How to Succeed as an Academic on YouTube

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More and more people are turning to YouTube to expand their knowledge, develop their understanding, and learn new skills. These "casual learners"—loosely defined as individuals who are curious about a topic and are self-motivated to learn more about it— are taking advantage of the ease with which nearly anyone with an internet connection, basic video skills, and something to say, can become a YouTube "creator." However, amidst a dizzying array of videos purporting to educate or otherwise inform viewers, academic content-creators are notable by their lack of presence on the platform. Here, there are largely-untapped opportunities for academics to contribute to the richness, diversity and trustworthiness of video content available to casual learners, and to effectively mobilize their knowledge at scale. There is also a pressing need for diversity in casual learning content, including diversity in creator gender, identity, ethnicity, and perspective, and academics are uniquely positioned to address this need. Drawing on the author's experiences in developing and producing the YouTube channel Risk Bites, this perspective explores how time, resource, and even talent-limited academics can nevertheless leverage YouTube as a platform for further mobilizing their knowledge for public good.

Keywords: YouTube, science communication, casual learning, informal online learning, academic content creation, knowledge mobilization

INTRODUCTION

Since its launch in 2005, YouTube has emerged as a versatile educational platform (Sherer and Shea, 2011; Snelson, 2011) and perhaps one of the most influential online platforms for casual (or informal online) learning (Duffy, 2008; Brossard and Scheufele, 2013; Maynard, 2016, 2017; Welbourne and Grant, 2016). Despite this, academic experts have struggled to make effective use of YouTube and similar platforms for effective and impactful knowledge mobilization, in spite of growing expectations that research and scholarship are connected more effectively to socially relevant issues and outcomes. This seeming-disconnect between holders of knowledge within academia, and consumers of knowledge (or what masquerades as knowledge) on YouTube, has long intrigued me as a university professor and science communicator—so much so that, in 2012, I set out to explore how academic experts with little to no institutional support can effectively utilize the platform in providing YouTube users with accessible and engaging content that represents the cutting edge of current knowledge. The result was the YouTube channel Risk Bites[1], and 8 years of learning the hard way what works and what doesn't as an academic who also aspires to be a YouTube content creator.

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[1]YouTube: Risk Bites http://youtube.com/riskbites (accessed June 4, 2020).

In setting out on this journey, I was particularly interested in how individuals with no institutional support or communication-specific funding, but with a passion for making their knowledge accessible and useful to others, could effectively use YouTube as a casual learning platform—where casual learners are loosely defined as individuals who are curious about a topic and are self-motivated to learn more about it (Maynard, 2016).

Sadly, effective public communication as a social good remains under resourced in many academic institutions, and one consequence of this is that academics who take such a role seriously often need to resort to modes of communication that they can squeeze between the cracks in a profession that is extremely demanding of their time and attention. Within this context, I set out to better understand as a practitioner how time-constrained academics interested in public education/communication could leverage the opportunities afforded by YouTube to reach wider audiences and engage in effective knowledge mobilization at scale.

This paper draws on that journey as it provides a personal perspective on the opportunities and challenges that the democratization of online video-based communication and education opens up to independent academic experts. In doing so, it considers ways in which academics may succeed as YouTube "stars"—not in the conventional sense of online stardom, but in the sense of effectively mobilizing their knowledge for online audiences, and making it accessible to casual learners in a form that is relevant, impactful, and scalable.

WHY YOUTUBE?

Over the past several years, the ways people learn and the various roles of learning in society, have been undergoing a number of transformations (Brown and Adler, 2008; Thomas and Brown, 2011, 2012; Peters et al., 2014). In particular, the emergence of new technologies, shifts in social systems, norms and expectations, and the continuing march of automation, are together calling into question how we learn and what we learn. One consequence of this has been a growing shift toward online informal self-directed, or casual, learning, where users actively seek out the knowledge they are interested in (Song and Bonk, 2016; Welbourne and Grant, 2016; Peters and Romero, 2019). This form of learning is endemic within generations who have grown up with Google and near-ubiquitous internet access, and where information (although not necessarily knowledge) is often a mere search box or smart-speaker query away.

