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# Making a Difference: A Case Study on Developing Effective Training

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## Introduction

This paper will present a case study of the development of new training videos for high-risk, blue-collar workers in the oil and gas extraction industry under a research program funded by NIOSH. While the author has over 35 years experience in the mining industry, including the successful development of 10 training videos that have been very popular in that industry, it was necessary to begin from scratch when a new project was funded to create equally effective training for land-based oil and gas extraction workers. Although miners and roughnecks share many common traits and norms, it is not true that what works in one industry will work in the other. Each group of workers desires and deserves training that is specific to the unique work processes and hazards they encounter. The NIOSH Oil and Gas Injury Reduction project was designed to accomplish the goal of developing culturally relevant and acceptable materials for workers in an industry unfamiliar to the author. Included will be guidance on how to undertake an "occupational ethnography" or work culture study, and what to do with this information once gathered. Attendees will learn why work stories matter, and who might be the most effective people to use as "stars" in training videos in order to improve effectiveness and message retention. Participants will also learn some quick tips on how to create training videos in the field, and how to avoid common mistakes that can reduce effectiveness of the training products. This presentation draws on nearly 15 years of experience gathered in the field by the author, as she worked in underground and surface coal, metal/nonmetal, and aggregate mines, on salmon fishing boats, and on land-based oil and gas rigs, to develop training for those workers. The experience she gained over the years has been the source of knowledge about high-risk workers, and how they choose to learn, which will be very valuable to safety and health professionals attempting to improve the training they provide.

## An Introduction to Culture

Culture can mean a lot of things to a lot of people. We can use the word when we talk about "the fine arts" or social competence as in, "She is certainly a *cultured* person." We can talk about social structures and practices that appear to us to be uniquely different, as in, "The Maori *culture* of New Zealand can be very intimidating to outsiders." Safety professionals talk about safety *cultures,* by which they mean the

values, norms, and practices of an organization that deal with the safety of its people. All of these definitions have a common thread, the idea that *culture* is socially constructed. In other words, the members of the culture in question create, define, protect, and teach it to new members.

Human beings cannot operate without cultures. These systems provide roadmaps for their members to know how to make sense of what is happening in their lives and how to deal with it. Patton (2002) defines culture as "that collection of behavior patterns and beliefs that constitutes:

- Standards for deciding what is;
- Standards for deciding how one feels about it;
- Standards for deciding what to do about it;
- Standards for deciding how to go about doing it" (81).

Another researcher defined culture as "the collective programming of the mind which distinguishes the members of one group or category of people from another" (Hofstede, 1997, p.5). Very simply, culture is "the way we do things around here."

Any individual person can be a member of many different cultures. They may be a member of a family that has its own rules and traditions, they may be a member of a church that provides definite guidance on what constitutes moral behavior, they may be an alumnus of a school with very well-defined customs, and they may work for an organization that has established policies and procedures. Each of these cultures is different from the others, with different members, and with rules and standards that govern different parts of that person's life. All of these cultures share common traits, however. Some of these are:

- They are socially constructed systems.
- They have developed over time.
- They are shared by all of the members.
- They define who is a member and who is not.
- They provide a social roadmap on what is acceptable and what is not.
- They can be difficult to describe but are quite obvious to both members and outsiders.

Why are cultures important? It is because they control, to a very large degree, the actions of everyone inside of them. Arnauld and Wallendorff describe culture as "the cumulative total of learned beliefs, values, and customs that serve to order, guide, and direct the behavior of members… [it is] that which one needs to know to behave in a manner acceptable to its members" (1994, 485). A member of a culture cannot go against that culture and expect to remain a trusted insider. The culture will always have penalties for "rule breakers," and in extreme cases, those penalties will include banishment.

## Occupational Ethnography

Occupational cultures have particular significance for safety professionals because they control how workers behave on the job. Workers in high-risk industries, such as mining, commercial fishing, or oil and gas extraction, don't generally define themselves by who they work for, but rather, by what they do. In many of these industries, workers are fairly transient, moving from mine to mine, boat to boat, or rig to rig, looking not only for better pay, but also for better working conditions, or sometimes, just because they want to do something different. Hard rock mining even has a term for these miners, calling them "tramp miners," because they tramp from site to site, or "gypos," a term generally believed to derive from their "gypsy nature." Workers who refer to themselves as "gypos," "roughnecks," or "seiners" are going to be much more strongly connected to their occupational norms than to any company policies. Their belief is that if they don't like the company rules, they will just move on. Policies and procedures that are

not acceptable to a work culture will not be adopted by the workforce, regardless of the organizational consequences. It makes sense, then, for a person trying to convince workers to change the way they do things to understand their work cultures and to use them rather than struggle against them.

