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Once upon a time in Germany, there was a very prestigious school. At this school, students didn't read books or attend lectures. Instead, professors would insert magic funnels into the students' heads. It was into these funnels the professors would pour the knowledge of the world – history, science, mathematics, and so on – which would be directly transferred to the minds of their students.

The origin of this fairytale story is the city of Nuremburg. Hence, the funnel became known as the *Nuremburg Funnel*, and it is an interesting model for what the utility industry seems to have in mind when thinking about customer education for the smart grid. Customers are passive vessels into which we will pour the knowledge of the grid. And are we ready to pour! If customers really wanted to learn about the smart meters, dynamic pricing, energy efficiency, and a host of other topics associated with the smart grid, they would go to the modern-day Nuremburg Funnel, Google. They would enter "learn about smart meters" or "learn about energy efficiency" and within 0.13 seconds, they would have their choice of over 10 million documents that could teach them anything they wanted to know about those topics. But it doesn't appear that customers are connecting this funnel to their heads in any significant numbers.

When one reads journal articles, attends industry presentations, and reviews regulatory filings, two words, "customer education," appear frequently. For the most part, these two words are misunderstood and misapplied. We, as an industry, seem to think that customer education is a panacea that will cure all the ills we've seen hurled at the smart grid. One purpose of this article is to explore how customer education fits within the smart grid world as a solution to drive adoption of products, services, and programs. Another purpose is to provide you techniques for enhancing the effectiveness, efficiency, and appeal of your smart grid customer education.

Customer Performance

The purpose of any educational solution is to change behavior. In the 1950's, Benjamin Bloom developed a model that has guided millions of teachers, educators, and instructional designers. The model identified the primary learning domains as knowledge, skills, and attitudes, and they are the behavioral building blocks for any type of educational solution. The knowledge domain is associated with remembering, thinking, and problem solving. The psychomotor domain is associated with doing, such as walking, talking, and riding a bike. The attitudinal domain associated with feelings and choices, such as whether one trusts something or chooses to follow a certain path.

Unfortunately what people found when they applied Bloom's ideas is that educational solutions didn't always work to change behavior, even if the solutions were skillfully designed. Thankfully, Thomas Gilbert, a disciple of the eminent behavioral psychologist B.F. Skinner, led a group of researchers to investigate this problem. They discovered that there were a whole variety of other solutions for changing behavior, many of which were not "educational" in the traditional sense. So, Gilbert labeled his approach "human performance."

Figure 1: Customer Performance Model

In our 2005 book, *Creating Do-It-Yourself Customers*, we coined the term "customer performance," and connected Gilbert's ideas to customer experiences. Customer performance involves orchestrating four elements, Vision, Access, Incentive, and Expertise, to create a customer experience focused on changing customer behaviors so that customers can successfully accomplish jobs and tasks (Figure 1). The four element of this model are:

- Vision: Goals, feedback, and expectations that guide and shape performance.
- Access: The experience environment, such as includes processes, tolls, interfaces, and information, that enables performance.
- Incentives: Rewards and punishments that motivate performance.
- Expertise: Customer education that enhances the knowledge, skills, and attitudes required for performance.

So how does customer performance connect to the smart grid? Essentially, there are tasks customers perform that offer benefits to the customer, the utility, and society. For example, a customer wants to understand why their August utility bill went up 123%. A utility wants a customer to reduce load on a peak day. Society wants customers to reduce greenhouse gas emissions. Whatever the nature of the task, an experience that effectively orchestrates the four elements of the Customer Performance Model results in better customer performance (successful completion of the task), which in turn leads to greater customer satisfaction.

The point of this initial discussion is to have you to think "customer performance" each and every time you hear or read the words "customer education." Customer education makes little sense unless it is an integrated and orchestrated part of a customer performance experience. That said, we continue this article with the stipulation that the Vision, Access, and Incentive elements must be well-defined in a project. Once that is established, the goal is to explore ideas for how best to design and implement the Expertise (customer education) element.

What Must Customers Know About the Smart Grid?

When designing any type of education, the first step is determining what your audience needs to learn. This typically starts with content analysis and task analysis. To develop content one can review existing content sources, interview subject-matter experts, and collect other previously-produced educational materials. While these methods are helpful, they only offer a partial picture of what customers need to know. You need to ask customers what they need know and what they might like to do. This kind of thinking is new for many utilities who have been very teacher centered in their customer education. What we recommend embracing is a more student-centered approach.

