use of VRPs within the profession of teaching itself. For example, they are used in the evaluation and measurement of teaching quality in schools (e.g. Bill & Melinda Gates Foundation, 2013; Ho & Kane, 2013), as part of teacher professional development (e.g. Borko, Jacobs, Eiteljorg, & Pittman, 2008; Santagata, 2009; Seago, Jacobs, & Driscoll, 2010; van Es & Sherin, 2010), and as a critical tool teachers use to represent their professional growth and accomplishment and allow others to assess their achievements (e.g. Lustick & Sykes, 2006).

Along with this growing interest in VRPs there are an increasing number of initiatives to create broadly and easily accessible digital video collections for educational practitioners and researchers to re-use in their work. A few examples of repositories of VRPs that have been designed to grow over time, housing new collections and potentially accommodating a growing user base include –

- **Accomplished Teaching, Learning, and Schools** (**ATLAS**) case library (http://www.nbpts.org/atlas) – A collection of cases developed by the National Board for Professional Teaching Standards containing video submissions by teachers as part of the board certification process.
- **Everyday Mathematics Virtual Learning Community** (**VLC**) (http://vlc.cemseprojects.org/) – An online space for teachers to share, communicate, and reflect on practice, including a resource library containing several hundred VRPs (Virtual Learning Community, 2018).
- **Teaching & Learning Exploratory** (**TLE**) (https://tle.soe.umich.edu) – A repository containing collections of full-length classroom videos from research efforts like the Measures of Effective Teaching Extension (METX) project as well as collections of curated clips such as the TeachingWorks High Leverage Practices Exemplars collection.

Others have also developed smaller, self-contained, online collections such as TIMSS Videos (http://www.timssvideo.com), a set of VRPs collected in seven countries, associated with the Trends in International Mathematics and Science Study (TIMSS) study; or the Teaching the Core Archive (http://achievethecore.org/teachingthecore), a collection of lesson videos to support K-12 teachers' efforts to address the Common Core State Standards. In addition, it has become increasingly common for small sets of VRPs to

accompany publications for education professionals, such as Math Solutions Publications' Number Talk videos (http://mathsolutions.com/what-we-offer/number-talks-videos) or the National Council of Teachers of Mathematics' publications that come with an access code to their "More 4 U" resources (http://www.nctm.org/store/more4u/) containing, among other things, VRPs.

While there is growing interest and investment in VRP collections and making them available for re-use, little is known about how teacher educators select and utilize these resources in their work with preservice teachers. For teacher educators, this has meant few opportunities to learn about different ways VRP are re-used by other teacher educators or to benefit from the broader range of efforts being pursued. Or, put differently, it has made it difficult for the field to build a shared professional knowledge base concerning the re-use of VRPs. Additionally, for those who produce VRPs as educational resources, this lack of research has meant that such development work often proceeds with only best guesses and limited perspectives on what teacher educators are doing (or hoping to do) with VRPs.

As a result, VRPs are often produced with very little attention to re-use and are developed for highly constrained purposes that limit their educational potential. This paper sheds some light on the re-use of educational VRPs, focusing on the perspectives and experiences of individuals who have used these types of resources to support teacher learning – particularly in the context of mathematics preservice teacher education, where VRPs have played an important role. Mathematics teacher educators have leveraged VRPs in numerous and varied efforts to help preservice teachers come to a different understanding of mathematics than what they might have experienced as students and prepare them to teach mathematics in ways they may have not encountered before. Teacher educators have used VRPs to provide glimpses of new possibilities for mathematics teaching and learning, build vision and inspire, problematize assumptions and taken-for-granted values, immerse in different classroom environments and cultures, study a diversity of student ideas and ways of thinking, and practice working within different instructional situations — just to name a few (e.g. Brophy, 2004; Brunvand, 2010; Calandra & Rich, 2014)

Methods

This qualitative study consists of 34 in-depth, semi-structured interviews with individuals who have re-used video records of practice from online digital repositories or other accessible sources in their work as teacher educators – particularly those who have focused, at least in part, on mathematics teaching. The data is part of a larger data set (44 interviews) on the re-use of VRPs in the field of education, however, interviews that did not address VRP re-use in preservice teacher education contexts with some focus on mathematics teaching and learning were omitted from this analysis.