The term "ethnography" comes from the field of anthropology, and means the study of a group of people. While it is a tool often used by sociologists who want to find out why young people start smoking, for instance, or how fraternal orders attract new members, it is an excellent tool to learn how occupational cultures work. It is the primary tool used in the new NIOSH project that is focused on developing effective safety and health training for the land-based oil and gas (O&G) extraction and production industry, commonly known as the "upstream" portion of that industry. The research included in this project is qualitative in nature, rather than quantitative, in that we are are more interested in discovering what is going on and why than in measuring or evaluating.

Gathering Information on Work Cultures

If occupational culture is a key to the behavior of workers, then it makes sense that a safety trainer, training developer, or operator should understand the norms and values, the expectations and prohibitions, the heroes and the villains, and particularly, the stories shared among members of the culture. All of these provide the clues on what controls the culture has on the workers, and all can be used to craft training that will not only be accepted, but will be valued.

So how do you begin a study of a work culture? It should be obvious that work cultures can't be studied effectively from a distance. If you want to learn the culture, you need to show up. Visiting work sites, whether those be fishing boats, construction sites, mines, or oil rigs, is essential to seeing what really matters to the workers. When we began the NIOSH project to study the culture of O&G extraction and production workers, we first created an organized plan to gather information on key topics. These included:

- Demographic patterns
- Environmental issues
- Work practices
- Occupational norms and values
- Workplace taboos and prohibitions
- Language unique to this culture
- Beliefs common to workers, particularly beliefs about safety
- Geographical differences from one oilfield to another
- Recognized heroes and mentors
- Stories told by members
- Differences in company cultures

There are really only three ways for ethnographers to gather this type of information, according to LeCompte and Schensul (1999). These include observing:

- What people say (this includes the "tribal language" or jargon commonly used)
- What people do
- What artifacts (or documents) they choose to create.

Consequently, the data gathering plan for the occupational culture project began with the need to get out into the field and actually talk to workers. The O&G extraction industry in the U.S. is divided into distinct fields, which are tracked and reported by the Department of Energy office, called EIA or Energy Administration Information (http://www.eia.doe.gov/oil_gas/rpd/topfields.pdf). Certain fields were selected as starting points, including the Permian Basin in west Texas, the Piceance Basin in western Colorado, the San Juan in northwest New Mexico, the Barnett Shales in central Texas, and the TX-LA-

MS Salt Province of east Texas and Louisiana. These included both natural gas and oil formations, and shallow as well as deep reserves.

O&G companies do not generally drill their own wells. Specialized drilling companies are contracted to do this, as well as numerous "well service" contractors that all play a part in bringing a well into production. For the early phases of the project, I focused primarily on the drilling operations, rather than any of the service tasks. Later phases of the project will include these other types of rigs. In July, 2008, I began visiting companies and drill rigs to learn about drilling operations and start gathering data on the workforce. Drill rigs come in a variety of sizes, and companies hire rigs depending on the depth of the hole to be drilled, and the geologic complexity that will be encountered. Most drill rigs use 5-6 man crews, with either two or three crews per rig, depending on the shift (or "tower" as it is known in the industry) length. The rig boss is known as the "tool pusher," and he lives on the site in a house trailer provided by the company, so that he is always available. There are usually two tool pushers per rig, and these men rotate their "hitches" (the number of days worked before going on leave) so that there is always a supervisor on site. For the rigs I visited, the hitches for tool pushers ranged from three days to two weeks, while the hitches for the men ranged from one to three weeks. (I have purposefully used the term "men." In nearly two years, I have not encountered a single woman working on a rig. This is a very male work culture.)

