

# “Alexa, How Do I Build a VUI Curriculum?”

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## ABSTRACT

As Voice User Interfaces (VUI) become more prominent in everyday life, there is an ever growing need to ensure that designers have the appropriate knowledge and tools to be able to build usable VUIs. To do this, we need to develop a curriculum for VUI design. However, there are few resources in academia and in industry to help ground the development of a new VUI-specific HCI curriculum. We discuss the limited approaches to VUI design, and particularly to preparing designers for this emerging interaction paradigm - both academia and industry training. Grounded in this, we then describe potential avenues for understanding what a VUI curriculum may entail, what would HCI educators need from it, and how such a curriculum would be validated.

• **Human-centered computing** → **Human computer interaction (HCI); HCI design and evaluation methods.**

## KEYWORDS

Voice User Interfaces; Speech Interfaces; HCI Education; HCI Curriculum

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## 1 INTRODUCTION

As voice interaction becomes more prominent in current technology, and as commercial voice interfaces become more common place in our daily lives (e.g. Amazon Alexa [31], Google Home [32], Siri [33]), designers and usability experts are faced with the challenge of how to design for Voice User Interfaces (VUI). VUIs are advertised as a natural form of interaction – but usability issues are still common in current commercial interfaces. These issues often turn people away from using and adopting them [2,7].

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To rectify this, we need to train designers in how to design for VUI interaction. For that, we need a curriculum in order to guide this training. Much of current HCI education and training is focused on training in GUI design principles and methods [16,18]. However, previous research shows that designing for VUIs is quite different than designing for GUIs [19,24,28]. This calls for an update in HCI curricula to incorporate VUI design training into it.

Unfortunately, there is little in both academia and industry to base a VUI-specific curriculum on. Research shows that very little exists in the way of academic VUI design curricula and training [18]. On the other hand, providing VUI design training may not be as insurmountable as it seems, as it has been shown what the path of least resistance may be on the designer’s side [19]. This, however, will not fully rectify the lack of training that currently exists for VUI design. There is still a need to identify the pedagogical content that a VUI curriculum would require. We therefore present an action plan on how to begin developing a VUI curriculum with the limited resources that currently exist in this education space.

## 2 THE NEED FOR VUI TRAINING

There is much current industry interest in developing good and usable VUIs [4,8]. Commercial VUIs such as Amazon Alexa [31], Google Home [32], and Siri [33] have become hugely popularized, and many companies are rushing to incorporate VUI interaction with their services, such as Amazon Alexa skills for banks [30] or being able to control a variety of music and other entertainment services using Google Home [29].

It is important for VUI designers to have the training and resources to design usable VUIs. This requires established VUI training resources and curricula both in academia and in industry [16,18]. As budding new designers and HCI experts are trained in Graphical User Interface (GUI) design principles, methods, and practices, so do we need similar training in Voice User Interface (VUI) design.

## 3 WHERE DO WE LOOK WHEN STARTING TO DEVELOP A VUI CURRICULUM?

How do we start developing an VUI curriculum? We must first look at what currently exists in VUI design training, in order to understand how to pave a way forward to develop a solid VUI curriculum for HCI.

Much of HCI and design training happens in the academic training that designers receive in post-secondary programs. This would be the first place to provide designers and usability experts with VUI training. Past research has looked at the state of VUI education in academia, by exploring the courses taught in HCI departments in over 20 international universities [18]. It was found that there is a great lack of VUI courses or VUI design discussion in academic courses. In the courses that do exist, practical design advice is rarely given, and VUIs are treated primarily as “new and emerging technology” [18].

So how does one build a VUI curriculum when there’s nothing at the university level to look to? Another place we may look is at how designers and usability experts receive training in industry – such as through open courses where industry people can come and learn how to design VUIs.

Over the past few years, many courses have been conducted that bring both academics and practitioners together to learn about Voice and Conversational Interface design (e.g. CHI [9,14,27], IUI [13,26], MobileHCI [15], IITSEC [12], UXPA [22,25]). A few examples are courses such as “Conversation Design: Principles, Strategies, and Practical Application” [27] and “Speech and Hands-free Interaction: Myths, Challenges, and Opportunities” [14] that have been conducted over the past few years at SIGCHI sponsored conferences, which are open to anyone. UXPA is another example of a conference that often runs several hour-long presentations with interactive exercises geared around VUI design, with a few being “This is Not What We Wanted: Talking With And Around Voice Agents” [22] and “Talking With Robots: Creating Voice Interfaces” [25] that were offered just last year (in 2019). We are also seeing industry-geared textbooks being published which are meant to guide designers in building VUIs [1,21], often providing step-based solutions for how to design them.

However, none of these resources or courses follow a consistent curriculum. There is a limited number of courses available, and the ones that exist either focus particularly on theoretical overview of speech interfaces [11,15], or on low-level, hands-on, practical steps for building a VUI [12,22,25,27]. For the latter, many of these are hour-long “lectures”, with some potential interactivity. While these can be helpful, even if designers are exposed to practical examples through these lectures, they are not systematically employed to illustrate pedagogically-validated theoretical constructs. In fact, they are often based on the leading practitioner’s personal experiences in designing VUIs. This means that they can be inconsistent, without any validation of effectiveness behind them. While there are a large number of VUI-geared workshops available [3,5,6,9,10,23], they are largely meant for discussion among people who are already experienced and trained in VUIs, and less about training new designers in this space. Textbooks that aim to instruct how to design for VUIs are often written as “step-by-step” lists without a theoretical grounding behind them [1,21]. This may be due to the lack of widely-adopted VUI heuristics [17,19,20]. All of these issues can cause incomplete and inconsistent training modules for VUI designers to interact with.

## 4 THE ROAD FORWARD

From the previous section, we see that there is very little to base a VUI Curriculum on. We currently have a limited set of courses and resources in both academia and industry. These courses currently teach inconsistent design practices and provide personal-experience-based design advice that is not empirically validated. This may explain why the design of current VUIs in the commercial market are currently inconsistent, causing confusion and usability issues for users who try to use and adopt these devices.

Two main problems we have described are 1) the lack of training courses/modules in academia and industry, and 2) the lack of a consistent curriculum that has been developed and validated for VUI design training. These two issues need to be solved in order to ensure we have appropriate VUI design training in HCI curricula. However, if there is little for us in both academia and industry to base a curriculum on, where do we as HCI educators begin?

Based on the research we have conducted over the past few years, and the argument we have articulated in this paper, we propose the following action plan for addressing the lack of a VUI curriculum within HCI education:

1. Look towards other specialized fields and interaction techniques (such as Touch Interfaces, Virtual Reality, Ubiquitous Interfaces, etc), and explore how curriculums for those fields were developed, to provide us with a groundwork process to follow.
2. Conduct interviews or focus groups with HCI educators in order to identify the barriers they face in incorporating VUI design into their teaching, and the tools and resources they require in order to teach VUI design.
3. Run participatory design workshops that bring both educators and current VUI designers together to develop a proposed curriculum that incorporates educator’s experience of teaching HCI, and VUI designer’s experience of what is required for VUI training.
4. Validate proposed curriculums through academia and industry-based practice.

We plan to employ these in the future, and we also hope to engage HCI educators in these discussions, so that we may make an active effort to provide HCI educators with the tools and resources needed to incorporate VUI design into HCI Curricula.

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