Within this casual learning environment, YouTube has arisen as one of the most widely used platforms for informally acquiring new skills and knowledge. The platform is purportedly the largest search engine in the world after Google,[2] and is increasingly a go-to platform for learning specific skills. It's where casual learners turn if they want to know how to mend a leaking toilet, or try a new hairstyle, or bake bread, learn to paint landscapes, ace an

interview, or master a myriad other practical techniques. But it is also where a growing number of users are turning to expand their understanding and to learn more broadly. As a result, there is a growing breadth and depth of knowledge-content on YouTube that dives deep into areas such as mathematics, philosophy, history, and science (social as well as natural), and that provides casual learners with access to material that was previously confined to academic books, peer review papers, and tuition-based college and university classes.

This content is being spurred on by a growing global desire for learning that is not being met through conventional channels, and that is reflected in the popularity of Massive Open Online Courses (MOOCs) (Breslow et al., 2013) and movements, such as TED (Technology, Entertainment, and Design) (Sugimoto and Thelwall, 2013). This is a desire that, I suspect, is being stimulated in part by living in a world of rapidly changing technological capabilities and social norms, where conventional educational platforms are not keeping up with the need for agility in developing new skills and understanding. But it also reflects the natural curiosity and innate desire to learn that many of us possess. Here, YouTube is enabling people to satisfy this curiosity on their own terms, without the constraints imposed by formal educational establishments.

Perhaps reflecting this, YouTube reportedly has over 2 billion users who watch over a billion hours of video each day,[3] and according to the Pew Research Center, it continues to be the most widely used online platform in the US, with 81% of 15–25 years old and 73% of adults claiming to use it at some time (Perrin and Anderson, 2019). Of course, many YouTube users will be looking for content that is entertaining, and that is associated with and reinforces their online social community and identity. Of these, only a relatively small subset of users are likely to be explicitly seeking educational content. Yet the very nature of casual learning blurs the lines between how content is defined, meaning that many YouTube users are likely learning from a broad diversity of video types, styles and genres, irrespective of how content creators or researchers categorize them.

Within this online learning environment, a number of educational content creators have become highly successful in terms of video views and the numbers of people subscribing to their channels. For example, at the time of writing, Minute Physics[4]—an early trend-setter in science content on YouTube—has over 5 million subscribers and over 440 million views. Vsauce[5]—another early pioneer in casual learning-oriented content—has close to 16 million subscribers, and over 1.8 billion views. CrashCourse[6]—a learning channel launched by Hank and John Green in 2012—has nearly 11 million subscribers, and over 1.2 billion views. And Khan Academy[7]—an early leader in

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[2] Search Engine Journal: Meet the 7 Most Popular Search Engines in the World https://www.searchenginejournal.com/seo-101/meet-search-engines/ (accessed 4 June, 2020).

[3] YouTube: YouTube for Press https://www.youtube.com/intl/en-GB/about/press/ (accessed June 4, 2020).

[4] Minute Physics: https://www.youtube.com/user/minutephysics (accessed June 4, 2020).

[5] VSauce: https://www.youtube.com/user/vsauce (accessed June 4, 2020).

[6] CrashCourse: https://www.youtube.com/user/crashcourse (accessed June 4, 2020).

[7] Khan Academy: https://www.youtube.com/user/khanacademy (accessed June 4, 2020).

simple video-based educational instruction—has over 5.7 million subscribers and 1.7 billion views.

The learning-reach implied by these numbers is substantial, and these are just a few of the many YouTube channels that combine sought-after educational content with views in the millions or billions. These figures attest to a deep interest amongst users for educational content, and the potential for educational channels on YouTube to reach large numbers of casual learners. And yet, while many of these channels are produced by experts, or draw on the knowledge of experts, very few are produced by individual academics as part of their public communication and/or knowledge mobilization efforts. Even at substantially lower levels of reach and engagement (such as YouTube channels with thousands of subscribers and tens of thousands of views) successful academic content creators are hard to find.

This is problematic, both with respect to the implications for how much knowledge residing in academia that is not being mobilized and contributing to social value creation through YouTube, and in terms of the quality and trustworthiness of content that is, in turn, filling the resulting vacuum.

On this latter point, there is rising concern around the use of YouTube and other social media platforms to promote false and misleading information (Briones et al., 2012; Donzelli et al., 2018; Allgaier, 2019; Scheufele and Krause, 2019; Ahmed et al., 2020). And the reality is that, as online platforms continue to enable a rapid scaling of one-to-many communication that is independent of the validity or trustworthiness of the content, there is a growing danger around potentially harmful misinformation propagating through society. Yet this only serves to emphasize the importance of academics developing the skills and abilities to act as counterweights to misleading and mischievous content masquerading as authoritative educational material.