Learning about a new industry takes more than a few visits to work sites. I developed a list of questions that might help identify cultural norms. When starting out, the list included the following:

- Drill rig site, name, company, and method
- Location and size of workforce
- Union affiliation, if any
- Contractors, if any
- Rough percentage of new hires (workers with less than one year of experience)
- General demographics of workforce
- Training required and who provided it (both for career and for this rig)
- Preferred materials/media for training, including available facilities
- Common beliefs and perceptions about safety and work hazards
- Work practices and how work is assigned to different workers
- Best practices and/or company policies concerning operations
- Recognized "masters" (who do people look up to and why)
- Accidents, injuries, and near misses workers have experienced or witnessed

Some of these questions fell out fairly quickly. Labor unions, for example, are not common, and every rig I visited was contracted rather than owned and operated by the energy company. In addition, I learned quickly that this industry reacts very rapidly to commodity prices, so when prices are high, there are a significant number of new hires with little experience. When prices drop, these men are the first to lose their jobs, as the rigs they work on are "stacked" and no longer available for hire. The percentage of inexperienced workers, then, was a moving target. The questions I started with were just that, a starting point. The men I talked to provided a lot of other information, which was all used to begin developing an image of this unique work culture.

Over the next 18 months I visited nearly 30 rigs in seven different areas of the country. These included small, mobile rigs, very large "walking rigs," rigs that were put into service over 60 years earlier and were still using manual methods, and others that were only months old and were much more automated. I took a lot of photographs of the rigs, the sites, the workers, and any other signs or artifacts that would provide keys to the culture. I used standard ethnographic tools such as interviews, observations, field notes, informal conversations, and review of documents, such as company policies and

training materials. In all cases, my primary "gatekeeper" was the safety director for either the energy company or for the drilling company. I was able to gather a lot of information from these people, as we drove from site to site, often covering long distances. They were, in all cases, invaluable to the success of the project.

Why Stories Matter

High-risk work cultures share a love of stories. Stories provide a lot more than entertainment on work sites; they are used to share information about cultural norms and expectations, and provide graphic illustrations about what happens if those norms are violated (see Cullen, 2008). The roughnecks working in the O&G drilling industry are no exception. They shared stories with me about people they had met, about near misses (called "near hits" by most of them), about weather extremes, and about many of the incidences that provided harsh but valuable lessons on how to do this work. They also talked about what they do when they are not working, including stories about their families, friends, and leisure-time activities. All of these provide keys to what these workers value.

Stories share a couple of important features that make them valuable to an ethnographer. First, they are always culturally based. This means that they are *situated*; they are about *someone*, located *somewhere,* during a specific *time*, who is doing *something.* Stories reveal a lot about the culture, in the language that is used, the actions of the heroes and the villains, the reactions of the listeners. Stories also provide a way for people to organize a lot of information in a way that is understandable. New hires often have a difficult time "breaking out" (a term used for new employees entering the workforce for the first time) because of the unfamiliar tools, terms, work practices, or expectations they must master in order to do the job (see Livo & Rietz, 1986). It can be bewildering to be new on a job site where even the tools have names that are unfamiliar. If these workers are to be kept safe while they learn the job, they must have a way to deal with an overload of information. Stories help make sense of these types of information so that they can be used to do the work safely and effectively (see Cullen, 2005).

If the goal of safety training is both educating new employees on work hazards and convincing all employees to act safely on the job, stories are an excellent way to move toward that goal. Haven (2007, 92) presents the results of several research studies on the power of stories to provide information and help create meaning. He says research shows that stories are effective teaching tools because:

1. They evoke prior knowledge
2. They provide details
3. They improve comprehension

Stories are remembered by listeners because they are more interesting than facts or statistics. Listeners can learn vicariously, putting themselves into the story to both think about what is happening, but also to feel the emotions and to decide what they would do if they had been the protagonist. Trainees listen with different levels of consciousness, according to Newhauser (1993), who believes that using your whole brain allows you to both understand what you are hearing, but also to feel it. For safety trainers, stories are one of the most powerful tools available. The good news is that they are everywhere. Every accident/injury statistic has a story behind it, and every safety and health regulation is "written in blood." Workers are eager to share their stories if they believe they will not be penalized for doing so.

Insiders and Gatekeepers

One of the primary roles of cultures, according to Van Maanen and Barley (1984), is to define who is a member and who is not. High-risk work cultures are particularly adept at this because members believe that they are the only ones who "have what it takes" to do this work. Outsiders, they believe, don't understand the dangers and the difficulty, and therefore have little credibility inside the culture. For workers in these industries to learn from safety messages or trainers, these need to be perceived as being knowledgeable about and sympathetic to the culture.