Interview participants who comprise the full data set were recruited through a combination of convenience and snowball sampling techniques. The research team worked with repository and research partners to identify video re-users, we asked interview participants to recommend others, and we identified potential participants through disciplinary publications and conferences. The team continued to pursue potential interview leads until we had achieved data saturation among participants' responses regarding their re-use of video records of practice. All interviews were audio recorded and transcribed. Transcripts were then initially analyzed with a set of codes that were developed based on themes from the literature. The codes were further refined based on themes that arose from earlier surveys, during the interviews, and during the initial coding and analysis process — this included topics such as instructional goals for data re-use, learning activities in which VRPs were integrated, and teaching context. Using the code set we developed, two coders worked independently to code the same transcript in order to assess interrater reliability. We repeated this process until we reached an acceptable level of interrater reliability for our two groups of interviewees: those whose re-use focused primarily on teaching, and those focused on research. Using Scott's Pi, a statistic measuring interrater reliability for coding textual data (Holsti, 1969), we achieved a score of 0.732 for interviews that used a version of the protocol primarily focused on re-users' teaching efforts and 0.712 for a version that focused primarily on the re-users' research efforts.

This study further analyzed data from interviews with 27 university faculty members, one postdoctoral fellow, three graduate students, two school-based education professionals, and one administrator. These individuals came from 24 different institutions located in 13 different states of the U.S. as well as three non-U.S. countries. This entailed a secondary analysis of the interviews – a fine-grained examination focusing on interviewees' discussion of:

- **Video records of practice (VRPs)**: i.e. videos that captured classroom interactions or documented students' thinking and learning during an interview or other one-on-one/small group interaction. This

excluded discussion of other types of videos that might be considered "educational" such as "how to" videos, demonstrations, documentaries, stories or dramatizations.
- **Instances of *re-use***: i.e. those uses that involved *existing VRPs* that had been produced by someone else (i.e. not the re-user) and/or had been produced for completely different purposes. This primarily excluded the very common use of video in teacher education that focuses on video of preservice teachers' own teaching practice for feedback, coaching, assessment, etc.
- **Instructional goals and learning activities**: i.e. looking closely at what teacher educators were doing and/or hoping to achieve in their work with preservice teachers when re-using VRPs.

The secondary analysis was carried out by a single team member who examined interview data to identify emerging themes concerning how teacher educators were re-using the VRPs – particularly, the ways in which they were trying to leverage the VRPs, the types of learning experiences and outcomes they hoped to achieve, and the ways in which they went about creating these opportunities for preservice teacher education students.

Findings

Interview participants re-used VRPs in diverse ways (and often, in more than one way) in their work with preservice teachers (i.e. their "learners"). These efforts to leverage VRPs and integrate them into educational experiences for beginning teachers fell into three main categories:

- **Illustrations**: VRPs were used as illustrations, shown to help learners understand or see specific things more clearly.
- **Data or cases**: VRPs were used as "raw" data or cases that captured rich instances of teaching and/or learning for learners to study through close – and often structured – questioning and analysis.
- **Scenarios or simulations**: VRPs were used as practice-based scenarios or simulations to engage learners in doing – "practicing" – certain professional activities and skills.

These three types of VRP re-use were described by interview participants as part of many different learning activities, supporting a variety of instructional purposes. These uses, activities, and purposes are briefly described below.

VRPs as Illustrations

The most common way interviewees leveraged VRPs in their work with preservice teachers was to use them as illustrations that offered learners an opportunity to see or understand something about teaching and/or learning captured in the videos. Typically, these videos were carefully selected by instructors/facilitators to intentionally show, convey, or evoke something as part of the learning experience – to illustrate something for learners. For example, one instructor described an interview video she re-uses that provides a "powerful example of letting the (math) student take responsibility for figuring things out" (Interviewee 20). Another instructor described re-using classroom video in his preservice math methods class to begin to demonstrate and have his preservice teachers "start to look for what teacher moves happen" (Interviewee 15).

Illustrations were used toward different instructional purposes, involving different types of video exemplars and examples. These are categorized and summarized in the table below (Tab. 1).

Instructional purposes	Type of VRP used/sought
Develop shared understanding of and/or language around a specific idea, concept, or practice	Exemplars that show typical/clear instances *or* particularly interesting examples that might seem counterintuitive, complex, or borderline
Inspire or expand imagination	Outstanding exemplars of what is possible, intended to stimulate the imagination and spark new aspirations
Convey a specific message or point	Examples that show or could be used to voice a persuasive argument or compelling case
Consider and grapple with new possibilities for experiencing, knowing, teaching, learning, doing mathematics, thinking about school and society, etc.	Examples that offer a glimpse of human experience different from one's own – i.e. offering an image of another person's experience or of educational experiences that the viewer may not have encountered or seriously considered before
Offer a model for imitation	Exemplars that display teaching practices, approaches, or other actions/activities that can be emulated or used in one's own teaching

Table 1: Instructional purposes when using VRPs as Illustrations

These video illustrations were primarily shown by the instructor during class sessions as part of a presentation or larger activity for helping preservice teachers understand or see something more clearly. The activities included a variety of whole group, small group, and individual writing/thinking tasks – such as working through the mathematics that was (or will be) seen in the video, making/sharing initial observations and impressions from viewing the video, and considering focal questions about the video posed by the instructor.