A method for being more customer-centered is to organize one or more groups of customers, provide them a brief overview of what you are doing (for example, installing smart meters), and then have them start writing the questions they have about the subject. For example:

- How does a smart meter work?
- What's in it for me?
- How will I know the meter is working properly?
- How do I monitor my daily electricity usage?
- How do I determine why my bill is so high?
- What will happen to the meter readers?

Generating such a list of questions is the starting point for determining what you teach. The follow-up to these questions involves understanding why a customer needs to know the answer and prioritizing the questions.

Every question a customer states is connected to a much more important customer task. To understand the nature of that task, all one must do is ask the customer *why* a couple of times.

- Customer: How does a smart meter work?
- Analyst: Why do you need to know that?
- Customer: Well, I like to know how things work, like cars and things.
- Analysis: Why do you like to know how things work?
- Customer: If I know how things work, then I'm more apt to trust them.

As you can see in this example, the customer's task involves *establishing trust*, which most closely aligned with Bloom's attitudinal learning domain. The process the customer describes to develop the attitude of trust reflects a classic instructional strategy. Before a customer can develop a desired attitude (trust), the customer must acquire specific knowledge and/or skills (how things work) that align with that attitude.

Through the content and task analyses methods described above, you will develop a large amount of content. The problem with a lot of content is that you will not be able to teach it all – our research indicates that most customers devote less than a minute each month to utility business, including paying their bill. In our experience conducting focus groups and single-subject tests of customer education materials for the smart grid, one principle is clear: less is more. With that principle in mind, you need to prioritize the content, from the most important to the least important.

We prioritize content using simple but effective methods. For one of our initial projects involving customer education for smart meter deployment, we used a prioritization method called *nominal group technique*. It works like this. You take a list of content, say 21 content topics. You divide the number of topics by 3 (21/3 = 7), then add 1 (7+1 = 8). This gives you the number of votes. You give a group of customers the 21 topics and ask them to vote for the eight most important ones. You count up the votes or each item, calculate the percentages, and prioritize the list.

We used this method to determine what customers must know about smart meter deployment. To gather content, we used our online Customer Codesign Process to gather over 80 customer content questions. We organized these questions into 21 categories and had customers assign their eight votes to the list. The result is shown in Table 1.

%	Content Category	Example Questions
75%	Benefits	What is 'Smart Metering', why is the utility doing it, and what are the benefits?
75%	Notifications	How will I be notified about peak events and days I can save money?
70%	Bill	What changes in rates will I see on my bill?
60%	Feedback	How do I access usage information and feedback from my Smart Meter?
60%	Support	Who do I call, email, contact if I need help with my Smart Meter?
55%	Capabilities	What are the capabilities of the Smart Meter?
55%	Reading	How do I read my Smart Meter?

%	Content Category	Example Questions
45%	Inform	How will the utility inform customers, property owners, and so on about installation?
40%	Install	What will be installed, when will it be installed, and what should I do after installation?
35%	Functional	How do I know my Smart Meter is working correctly?
35%	Peak Days	How are peak days determined, what are the hours, and how can they change?
30%	Install Preparation	How long will the installation outage be and how do I prepare my residence for installation?
30%	Services	What other add-ons or services can I get for my Smart Meter?
25%	Configuration	How do I change my Smart Meter's settings?
25%	Solar	How do I use my Smart Meter in conjunction with a solar array?
20%	Guarantee	What kind of guarantee or warranty does the utility offer with the Smart Meter?
15%	Maintenance	How often does the meter need maintenance and who will maintain it?
15%	Security	How secure is my Smart Meter data and who is authorized to see my data?
15%	Special Needs	What solutions and installation options are available for customers with special needs?
10%	Installers	How will I know the installers are real installers?
5%	Esthetics	How can I change my Smart Meter (coverings, paint) so it blends in with my home?
5%	Meter Readers	What will happen to the meter readers?

Table 1: Prioritized content for smart meter deployment

The example shown in Table 1 is a subset of what you could potentially teach customers about the smart grid. For another project, we identified over 130 learning objectives that cut across such topics as smart metering, dynamic pricing, energy efficiency, demand response, load shifting, and enabling technology. Regardless of how much content you generate, systematic prioritization will help narrow down what you ***must*** teach, what you ***should*** teach, and what you ***could*** teach.

How Should You Educate Customers?

What we will discuss in this section of the article is a set of principles that we've collected from literature, focus groups, workshops, and field implementations that we believe are most important for smart grid customer education. The methods you can use to educate customers are endless and would easily exceed the scope of this article (or any one book, for that matter) to provide a thorough review.