Of course, many prominent educational channels on YouTube provide exceptionally high-quality content that is expertly crafted by professionals for the audiences they serve. And it would be naïve to assume that individual academic content creators could and should aspire to compete with them on the same grounds— especially as they have many other commitments on their time and attention to balance. And yet, despite the presence of these professional education channels, YouTube remains rife with poor and misleading content that is returned in searches by casual learners, and that is challenging for them to sift through.

In addition to the tension between accurate and informative vs. inaccurate and misleading information, there are also gaps in YouTube content where leading educational creators simply do not have the time or the impetus to produce the diversity of material that casual learners are looking for. This is exacerbated by successful content creators often pursuing business models that are based on ad-revenues which are, in turn, driven by user views. And while this is a model that can and does support high quality content, it is also one that prioritizes popular content over useful content.

The result is a landscape of authoritative, accessible and informative content for casual learners on YouTube that is far from comprehensive, and a community of professional content-producers who, despite their best efforts, are unable to meet the needs of users—especially in niche areas. And it was this gap between content-production and content-demand that got me asking in 2012 what it might take for academic content-creators to become increasingly successful in using YouTube for knowledge mobilization, and what might define success in this context.

RISK BITES

Prior to 2011, I had relatively little interest in YouTube. As well as being a professor at a research university, I was an active science communicator, writing and talking widely about the responsible development and use of nanotechnologies and other emerging technologies. And I'd occasionally used the platform to post-videos relevant to my work. But it wasn't until my then-teenage daughter and son introduced me to how some communities were using YouTube that I began to explore more deeply how it might be utilized by academics with an interest in public education and communication.

In July 2011, my daughter and son persuaded me to accompany them to VidCon—an annual convention dedicated to online video that was originally conceived by the authors and YouTube creators John and Hank Green. At the time, my daughter was a member of an international YouTube collaborative channel, and deeply engaged with the online community fostered by the Green brothers.

This was the second year the convention had been held, and it was still small and informal enough for top YouTube creators to mix and engage relatively freely with their fans. At the start of the convention, I was mildly curious about what was happening with YouTube around science communication and education. But by the end of it, I was convinced that this was a platform that offered academic content creators a unique opportunity to make what they know accessible to others—and the seeds for the educational channel Risk Bites were sown.

Under the curation of John and Hank Green, VidCon 2011 had a strong focus on educational content creators. This is where I was introduced to a foundational community of creators who had either set out to make educational content that was highly accessible and engaging (such as Derek Muller and Veritasium,[8] and Henry Reich and Minute Physics), or had morphed into educational content (such as the channel Vsauce). What struck me most though was the combination of authenticity and simplicity that many of these creators represented, together with an ability to reach hundreds of thousands, if not millions, of viewers. Using the simplest of methods—at least on the surface—creators, such as Henry Reich, Vi Hart,[9] and others were demonstrating that, equipped with a video camera, whiteboard (or sheet of paper) and a handful of pens, anyone with knowledge to share and some patience could become a successful YouTube creator.

Of course, it wasn't quite this simple. But after the convention, I was intrigued by whether someone like myself—an academic with deep expertise in risk, emerging technologies and

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[8]Veritasium: https://www.youtube.com/user/1veritasium (accessed June 4, 2020).
[9]Vihart: https://www.youtube.com/user/Vihart (accessed June 4, 2020).

responsible innovation, but little creative talent, less time, and no training—could also leverage the platform as a way of making accessible what I knew to others.

My motivation here was 3-fold. As a science communicator, I was interested in better-understanding how YouTube could be used for user-centric communication, where viewers are the arbiters of what is worth their time to watch. As an educator, I was intrigued with the potential to make what I taught inside relatively small limited-access classrooms publicly accessible at scale, to thousands, or even tens of thousands of YouTube users. And as an academic, I wanted to know if it was possible to develop a video creation process that would empower people in a similar position to myself to make their knowledge freely accessible to others within the constraints of having little time or perceived ability, and often with little to no institutional support.

The result was the channel Risk Bites,[10] which soft-launched in July 2012, and formally launched in November the same year.