VRPs as Data or Cases for Analysis

Another way interviewees re-used existing VRPs was by having learners work with them as a sample of classroom data or as cases of teaching and learning to analyze. This served two main purposes for these interview participants: to create an opportunity for learners to (a) closely examine an instance of practice, analyzing some of the details or complexities of practice and/or (b) learn to use particular analytic lenses or frameworks for examining practice. For example, one instructor (Interviewee 25) described her use of VRPs with StudioCode, a video analysis software, in a preservice teacher education course:

> They're coding the video for particular high leverage instances of student thinking and then… us(ing) an analytic framework to make sense of those instances or to unpack their thinking about those instances and then propose a follow-up move to those instances.

This type of careful analytic work can take place both within and outside of class time. For example, in the activity described above, the instructor had preservice teachers independently analyze the same video outside of class, send their analysis to her as a StudioCode "timeline," then she compiled these analyses for an in-class discussion. She explained:

> I can put them all together and when we come together they can very quickly see where their coding lines up or doesn't line up with other people and we can have a discussion around those and unpack those instances.

In this example of re-use, preservice teachers worked directly with the VRPs themselves, taking the time to view instances of student thinking in detail as well as examining multiple perspectives of these instances.

Interviewees who discussed this type of re-use typically described efforts to engage learners in closely examining the videos to uncover details, processes, relationships, interactions, etc. that could be seen within the footage. And, like the example above, this work often involved spending time working directly with the video (rather than simply viewing a video shown once or twice by the instructor) to carry out analyses and consider new or multiple perspectives. The foci of these efforts included investigations into *teaching practices* as well as *student thinking, learning, and problem solving*. A few also described activities where preservice teachers focused on

comparing and contrasting practices or approaches by looking across videos from multiple teachers/students. For example, a teacher educator (Interviewee 14) discussed how, in her course:

> *We are looking for what's similar across a few different teachers teaching.... or what's different. Or they're looking at children's thinking to think about the range of ways that kids might think about something, so the activity is to look at several clips and compare and contrast how kids are thinking about a similar idea.*

In some cases, these activities involved using and testing particular theories or analytic frameworks. In other cases, learners were asked to put forth their own theories and claims, backed by evidence found in the footage. Either way, the videos used in these activities needed to allow preservice teachers to see and examine details of teaching and/or learning practices – making it possible for learners to view practice in multiple and varied ways.

VRPs as Scenarios or Simulations

Finally, interview participants described how they used VRPs to set up instructional scenarios in which to place their preservice teachers or to create simulations of typical or important situations for preservice teachers to work through as if they were the teacher. This type of re-use served the purpose of engaging learners in *doing* certain professional activities and *practicing* various teaching skills – that is, VRPs were used to help learners learn *through practicing*. Rather than viewing the video as an illustration, or studying it as a data sample or case (as discussed above), this use of video involved having learners *do* some facet of teaching within a scenario or simulation created with the video. For example, one teacher educator (Interviewee 41) described her use of VRPs to develop "professional vision" with its associated skills. She explained,

> *We're really focusing on professional vision and this idea that it's a cultivated skill that teachers have to be able to take in everything that's happening in the really chaotic classroom environment and decide what's important to focus on and how to interpret it and respond to it using your own teaching philosophy and using the theory that you subscribe to, to support why you're making decisions that you're making.*

Preservice teachers were given pre-selected video clips on which they practiced deciding "what's important to focus on," (Interviewee 41) interpreting it, and forming their response to it – working alongside peers and with the support and guidance of an instructor.