In workshops we have lead on designing smart grid customer education we engage participants in a card sort activity that investigates the qualities of great customer education. Participants brainstorm both positive and negative qualities, and then engage in a series of synthesis activities that identify techniques one should embrace and avoid. In a recent workshop that involved an international cast of participants we created a table that summarized the key customer education qualities that participants synthesized (Table 2).

Embrace	Avoid
• Transparency • Clear benefits explanation • Use of different media and language • Continuing customer education (not just one educational event) • Simple and easy to understand • Understanding customer interests	• Using media and language that don't fit with the audience • Messages that aren't relevant • Messages that aren't "grabby"

Table 2: Customer education qualities to embrace and avoid

At face value, the lists shown in Table 2 present a set of guiding principles for customer education design. In fact, when compared to the instructional strategy literature, they are prudent guidance for designing effective smart grid customer education. In the sub-sections that follow, we will focus on the qualities one should embrace and provide some ideas for the methods you can use in your customer-centered designs your materials align with those qualities.

Transparency

While customers demand transparency, being completely transparent with customers is something most utilities find challenging. The smart grid has some challenging content that has the potential to increase the risk of customer concern, but that customers want to know. For example, the smart meter accuracy assessments conducted by the Structure Group in California and Navigant Consulting in Texas showed that there was an accuracy difference between electromechanical meters (98.397%) and smart meters (99.839%), with smart meters providing greater accuracy. If customer education was truly transparent, we would educate customers that smart meters may cause a slight bill increase due to the smart meter's capability in recording an average of 1.5% more usage. This increase also generates more revenue for the utility. This type of content is not exactly consistent with the *smart grid will save you money* benefit most utilities tout. Thus, we have yet to see this content explicitly presented in any smart grid customer education.

We do, however, see positive movement for utilities to be more transparent in their customer education. Utilities that must include a smart meter charge on customer bills are clearly disclosing that in their education materials. One utility that is offering customers time-based rates included estimates of the potential bill impact associated with the rates, framed as a plus-or-minus change if the customer took no action. This was driven by initial focus group research indicating that customers thought the impact might be 30%, when in fact the impact was more around 8%. By proactively disclosing information that smart customers will otherwise conclude and misinterpret, utilities can use transparency to reinforce customer trust in the smart grid system.

Clear Benefits

Educating customers about the benefits of smart meters has been challenging. One issue is that utilities mistakenly position features as benefits. For example, *daily information about your electricity usage* is not a benefit. It is a feature. A benefit of daily information is that one can *better manage usage and costs*.

The other issue with benefits is that the customer education we see consists of rationally-framed benefits. *Better manage usage and costs* is a rationally-framed benefit. It is completely accurate, but it lacks pizzazz and behavioral punch – the "materials not being 'grabby'" quality in the avoid list. The alternative is to construct emotionally-framed benefits. This takes a bit more analysis and creative thinking. In a recent project we analyzed the nature of customer calls to the utility's call center. We found that the greatest percentage of calls had to do with billing and payment issues. As we dug further into the data, it was clear that the root emotions of these customers were worry and surprise. So we are now investigating framing smart grid benefits as *reducing worry* and *fewer surprises*, and using graphical analogies as the primary instructional tactic to educate customers about those benefits.

Use of Different Media and Language

Since there is a tight relationship between marketing and customer education, it is prudent to adopt an integrated marketing communications (IMC) approach as a means of disseminating customer education. This approach involves blending advertising, personal selling, public relations, direct marketing, and sales promotion media channels. In fact, every customer touchpoint should potentially be an education point. We advise our clients to start by educating their employees, which from an IMC perspective are the personal selling sales force. In fact, a recent study conducted by a Purdue University graduate student of 100 utilities showed that most utility customer service representatives could not answer basic questions about smart metering and the smart grid. We also know that friends, family, and neighbors will ask employees about what's going on when other media starts appearing. With employees educated to be *brand ambassadors*, other media such as traditional advertising, customer outreach, direct mail, e-mail, web, and so on can be orchestrated to carry customer education messages.

With regard to language, most utilities already have standards in place for the languages in which they communicate and the media that carries that language. What we see is that printed customer education materials are provided in English and usually in Spanish, but other communication, such as television ads may not be. Our guidance here is to follow existing standards, and if those standards don't exist, establish them. Another approach is to use more instructionally-oriented pictures in materials, similar to how the safety brochure in an aircraft is designed – it must accommodate a variety of people with different language skills and reading levels.

Continuing Customer Education

In our book Strategies for Effective Customer Education we demonstrate that customer education must be designed as a process and not an event. That's what the quality of continuing education refers to. We know that for education to be effective, it must be repetitive. We also know that with such a large body of content, that we cannot "Nuremburg Funnel" the content and teach it all in one sitting.