VIDEO CONTENT-CREATION FOR TIME AND TALENT-LIMITED ACADEMICS

Given my lack of time, resources, and talent as a video-creator, Risk Bites was designed and developed around a concept that worked within these limitations to produce content that was engaging, informative, and useful. Drawing on my work around risk (which spans conventional risk assessment to the potential risks of emerging technologies and novel approaches to value protection and creation[11]), the channel focused (and still does) on making the science of risk engaging, accessible and useful to a broad audience. Within this, a style was developed that was loosely based on the simple drawings of Minute Physics and the screen-drawings used by Kahn Academy, and was modulated by my limited skills with a whiteboard, which consisted of the simplest possible stick figures, geometric shapes, and the occasional written word.

Given the constraints of time, ability and resources, a workflow was developed that was designed to support the effective production of videos that appealed to viewers despite their obvious limitations. Here, four factors were paramount: developing content built on a highly professional foundation, even where the results appeared somewhat informal; building videos around a tightly focused and constructed script that is easy to follow, engaging and as jargon-free as possible; ensuring the narration and audio quality were as high as could be achieved with available resources; and staying true to my personality, perspectives and interests as an expert and creator.

These factors were codified into a workflow for producing tightly-scripted 3–5 min videos that continues to underpin the channel's content, and which is outlined in **Table 1**.

With some practice, this workflow enabled the production of a ~3–5 min video with around 10–15 h effort, that reflected my expertise and was relevant and accessible to a wide audience. It also allowed for the rapid production of highly-responsive

TABLE 1 | Workflow followed for Risk Bites from the initial idea to the final video[a].

Step	Process	Details
1. Focus	Identify a clear, constrained and relevant topic for the video	Ensure that the video is focused on a topic of potential interest and relevance to casual learners, and that it stays on topic.
2. Script	Develop a tightly focused 3–5 min script that tells a story, is engaging, and that is accurate and informative	Draw viewers in, keep them engaged and entertained, and leave them with new knowledge and insights. Ensure the script is easy to follow and understandable when read aloud, engaging, and as far as possible, jargon-free.
3. Storyboard	Sketch out each unique scene in the video, based on the script	Plan the video's visuals so that they help tell the story and inform the viewer, while complimenting the script
4. Voiceover	Record the video voiceover and add a music track that compliments and enhances the video.	Provide a compelling narrative and music track for the video. A sufficiently high-quality voiceover is possible to record using a smartphone in an acoustically dead space.
5. Filming	Film each scene being drawn out on a whiteboard (or other media, such as a sheet of paper, or a tablet)	Capture the raw material for the video. With practice, a smart phone can be used to capture video of sufficient quality.
6. Editing	Combine video and audio	Using a video editing app, match the video to voiceover/soundtrack through speeding up video clips and inserting stills.
7. Finishing touches	Add titles and credits, refine video, and check for quality before finalizing.	Finalize the video, and check multiple times that the content is accurate, that the phrasing and cadence of the video is engaging, and that there are no errors or glitches.
8. Publication	Post to YouTube	Make sure to include closed captions on all videos to ensure accessibility, and links to additional resources, as well as a descriptive title and blurb. Optimize the video title, description and keywords for Search Engine Optimization.

[a]More information on this workflow is available at Science Videos made Simple: https://therealandrewmaynard.com/videos-introduction/ (accessed June 1, 2020).

videos where there was an emerging need. For instance, it took around 12 h from initial concept to publication for the 2014 video "5 Things Worth Knowing about Ebola."[12] And somewhat uniquely, it enabled the production of videos that reflect nuances and subtleties in expertise and insight which are common in the classroom, but hard to replicate by video producers who are not also domain experts.

By utilizing this workflow and taking advantage of the simplicity of whiteboard-style videos, Risk Bites has developed into a niche YouTube channel that is effective at reaching specific audiences. At the time of writing, the channel has over 15,400

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[10]Risk Bites: https://www.youtube.com/user/riskbites (accessed June 4, 2020).
[11]See, for instance, the work of the Arizona State University Risk Innovation Nexus: http://riskinnovation.org (accessed November 29, 2020).

[12]Risk Bites: 5 things worth knowing about the risks of Ebola: https://www.youtube.com/watch?v=jRv5zZUcWRc (accessed June 4, 2020).

subscribers and 100 public videos that have been watched over 2.6 million times, with aggregated channel videos being watched nearly 100 h per day on average.[13] These numbers are not high compared to the top science channels on YouTube. But for a channel produced as a side-project by a full-time academic, they represent a substantial reach.

