OpenEd

Insights Into Effectiveness
of K-12 Online Instructional Resources

By Adam Blum, CEO, OpenEd.com

OpenEd has the largest K-12 resource library with over a million videos, games, assessments and homework assignments, all aligned to Common Core and other state standards. Virtually every free K-12 resource publisher is represented on OpenEd, from prominent content owners such as Khan Academy and LearnZillion to more focused providers such as Let's Start Smart and Teaching Library.

A unique aspect of OpenEd is that it uses formative assessments to drive resource selection. Based on the student's results on the assessment, they are presented with suggested instructional resources (generally videos) to address the identified learning gaps.   Many students then take a subsequent assessment on the site to determine if they have achieved mastery. A large number of students use OpenEd this way: more than 200,000 teacher subscribers, representing 10 percent of U.S. classrooms, employ it to teach their students. Because of this usage pattern, the breadth of Open content, and the large amount of users, we have a unique view into the effectiveness of instructional resources, especially videos and games.   This paper presents some of the key insights we have noticed in evaluating the effectiveness of those resources. OpenEd obviously uses this data to help highlight the best resources, but we hope this information will help teachers make the best use of educational videos and games whether they use OpenEd or not.

Resource Effectiveness

So how do we define resource effectiveness?   For the purposes of this analysis, a resource is rated by evaluating how students perform on an assessment that is on the same subject or standard category subsequent to that student viewing the resource. If the same assessment is taken again later, it is not used to evaluate that particular resource.

For example, imagine a student, Tiana, watches the video "Area of a Triangle - MathHelp.com - Geometry Help" aligned to Common Core standard 6.G.1.   She then takes the assessment "Geometric Area" and gets a 90 percent.   Malik watches the same video and then takes another assessment on 6.G.1 called "Area of Triangles, Quadrilaterals, Polygons" and gets a 70

percent. So far the video has an effectiveness rating of 80 percent for that standard. Resources get an effectiveness rating for each standard to which they are aligned, derived from all student viewings and subsequent assessments on that standard.

Using this methodology, the average resource effectiveness for all resources in the OpenEd catalog was 66 percent. The standard deviation is 11 percent.

In this paper we present some concrete insights we have gleaned from looking at the effectiveness of various publishers and of specific resources based on various aspects of the resources. We, of course, use resource effectiveness to search results on OpenEd and to build lesson plans and suggested resources for assessments.   We hope that providing these insights to teachers will help them more effectively choose resources, whether they use OpenEd to find those resources or not.

"Niche" Resource Specialists Outperform Generalists

The largest resource publishers on OpenEd are Khan Academy, LearnZillion, IXL and eSparkLearning. Khan Academy and LearnZillion's average effectiveness is right at the overall average of 66 percent. These are edged out only slightly by IXL and eSparkLearning with effectiveness of 67 percent and 68 percent respectively.

By contrast, more focused specialist publishers, such as The Balanced Literacy Diet, Teaching Library and Virtual Montessori, have much higher average effectiveness (with average effectiveness scores of 90, 89 and 88 percent). Publishers that concentrate on a single subject area (such as math or English/language arts) in a limited grade range (such as elementary or middle school) also have higher engagement as measured by video completions and repeated viewings.

Here is a list of the top publishers based on average effectiveness ratings.

Table 1 - Top Most Effective Publishers

Publisher	Rating	Content Details
WordWorldPBS	94	PBS has a long list of highly effective resources and "subchannels." Word World is one of the best for younger learners of ELA skills.
LetsStartSmart	92	Cartoons and songs work for younger ELA learners.
The Balanced Literacy Diet	90	Original approach to undercovered ELA skills with teacher style videos.
Teaching Library	89	Cartoon-based ELA videos.

VirtualMontessori	88	Cartoons and songs for early learner ELA skills.
Bozeman Science	86	Science and math videos for mostly middle and high school.
Brainzy Games by Education.com	86	Games for math and ELA for all grade levels.
Skills@Library University of Leeds	86	Videos for ELA aimed at upper grades.
bka65	85	Cartoon-based ELA videos for younger grades.
mrscodispoti	83	Teacher-produced ELA videos for elementary grades.
Mr Walton	83	Songs and games for math.
Complabteacher	83	Cartoon-based math videos for younger students.
Grancie48	82	Videos for ELA and math for very young students.
turtlediary	81	Interactive videos in ELA and math for young students.