Gatekeepers can be both formal leaders and informal ones. For my study, it was the formal leaders who provided access to work sites and to other insiders. Initially, my contacts were the safety directors or supervisors. They were very generous with their time, and were willing to spend days in the field with me, taking me to different rigs that were drilling in the area. Once on a rig site, we checked in with the site manager, the tool pusher. Some sites also had a company man, who represented the energy company's interests. He was also concerned with safety, but the drilling operations were the responsibility of the tool pusher. On the rig floor, however, it was generally the driller was in charge of the safety of the work team, which was made up of a motor man, a derrick man (who also was responsible for checking on drilling fluid, or mud), and one or more floor hands. This is a hierarchical team, with people "breaking out" as floor hands, and moving up through the other positions when they were ready and positions opened up. Among more experienced workers, it was common that they had done all of the jobs. When a new hire first broke out, he was known as a "worm," a position he held for several months until he reached a level of knowledge and expertise and would then be a floor hand. Worms usually wore hard hats of as different color…green or orange, perhaps, so that other workers could tell immediately that they were inexperienced and could both watch out for them and help teach them how to do things.


**Figure 1. Patch Dog Sticker**

Informal leaders are almost always present on high-risk work sites. These are people who have earned the respect and admiration of their peers, usually by mastering aspects of the job that others struggle with. They may have many years of experience, or may have a special talent for doing a certain task. They may also have survived an incident that gives them authority to speak about specific hazards and what can happen if safety precautions are ignored. It is not difficult to identify these people. Others on the team may tell stories about them (the "hero stories" that include information about valued attributes in the culture) and they are usually the "go to" people when someone needs advice or information. Workers may hang back when asked to do something, waiting to see what the "masters" do. These people can be very powerful gatekeepers into occupational cultures. If they refuse to work with you, for whatever reason, it is unlikely that other members will. They are also excellent choices to be spokespersons or informal trainers, if you decide to produce safety training products. They are trusted insiders, and will command the attention of the workers, where you have yet to establish any credibility, and could be viewed with skepticism if not disdain.

As I gathered information about the drilling industry and its people, I talked to workers with only a couple of days on the job and those who had been there nearly 40 years. Because I believed that

roughnecks were similar to miners in that they loved hard hat stickers, we designed several stickers that we thought might work, and then asked the workers to provide us input on which ones they thought we should print and hand out. These designs took advantage of some of the "tribal language" we encountered in the oil fields, including the roughnecks' use of "worm" for an inexperienced hand, and "patch dog" for those who had been in the oil patch and were tough enough to do the job. Figures 1 and 2 show the designs NIOSH printed up. These have been handed out at every rig we visited, and have always been enthusiastically accepted by the hands.


**Figure 2. Worm Sticker**

## Creating Effective Training Videos in the Field

The underlying goal of the ethnographic study was to learn enough about the culture of oil and gas drillers to be able to develop safety and health training that would resonate with the workers, be accepted by them, and memorable enough to change how they think and act about safety hazards. Video was a successful medium we used in developing training for the mining industry, so this was a medium we were interested in using in the oil fields. For our new training to actually be effective, it would have to be interesting to the workers, credible, and compelling. The lessons learned in the mining industry proved to be just as important in the O&G industry. These included:

- The workers are all adults and must be trained as adults (using adult learning theories).
- They do the job every day and are very familiar with its dangers and challenges.
- They are good at what they do and proud of it.
- Not everyone has what it takes to be a roughneck; those who do are admired and accepted as members of the work culture.
- Roughnecks can be transient, moving from rig to rig, or oil field to oil field.
- The work culture controls, to a very large degree, how they do their jobs.
- Workers value safety and understand that one wrong move by anyone can put everyone in danger.
- This is a macho culture, with very few women.
- Roughnecks are proud of their ability to solve unexpected problems.

Any training product developed by NIOSH would have to respond to these norms in order to be accepted.