This reach becomes more apparent when watch-time is compared to in-class face-time with students. 100 h is roughly equivalent to individual student-instructor face-time associated with teaching seven students in a one-credit course over a semester (assuming a 15-weeks semester). In other words, each day, Risk Bites videos have a similar reach to a small semester-long class. By this metric, 100 h per day of YouTube watch-time over 15 weeks is similar to the student-instructor face-time associated with teaching 105 such courses over a semester, or teaching 735 students in a one-credit course or 245 students in a 3-credit course.

Of course, these comparisons are flawed, as class-based teaching involves far more than face to face lecturing (or equivalent). And unlike education within a structured learning environment, there is no clear association with YouTube videos between watch-time and measurable learning with respect to specific learning objectives. To complicate matters further, watch-time is not associated with the number of users who view videos in their entirety (many videos are only watched for a fraction of their duration). Yet despite this, the comparisons serve as a crude yet useful indicator of the potential reach and impact of even a relatively modest YouTube channel.

Useful as video views and watch-time are in indicating reach and impact though, it's also helpful to gain insights into who is engaging with content, and how it is relevant to them. Here, subjective indicators of success used by Risk Bites have included requests for permission to use videos as an education or training resource, and requests for new videos (or collaborations) addressing specific topics.

Since the channel's formation, a number of its videos have been used as class resources around the world, or by media outlets to explain complex topics. These uses are not always reflected in YouTube analytics, and so are sometimes hard to track. But where they can be, they help indicate the value, utility and reach of the channel's content.

Video collaborations, and requests for videos on specific topics, further establish the value of the channel to others. Since its launch, over 20% of videos produced have involved collaborations of one form or another. For example, the video "TOX21: A New Way to Evaluate Chemical Safety and assess risk"[14] was produced at the request of the International Life Science Institute North America (ILSI NA—an organization which I am affiliated with) and with collaborators from the US Environmental Protection Agency, and the Environmental Defense Fund (EDF). And the video "What Does

'Probably Causes Cancer' Mean?"[15] was a collaboration with the online environmental magazine Grist. More recently, "A social distancing guide for students living with coronavirus"[16] came out of a collaboration with two prominent public health experts. And in 2017, the Swiss National Science Foundation supported a series of videos on nanotechnology research that were directly inspired by Risk Bites.[17] These and other collaborative videos indicate a level of recognition for the relevance and impact of the channel that transcends metrics, such as views and aggregated view time.

A more quantitative metric that is also indicative of engagement—although one that is not straight forward to interpret—is the average percentage of each video that is viewed. Anecdotally, many YouTube videos show a sharp drop-off in viewer-retention by the half-way point with (a phenomenon borne out on Risk Bites). While this leads to a rather subjective metric of engagement, videos with a low average percentage of video viewed may be considered to be poorly successful in engaging their audience, while those with a high average percentage of video viewed may be considered to be reasonably successful. However, the percentages that delineate high/low success are not well-defined. While there are no hard and fast rules here, and a paucity of related quantitative studies, a general rule of thumb is that videos which lose most viewers in the first few seconds are not particularly effective, while that those which have average percentage views above 60–70% are good performers. Videos with an average percentage view duration around 50% are often considered to be adequate performers (Lang, 2013).

Average percentage view duration is commonly used in the context of video optimization with respect to monetization, where sustained viewing increases the potential of revenue from ads. However, it is also useful for assessing and, where necessary, increasing engagement levels amongst casual learners. As with most YouTube channels, the range of average percentage view duration on Risk Bites is wide. Between May 7–June 3 2020 for instance, amongst the 50 most-watched videos, the top average percentage view duration was 82% and the lowest was 12%, with both the mean and the median sitting at 54%. This suggests a reasonable level of engagement across the channel, and the presence of some videos that are engaging viewers to a high degree. But it also indicates that there is scope for creating content that is more successful in retaining the attention of viewers—although as creators have little control over who watches their videos, there will always be a percentage of viewers who quickly realize a video isn't for them.