Teacher educators also used VRPs to create simulations that resemble what might be found in schools and school districts. Sometimes these re-creations were designed to go beyond simply providing opportunities to practice to include other goals for professional preparation. For example, one instructor (Interviewee 19) described how he uses VRPs with his secondary math and science teachers to simulate Professional Learning Communities (PLCs) that are becoming common in schools:

> *...Working with pre-service teachers, we're not just training them on the content, but we're trying to train them to be professionals and really fit in, be a good colleague.... We really try to set our classes up almost like the way that districts set up Professional Learning Communities. And so, we might just pick a video or two to watch and have a targeted discussion, identify a student leader or two to kind of guide the discussion, give the follow-up questions and those kinds of things and that's typically what more schools are starting to do with video-based PLCs.... Again, kind of setting it similar to the context of what a PLC might look like in a district.*

In both this example and the one before it, VRPs were leveraged to create educational contexts in which preservice teachers began to engage in certain facets of teachers' work. In the first example, VRPs were used to engage learners in the observational, interpretive, descriptive, and decision-making work entailed in employing "professional vision" as a teacher. In the second example, preservice teachers practiced leading and participating in professional discussions of teaching practice captured on video. This included the diagnostic and analytic work of examining teaching practice but also finding productive ways to discuss teaching with colleagues – to encourage and enhance one's own and others' professional learning.

Conclusion

This paper is an initial step to look at VRP re-use in mathematics preservice teacher education through the eyes of re-users. This perspective and these initial findings offer several possibilities for those who create, provide, and work with VRPs in teacher education:

- **VRP Re-users**: For teacher educators who re-use VRPs, these findings offer expanded possibilities for how VRPs might be leveraged toward various instructional goals and in a range of learning activities. Additionally, as will be briefly discussed below, these findings may also result in more VRPs and better access to them for broad re-use in teacher education.
- **VRP Producers**: For those who produce VRPs as a facet of their work and see them as a valuable resource for other education professionals, these findings offer diverse images of how VRPs are leveraged in mathematics teacher education, going beyond common notions of simply using video to show how – or how one ought – to do something. While VRPs are commonly used by teacher educators as illustrations, what is being illustrated and how it is being used as an illustration greatly varies. Additionally, "illustration" is only one of several types of re-use. Understanding the ways in which the VRPs could be leveraged offers new possibilities for developing VRPs as educational resources. Rather than producing VRPs for single, focused purposes, VRPs might be developed in ways to facilitate re-use in many types of activities, supporting a range of instructional goals.
- **VRP Providers**: For those who provide VRPs for re-use in preservice teacher education and/or offer services that support this type of re-use, these findings offer a glimpse into the ways in which teacher educators integrate VRPs into their work with preservice teachers. They provide insights into what matters for teacher educators when looking for VRPs to use in different types of activities for varied instructional purposes (e.g. good "fit" for a particular type of illustration, visible/audible details that allow for close examination of practices, continuous footage of key classroom interactions that might be used for teaching simulations). These findings also suggest possibilities for the types of resources or supports that might be important for teacher educators as they re-use VRPs (e.g. transcripts of the video, re-usable text/graphics of the mathematics problem being focused upon in the VRP, the capacity to prepare one or more video segments for learners to work with during or outside of class).

A deeper and clearer understanding of teacher educators' instructional purposes, the types of VRPs used in and sought for these purposes, and the ways in which learners are asked to work with VRPs can offer re-users, producers, and providers with important insights into re-use and expand their own sense of the possibilities for VRP use, development, and support.

References

Bacevich, A. E. (2010). *Building Curriculum for Teacher Education: A Study of Video Records of Practice.* Retrieved from http://deepblue.lib.umich.edu/handle/2027.42/77781

Bass, H., Usiskin, Z., Burrill, G., National Research Council (U.S.), Mathematical Sciences Education Board, & United States National Commission on Mathematics Instruction (Eds.). (2002). *Studying Classroom Teaching as a Medium for Professional Development Proceedings of a U.S.-Japan Workshop*. Washington, DC: National Academy Press. Retrieved from http://www.nap.edu/catalog/10289.html

Biberstine, R. D. (1971). The Utilization of Videotape Equipment in Teacher Education. *Contemporary Education*, *42*(5), 217.

Bill & Melinda Gates Foundation. (2013). *Ensuring Fair and Reliable Measures of Effective Teaching: Culminating Findings from the MET Project's Three-Year Study* (Policy and Practice Brief) (p. 26). Bill & Melinda Gates Foundation. Retrieved from http://k12education.gatesfoundation.org/download/?Num=2572&filename=MET_Ensuring_Fair_and_Reliable_Measures_Practitioner_Brief.pdf

Boerst, T., Sleep, L., Ball, D. L., & Bass, H. (2011). Preparing Teachers to Lead Mathematics Discussions. *Teachers College Record*, *113*(12), 2844–2877.

Borko, H., Jacobs, J., Eiteljorg, E., & Pittman, M. E. (2008). Video as a Tool for Fostering Productive Discussions in Mathematics Professional Development. *Teaching and Teacher Education*, *24*(2), 417–436. https://doi.org/10.1016/j.tate.2006.11.012

Brophy, J. E. (Ed.). (2004). *Using Video in Teacher Education* (1st ed). Amsterdam; Boston: Elsevier/JAI.