Like mining, construction, commercial fishing, or other high-risk industries, O&G drilling includes many hazardous operations that would be good candidates for safety training. Unlike mining, however, there isn't a regulatory standard that says exactly which topics have to be presented, nor is there a minimum number of hours of safety training required before people can start work. The U.S. mining industry has access to one of the most comprehensive accident/injury databases in the world, managed by the Mine Safety and Health Administration (MSHA). MSHA, operating under the Department of Labor, mandates that every injury or incident be reported. Penalties for failure to do this are severe, so the resulting database includes a wealth of information a trainer or training developer can use to identify specific areas where additional safety training would be valuable. No such database exists for the land-based oil and gas industry. Pieces are gathered by different agencies, associations or companies, but there is no comprehensive database of injuries occurring in the up-stream O&G industry. Data on fatalities are available, but injury data are not. A systematic review of accident/injury information was therefore impossible. The best way to learn what topics should be included in training development, then, was to ask the workers themselves. Tool pushers and drillers are responsible for training the rig workers in most cases. We asked them to identify topics where they would like to have more training materials, and they responded enthusiastically. We developed a potential list of topics, and after further questioning about what the most dangerous operations were, decided to begin with making a training/hazard recognition video on rig moves. (It is important to note that while new hires can benefit from safety training, people who have done this work for long periods of time will be disdainful of attempts to train them. Research conducted in the mining industry showed that experienced workers are insulted by traditional "training," particularly if it is provided by people who don't do the work they do every day. There still exists a need to remind them about hazards, however. Luckily, stories can bridge the gap between new employees and experienced ones.)

Drill rigs can be massive pieces of equipment. When all of the necessary peripheral equipment is added (which could include mud tanks, the dog house, mixing sheds, diesel engines, fuel tanks, tool sheds, offices, house trailers, and so on), these operations are like small towns. They must be dismantled and moved quickly to the next site when the hole is finished. Workers are in agreement that taking them down and reassembling them in a new location is dangerous work. Before starting our filming, we needed to do the following:

- Find an industry partner who would let us film the whole operation
- Identify a "master" who would act as narrator for the video, describing what was going on and what the hazards might be
- Interview our expert at length to get an idea of the important things that needed to be addressed
- Schedule a shoot on location, using a professional videographer

We also wanted to capture as many stories as possible while we were shooting, but were very mindful of the fact that if people were not willing to share them, we would not require it. The most valuable training stories are often in the category of "fool stories" (Cullen, 2008) that people may tell about things they have done. These usually result in near misses, but can also include injuries to themselves or others. It is very important to respect these stories, and to use them in the spirit in which they are shared—to prevent someone else from suffering the consequences of doing the same thing. If you punish people for disclosing these stories, they will never share them and valuable occupational wisdom will be lost.

The NIOSH video on rig moves was filmed on location in west Texas in November 2009. Devon Energy provided excellent support and access for us, to several sites in the Midland-Odessa area. McVay Drilling and Bandura Drilling were the drilling contractors on the project, and they also helped us to film various operations over a week-long period, including capturing 26 interviews, drilling tasks on two different rigs, a "rig down" and two separate "rig up" operations. Willie Stephenson, one of the tool

pushers on the McVay rig, agreed to act as our narrator on the project, and was interviewed on camera for several hours. Devon, McVay, and Bandura were true partners in this project, which could not have been done without their guidance, suggestions, assistance, and support. The original plan was to develop a rig move video, but it became obvious that there were two separate videos needed—one for taking the rig down and another for putting it back up. (These include, obviously, moving and setting up all of the necessary peripherals, not just the drill rig itself.) These videos have not been completed at the time this paper is written. They will follow, however, the process and schedule developed by NIOSH in the mining sector. These include:

- Logging all of the "B-roll" footage gathered;
- Transcribing all interviews;
- Creating a "story line" from the master interview;
- Picking shots from the B-roll to illustrate the points included in the narrative;
- Editing it all together into two separate videos;
- Taking the drafts out for review by safety and operations experts in the O&G sector;
- Revising the drafts to reflect comments and suggestions by the technical experts;
- Gaining final approval for the videos from NIOSH;
- Releasing the videos; and
- Marketing and distributing free of charge to industry stakeholders.