Beyond average percentage view duration, another metric has emerged over the course of working on Risk Bites that is partially quantifiable, and perhaps provides an even greater indication of video alignment with casual learner interests: YouTube search rank. This, it should be noted, is an unreliable metric, as the

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[13]Between March 6, 2020 and June 3, 2020, videos across the channel were watched 97 h per day on average.
[14]Risk Bites: TOX21: A New Way to Evaluate Chemical Safety and assess risk: https://www.youtube.com/watch?v=vKhn1HRXgn8 (accessed June 4, 2020).

[15]Risk Bites: What Does "Probably Causes Cancer" Mean? https://www.youtube.com/watch?v=CbBkB81ySxQ (accessed June 4, 2020).
[16]Risk Bites: A social distancing guide for students living with coronavirus: https://www.youtube.com/watch?v=BzfueLoRjwM (accessed June 11, 2020).
[17]NRP 64—Opportunities and risks of nanomaterials: https://www.youtube.com/playlist?list=PL1tMJ7C04BiZqtwOaXKaj0kla_onlexV7 (accessed June 4, 2020).

YouTube search algorithm is opaque, dynamic, and context-dependent. Yet within these limitations, videos that are within the top ten YouTube search results for given keywords and phrases are more likely to be reaching and serving their target audience.

For the past few years, the success of Risk Bites videos has increasingly been assessed by their YouTube search ranking for keywords and phrases associated with their content, and videos have been actively optimized to increase their search rank. This has typically been carried out with the aid of a video optimization plugin, such as VidIQ that helps guide search engine optimization (SEO). Here, search ranking has proved to be a useful tool for assessing the degree to which videos are potentially reaching target audiences, and has indicated a number of notable successes.

For example, the video "What is Nanotechnology" posted in 2016,[18] is one of the top videos returned in the US for YouTube searches for "nanotechnology," "what is nanotechnology," or "nanotechnology risks." "Hazard and Risk – What's the difference?" (2014)[19] is likewise in the top returned items for searches on "hazard vs risk" and "hazard and risk." And "Ten risks presented by Artificial Intelligence" (2018)[20] is amongst the top videos returned on a search for "AI risk" or "Ethical AI."

This focus on search rank for keywords and phrases, rather than absolute views and watch-time, helps refocus efforts on meeting the needs and interests of particular communities of casual learners, rather than competing against channels that are geared toward optimizing views and advertising revenue. Here, it is worth noting that, while the first two videos cited above have relatively high numbers of views for an academic-creator channel (574,000 for nanotechnology, and 130,000 for hazard and risk), the third does not (19,000 views)—despite clearly meeting an area of interest amongst a subset of YouTube users.

Search rank can, of course, be misleading. As well as being context-dependent, it is time-dependent, and an initially successful video may drop in rank as it gets older (although constant attention to SEO can help alleviate this). Yet it remains a useful metric nevertheless for academic content-creators who are looking for indications of whether their videos are having a justifiable impact.

LESSONS LEARNED

Looking back over the past 8 years of producing Risk Bites, perhaps the greatest personal lesson has been that it is not only possible for time and talent-limited academics to be successful on YouTube—as long as appropriate metrics of success are used—but that there is an urgent and growing need for more content creators in this domain. I was curious though as to whether my perspective aligned with that of more successful professional YouTube creators serving casual learners. And so I reached out

to Hank Green, co-founder of the channels CrashCourse and SciShow and the production company Complexly, and a leading producer of YouTube science content, to get his sense of the opportunities that YouTube provides academic content-creators, and in particular whether the platform is simply too dominated by professional producers these days for academics to be able to thrive on it.

Green's perspective aligned with my own experiences: he was clear that there remains plenty of space "for higher-level content that explains things people need to know for work or education… and whether that content is going to be self-sustaining through advertising (it almost definitely won't be) is a completely different question than whether it will improve people's education and provide opportunities for the career of the creator" (Hank Green, personal communication).

Green also emphasized in his response that "more people doing this is better because different people like learning from different types of content" (personal communication). Based on my experiences with Risk Bites, this is especially important, in that being an academic content-creator is not about being the best, or being the most viewed or most popular content-creator, but about providing casual learners with resources that match their needs and interests—even if this is a small and select community of casual learners.

So where does this leave academics with little time and (in some, although not all cases) not much video-creation training or skill, but with a vision for empowering casual learners through YouTube and other video sharing platforms? Based on my personal experiences with Risk Bites and talking with others, the following six areas provide a framework for helping provide meaningful and impactful content to a growing number of YouTube users the world over who are hungry for new knowledge and insights in a rapidly changing world.