So what are some good principles for designing education as a process? Consider this list:

1. It is useful to use a *simple-to-complex* sequencing approach. This means that you are going to start with the easiest-to-learn content before you teach more complex content.
2. It is prudent to sequence content from a *global-before-local* perspective. This means you are going to start with the big picture, and then delve down into the details.
3. It is imperative to deliver content in such a way where you *present*, you engage the customer in *practice*, and then you provide *feedback*.

Much customer education is presentation-only, and that is something you must avoid. You must use techniques that provide practice and feedback, no matter how trivial. For example, we've integrated multiple-choice self-tests into customer education materials. We've also worked to create discovery-oriented learning experiences with in-home displays in which we provide step-by-step instructions (presentation), integrated with a form that customers use to record the usage of different electronics (practice and feedback).

Simple and Easy to Understand

Making communications simple and easy to understand is achieved by following a few basic principles. Some of the principles are quantitative and therefore easy to assess whether you are meeting the standard. Writing customer education at the 8th grade level or below and avoiding passive voice are two easy techniques for ensuring text is easy to understand. Organizing elements, such as bullet points or the contents of graphics, so that there are no more than 7 +/- 2 chunks of information, simplifies the information (this rule is derived from George Miller's experiments in the 1940's that investigated the contents of short-term memory. Some designers now try to limit chunks to three).

A more qualitative technique in making customer education simple and easy to understand is adopting a design that incorporates the three primary learning styles: verbal, visual, and kinesthetic. Verbal is the words you use, visual is the graphics you use, and kinesthetic is how you engage and involve the learner physically. Of the three, kinesthetic is the most challenging to integrate, especially in printed communications. However, there are some simple techniques you can try. You can include a short multiple-choice self check that encourages the customer to use a pen or pencil to take the quiz. You might include scratch-off elements to reveal answers. If the content of the education involves a device, such as an in-home display, then you design the learning experience to make full use of the customer interacting with the device itself.

Understanding Customer Interests

Customer education is always constructed based on the needs of an audience, which you discover through an audience analysis. However, your initial audience analysis will likely be broad, given the limited customer information stored in a utility customer information system and the cost of acquiring primary data about customers. Thus, it becomes important to design into your customer education a means of elaboration, where a customer can further investigate topics that are of interest to them.

An approach we have used with success is to make customer education opt-in. Given our previous discussion regarding content prioritization, the initial education customers will receive about the smart metering and the smart grid will likely be minimalist, focusing on just a couple learning objectives. This lesson comes from a series of focus groups. In the initial focus groups, customers would tell us all the content they wanted to learn. We would design prototype educational solutions to include a lot of that content. Then we would test the solution with other focus groups who would tell us that they would never spend the time to read all that content. So we concluded that the opt-in method allows customers to engage at the correct level for them.

The solution that we crafted is simple and elegant. The initial education customers receive when notified of smart meter installation or a time-based rate opportunity is minimalist: we teach just a couple learning objectives. But in that minimalist notification is a reply card that offers customers additional information and education, by mail, e-mail, or via a website. Customers who return the reply

card or visit the website are taking an observable action – they are demonstrating that they have an interest. Also, since small actions lead to larger behaviors later, the small action of requesting more information enables us to begin segmenting customers based on this observable action.

Summary

This article has provided an overview of a few of the approaches we have found helpful in designing customer education for the smart grid. First, you need to develop a prioritized body of content. Since education is a process, not an event, you need to know the priority of content so that it can be sequenced and disseminated efficiently. Second, you need to embrace five qualities of well-designed customer education for the smart grid. These qualities are transparency, clear benefits, use of different media and language, continuing customer education, simple and easy to understand, and understanding customer interests (Table 3). Embracing these qualities will help ensure that your customer education is effective, efficient, and appealing. They will also help you avoid creating your own Nuremburg Funnel.

Embrace	**By**
Transparency	• Proactively disclosing information that smart customers will otherwise conclude and misinterpret
Clear Benefits	• Framing benefits emotionally as well as rationally
Usage of Different Media and Language	• Using integrated marketing communications techniques • Educating employees first
Continuing Customer Education	• Simple to complex sequencing • Global before local sequencing • Integrating presentation, practice, and feedback
Simple and Easy to Understand	• Writing at the 8th grade level • Avoiding passive voice • Respecting the rule of 7 +/- 2 for content chunking • Blending verbal, visual, and kinesthetic content
Understanding Customer Interests	• Conducting audience analyses • Including reply cards for so customers can easily request additional education

Table 3: Summary of the embraceable qualities and techniques

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