Avoiding Common Mistakes

Development of training that is acceptable and memorable to high-risk workers is not difficult if a few basic guidelines are kept in mind. Foremost is the idea that the workers know much more about the work than you ever will, and therefore it only makes sense to include them in the process. Prior experiences in creating training for the mining industry and for commercial fishing have shown that workers are eager to share what they have learned if you give them a chance. Their own safety is at stake if someone is working unsafely, and they understand clearly that they have a vested interest in making sure everyone knows how to do things correctly. Ignoring them or underestimating their interest in safety is a mistake that should be avoided.

Many training developers fall into the trap of choosing the wrong spokesman. It is crucial that the person who is providing the lessons look and walk and talk like those who are going to be watching the safety video. Using a "talking head" who is either someone totally disconnected from the industry, or one who obviously doesn't do this type of work, is just not a good idea. Professional actors, while arguable more comfortable in front of a camera than workers might be, are not credible as teachers. They don't understand the jargon used in these industries or the nuances of how to do the necessary tasks, and that is usually obvious to the trainees. Using a company VIP as a spokesperson is also ineffective. A CEO talking about how to do specific tasks, while wearing a clean, pressed shirt and shiny hard hat, won't be convincing to workers. The best choice for the "master trainer" in a safety video is someone who looks the part, and speaks with occupational (not organizational) authority. He will use language understandable to the trainees, who will understand quickly that he is a cultural insider, and that he knows what he is talking about. Even new hires are generally very adept at identifying those people who can keep them safe and teach them to do the work, and they will gravitate toward those people, regardless of who the company assigns the task of training (Machles, 2009). Putting these people in your video, if they are willing, makes a lot of sense.

If you decide to make a training video, one of the first issues you will have to consider is the topic. It is much easier to proceed if your topic is narrowly focused, rather than if you are trying to "change the world." So, for example, "Entering Confined Spaces" is probably a better choice than "Oil and Gas Safety." Some trainers believe that no video should be over 5-6 minutes. What our research has shown is that this limitation may be due to the fact that the videos themselves aren't interesting enough to keep

peoples' attention for very long. If your story is well told, and your story-tellers are credible, your videos can be much longer. One video made by NIOSH on a disastrous fire in an underground silver mine that killed 91 people runs over 60 minutes (Cullen, 2002). It is heavily used in training sessions, and has also been picked up by other industries, such as fire-fighting, the military, occupational nursing, tunneling, and many others. The story is very compelling, because the 27 "stars" tell the story from their own experiences of the fire. The length is not considered a negative.

It is always a good idea to use industry experts as technical reviewers. These should include safety people, but also some workers as well. They are generally quick to point out things that aren't quite accurate, or things that have been left out and should be added. It is very important that the training video be technically accurate. Different companies have different policies, and these, too, should be kept in mind. If one company requires, for example, green hard hats for worms, it doesn't make your video worthless to show new hires in red hard hats. Differences like these are perfect opportunities to have discussions with trainees on why there might be geographic or organizational differences in how certain tasks are done. These could be due to state or provincial regulations, environmental issues, workforce issues, or multiple other factors. It is not possible to show how everyone does things, but you should strive to show best practices, according to the experts in the industry.

When we were developing safety videos for the mining industry, we usually staged a "world premiere" in an area where the people in the video could attend. This was a way to thank them for their participation, but it also served to introduce the new training video to the industry. In many of these industries, because workers move around so much, the informal grapevine is very active. It was quite helpful to our efforts to market and distribute our new video to have the "actors" telling colleagues and co-workers that it was out and that it would be shown in a safety meeting. Miners actually started asking when the safety meetings might be held rather than trying to avoid them.

## Conclusion

Workers in high-risk industries face hazards that most people never experience. While it is true that these types of industries have higher injury rates than other industries, perhaps it is more noteworthy that they do the work they do with as few injuries as they do. This must be attributed to the efforts of safety directors and trainers, regulatory agencies, managers and operators, supervisors and the workers themselves. Training for workers is both mandated and necessary, but training will not work if it is not acceptable to the workers. Trainers who make use of the power of occupational cultures to control and to change the actions and beliefs of their members will be much more effective in reducing injury rates on the job. No one wants to get hurt on the job. It is up to us to provide the best, most effective training possible, and to keep people safe. Occupational cultures, and the norms, beliefs, and stories they include, are always present on work sites. They can be valuable keys to creating training that works, sending everyone home safely at the end of the shift.

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