Developing a User-Centric Mindset

Casual learners on YouTube are curious, intrigued by novel ideas, and actively seeking new knowledge, insights and skills. But they do this on their own terms, and are free to ignore or walk away from content that doesn't interest them, or that they find off-putting. Because of this, academic content-creators need to focus on what casual learners are looking for, what will engage and inform them, and what will keep their attention, if they are to succeed. Because this is not a captive audience, taking the attitude that viewers should watch your videos because of who you are and what you have to say, is a near-certain pathway to failure.

Working With What You've Got

You don't need to be a professional video creator, have professional video equipment, or be a great artist or animator, to make highly effective content for casual learners—a smartphone and a basic video editing app is the entry point for many creators. Of course, there are some basic rules of thumb for creating engaging and informative videos, including having a clear focus and a compelling narrative. But with practice, most academics have the potential to make impactful videos with the skills and resources they have. That said, within the constraints of working with what you've got, being professional where it counts, such

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[18]Risk Bites: What is Nanotechnology: https://www.youtube.com/watch?v=DAOFpgocfrg (accessed June 4, 2020).

[19]Risk Bites: Hazard and Risk" What's the Difference? https://www.youtube.com/watch?v=_GwVTdsnN1E (accessed June 4, 2020).

[20]Risk Bites: Ten risks presented by Artificial Intelligence: https://www.youtube.com/watch?v=1oeoosMrJz4 (accessed June 4, 2020).

as in the authority and accessibility of content, is important, especially when it comes to creating an engaging, accessible, and accurate narrative.

Nurturing Authenticity

Passion, personality, and being real about who you are and what you're communicating about, create compelling connections with viewers. And while the data are largely anecdotal here, there are indications that casual learners gravitate toward content that is authentic—content that doesn't cynically try to convince viewers to think a certain way or to mislead them, and isn't necessarily highly polished and "corporate," yet is infused with the creator's enthusiasm, personality, and perspective. This has certainly been my experience with Risk Bites where, even though I'm sometimes embarrassed by the poor quality of my animations, viewers constantly inform me that it's the authenticity of the videos that draws them in. Of course, being authentic will also mean that some casual learners won't resonate with your style, and different domains and audiences often have varying expectations around video production. For instance, audiences used to high-quality (and often expensive) graphics and special effects, may balk at the use of simple hand-drawings. Yet as more academics create authentic YouTube content, a growing diversity of styles and approaches will provide viewers with an increasingly rich array of informative content to learn from and benefit from.

Developing and Delivering Compelling Scripts

The more I've worked on developing short, accessible YouTube videos for casual learners, the more I've come to realize how foundational it is to start from a focused and compelling script rather than *ad libbing*. Successful scripts let viewers know where a video is taking them in the first few seconds, and keep them hooked for the remainder of the content. They avoid long-winded explanations and stay tightly focused on the central topic. They rely on a language and style that appeals to and resonates with viewers. And they inform and engage without being patronizing. This is where it's important to have the discipline to cut out all but the most essential information from the story you setting out to tell, and to repeatedly read the script aloud as you edit it. It's equally important to deliver the script in a way that engages viewers. This can vary with audience, with some preferring a more measured pace, and others a more fast-paced delivery (the latter being increasingly expected by younger audiences). In all cases though, scripts should be delivered with a level of expression, cadence and modulations in speed that is not typical in everyday conversation, yet draws viewers in.

Identifying Appropriate Metrics, and Maximizing Content With Respect to These

Perhaps the biggest lesson from creating Risk Bites videos has been the importance of identifying metrics of success that are based on impact within specific communities of casual learners. Of course, absolute numbers related to content views, channel subscribers, and video watch-time, can be useful metrics if the intent is to reach as many people as possible. But interest in particular educational topics is often limited, meaning that video content designed to meet the specific needs of casual learners will rarely attract millions of views. Rather, by identifying metrics that indicate how content is connecting with specific audiences, it becomes possible to assess and build on the success of videos that may only have a few thousand views, but nevertheless provide an important online learning resource.