Brouwer, C. N. (2011). Imaging Teacher Learning. a Literature Review on the Use of Digital Video for Preservice Teacher Education and Professional Development. Presented at the Annual meeting of the American Educational Research Association, New Orleans, LA.

Burleigh, J. C., & Peterson, H. W. (1967). Videotapes in Teacher Education. *The Elementary School Journal*, *68*(1), 35–38.

Brunvand, S. (2010). Best Practices for Producing Video Content for Teacher Education. *Contemporary Issues in Technology and Teacher Education*, *10*(2), 247–256.

Calandra, B., & Rich, P. J. (Eds.). (2014). *Digital Video For Teacher Education: Research And Practice*. New York, NY: Routledge.

Gaudin, C., & Chaliès, S. (2015). Video Viewing in Teacher Education and Professional Development: A Literature Review. *Educational Research Review*, *16*(2015), 41–67. https://doi.org/10.1016/j.edurev.2015.06.001

Ho, A. D., & Kane, T. J. (2013). *The Reliability of Classroom Observations by School Personnel. Research Paper. MET Project* (Research Paper). Bill & Melinda Gates Foundation. Retrieved from https://files.eric.ed.gov/fulltext/ED540957.pdf

Holsti, O. R. (1969). *Content Analysis for the Social Sciences and Humanities*. Reading, MA: Addison-Wesley Pub. Co. Retrieved from http://mirlyn.lib.umich.edu/Record/000000426

Janík, T., Seidel, T., & Najvar, P. (2009). Introduction: On the Power of Video Studies in Investigating Teaching and Learning. In T. Janík & T. Seidel (Eds.), *The Power of Video Studies in Investigating Teaching and Learning in the Classroom* (pp. 7–22). Münster, Germany: Waxmann.

Lustick, D., & Sykes, G. (2006). National Board Certification as Professional Development: What Are Teachers Learning? *Education Policy Analysis Archives*, *14*(5), 43.

Pecheone, R., & Wei, R. C. (2011). The Performance Assessment for California Teachers: A Policy Case Study of Teacher Work Sampling. In H. C. Rosselli, M. Girod, & M. Brodsky (Eds.), *Connecting Teaching and Learning: History, Evolution, and Case Studies of Teacher Work Sample Methodology* (pp. 187–206). Lanham, MD: Rowman & Littlefield Publishers.

Rook, M. M., & McDonald, S. P. (2012). Digital Records of Practice: A Literature Review of Video Analysis in Teacher Practice (Vol. 2012, pp. 1441–1446). Presented at the Society for Information Technology & Teacher Education International Conference. Retrieved from http://www.editlib.org/p/39784/

Santagata, R. (2009). Designing Video-Based Professional Development for Mathematics Teachers in Low-Performing Schools. *Journal of Teacher Education*, *60*(1), 38–51. https://doi.org/10.1177/0022487108328485

Seago, N., Jacobs, J., & Driscoll, M. (2010). Transforming Middle School Geometry: Designing Professional Development Materials That Support the Teaching and Learning of Similarity. *Middle Grades Research Journal*, *5*(4), 199+.

Sherin, M. G., & Sherin, B. L. (2007). Research on How People Learn with and from Video. In S. J. Derry (Ed.), *Guidelines for Video Research in Education: Recommendations from an Expert Panel* (pp. 47–58). Chicago, IL: Data Research and Development Center. Retrieved from http://drdc.uchicago.edu/what/video-research-guidelines.pdf

Sherin, M., & van Es, E. (2005). Using Video to Support Teachers' Ability to Notice Classroom Interactions. *Journal of Technology and Teacher Education*, *13*(3), 475–491.

The American Association of Colleges for Teacher Education (AACTE). (n.d.). edTPA FAQ. Retrieved December 17, 2016, from http://edtpa.aacte.org/faq

van Es, E. A., & Sherin, M. G. (2010). The Influence of Video Clubs on Teachers' Thinking and Practice. *Journal of Mathematics Teacher Education*, *13*(2), 155–176. https://doi.org/10.1007/s10857-009-9130-3

Villegas-Reimers, E. (2003). *Teacher Professional Development: An International Review of the Literature*. Paris: UNESCO: International Institute for Educational Planning.

Virtual Learning Community. (2018). About the VLC. Retrieved October 10, 2017, from https://vlc.uchicago.edu/about

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