The full list of average to above average publishers is available upon request, however, we do not list the below average publishers because over time we prune out publishers with below average resource effectiveness.

Resource Types: Games Outperform Videos

The average instructional game across OpenEd has an effectiveness score of 70 percent. Some of the standout game providers include MathChimp and Utah State University. This is a significant improvement over 66 percent for videos. The message for teachers is to try to include games wherever possible in your instructional resources. Free games outside of elementary and middle school are still rare in the industry. OpenEd already has the vast majority of free instructional games available, and we are working to add more paid game providers in other subjects (such as English and science) and age ranges (particularly high school).

Games and videos drastically outperform other resource types, such as printed worksheets and supplementary text. We encourage teachers to bear this in mind when choosing supplementary resources.

Effectiveness of "Video Types"

We have divided video types into several categories:

- Cartoons (an animation, often with accompanying music or songs for younger grades)
- Flashcards (a specific type of animation, with a pause to allow students to answer questions)
- Lessons (a slide deck or PowerPoint preso narrated over by a teacher)
- Teachers (a live teacher being videoed as a "talking head" or standing by a blackboard)
- Blackboards (drawing on an electronic slate as popularized by Sal Khan)

Specifically, "flashcard-style cartoons" are most effective.   After that, "lessons" as slide decks or Powerpoints with narration have the highest level of effectiveness. Then "generic cartoons" rank at the average level of effectiveness. There is then a big gap in effectiveness to the "teacher standing up or talking head." Finally, the least effective video type is the "blackboard." Table 2 summarizes these results.

Table 2 - Video Type Effectiveness

Video Type	Average Effectiveness
Flashcards	72.1
Lessons	68.6
Cartoons	66.7
Teachers	64.6
Blackboards	63.5

Optimal Duration: Shorter is More Effective

Shorter videos outperform longer videos. "Fragment videos" of less than two minutes work very well with greater than 69 percent effectiveness, though they are relatively rare (less than 20 percent of the OpenEd catalog). "Standard videos" of two to five minutes work right at the median effectiveness of 66 percent. Such videos are very common - approximately 45 percent of the catalog. Anything beyond five minutes is strongly advised against as it results in below average effectiveness by a significant margin.

Table 3 - Resource Effectiveness by Video Length

Length	% of Catalog	Effectiveness

Less than 1 minute	3.3%	70%
1 to 2 minutes	16.6%	69%
2 to 3	19.0%	66%
3 to 4	15.8%	66%
4 to 5	10.1%	66%
5 to 6	7.2%	63%
6 to 7	6.2%	63%
7 to 8	3.4%	63%
8 to 9	3.7%	64%
9 to 10	5.4%	64%
10 or more	9.2%	63%

Conclusion

Using our teacher base of more than 200,000 teachers who assign videos to students and then have them take related assessments, we have analyzed resource effectiveness according to various attributes. The most important insights include:

- Focused specialized content publishers provide more effective content than publishers who attempt to cover all subjects and grades. Teachers should look for specialists that provide content that accelerates learning for their students.
- Games and videos are both powerful instructional supplements.   Games are a bit harder to find for some topics but are worth including if you can find them.
- With video resources, cartoons, "flashcard-cartoons," and slide deck-style lessons outperform both Khan-style "blackboards" and teachers standing at blackboards.
- Shorter videos are more effective than longer videos.

To continue to provide teachers with our unique insights into the effectiveness of various online instructional resources, we will be breaking down this analysis further in later papers based on student age and subject.

Adam Blum is the CEO of OpenEd, which provides teachers with access to the best educational resources for their students, with a focus on finding the right resources to teach the Common Core

State Standards. To accomplish this important goal, OpenEd built the world's largest catalog of lesson plans, assessments, educational videos and games. OpenEd is committed to keeping the majority of its content available for free to educators around the world. For more information please visit www.OpenEd.com.