With Risk Bites, these metrics are increasingly focused on search rank with respect to key words and phrases, and the percentage of each video that is watched by viewers. But with other content, different metrics may provide the insights needed into whether videos are effectively connecting with intended audiences. Irrespective of the metrics used though, success depends on proactively ensuring that content is discoverable and accessible. This includes paying attention to title wording and length, video descriptions and associated material, keywords, and a number of other ways in which content may be optimized on YouTube—including accessibility options, such as adding closed captions (an essential element of any videos designed for casual learners). Here, search engine optimization won't necessarily transform an unsuccessful video into a successful one. But if the intention is to reach self-directed learners as effectively as possible, it is a critical part of the process.

Encouraging and Supporting Others

Finally, while YouTube provides a uniquely powerful platform for academics to make their knowledge and insights accessible to casual learners and public audiences more broadly, success is critically dependent on the support of others. This includes the willingness of institutions, colleagues, and users to proactively highlight and share video content, as this is one way casual learners become aware of it—perhaps one of the greatest fallacies surrounding academic-produced content is that good work speaks for itself; in the world of social media and online content, good work becomes buried, hidden, and ultimately, irrelevant, if it isn't promoted and shared by others.

Of course, asking others to share your work is often difficult. But one of the easiest ways in which online content created by academics can get more traction is by academics who are active online proactively sharing and highlighting the work of their colleagues without being asked. If you are an academic with a passion for making your work accessible through YouTube, one of the most important things you can do is to lead by example and share the work of your peers. This is how a grassroots community of practice emerges that has the potential for substantial and widespread impact that transcends the reach of any one individual creator.

LOOKING FORWARD

Beyond the channels that succeed in attracting views in the billions, YouTube continues to provide academics with a unique yet still deeply under-utilized platform for directly making their knowledge, expertise and insights accessible to casual learners the world over. And while some learning is required on the part of academic content-creators to use the platform effectively, it offers a powerful opportunity for increasing the flow of knowledge

and understanding from experts to users. This is an opportunity that it behooves the academic community to take seriously if their intent is to have broad societal impact through their work. And it is perhaps more important now than ever as casual learners face an ever-growing number of uninformative or even purposely misleading videos on YouTube that are nevertheless enticing and accessible, and that masquerade as trustworthy content. By increasing the amount and scope of engaging and informative content produced by academic creators, there exists an opportunity to tip the balance toward a diversity of informed and instructional content that will serve the interests of YouTube users looking for trustworthy content that is uniquely applicable and accessible to them.

As the past 8 years' experiences with Risk Bites have shown, it is possible for time and talent-constrained academics to be successful in creating YouTube content that serves the needs and interests of these users. Naturally, it takes time and skill to do this well, but nothing beyond what an academic with a passion for making their learning accessible to others is capable of achieving. And of course, whiteboard-style videos are just one of many ways in which creative academics can and are using YouTube as an effective casual learning platform. From my own perspective as an academic, an educator, and a YouTube creator, this is a critically important opportunity. As more and more people look to online platforms for the knowledge and skills they need to thrive in a rapidly changing world, there's a growing need for experts in all fields to embrace these platforms as they strive to make what they know accessible and useful to those who can benefit from it.

There is also a critical need for diversity in casual learning content—diversity in creator gender, identity, and ethnicity, in perspectives, in how content is conveyed, in design and style, and in many other areas. Casual learners need content that they identify with, and that engages and draws them in. And not everyone learns in the same way, or will connect with the same type of content. But casual learners also need access to content that is developed and delivered by people whom they identify with and are inspired by. There is no excuse for the academic community not to proactively encourage and support a diversity of creators who represent and resonate with an equally diverse community of casual learners (Amarasekara and Grant, 2019).

Of course, practice needs to be informed by evidence, and there remains a pressing need for further research into how casual learners use YouTube and other video platforms, and how experts can effectively use these platforms to mobilize their knowledge in the service of these self-directed learners. This includes research into different ways of defining and measuring impact, and increasing impact amongst key audiences. Yet even as research in this domain expands and matures, there is nothing to stop academics with a desire to increase the social relevance of their work from picking up their smartphone or similar, and becoming an academic YouTube "star"—not in the conventional sense of professional content creators with millions of views, but as someone who ably and willingly serves communities who are actively seeking the knowledge they hold.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author/s.

AUTHOR CONTRIBUTIONS

AM was solely responsible for the research, analysis, and synthesis, associated with this paper.

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