

COMMENTARY

How an Experiment in 3-D Printing Illuminated Our Humanities Classroom

By *Marta Figlerowicz and Ayesha Ramachandran* | OCTOBER 22, 2017

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Midway through a workshop aimed at demystifying 3-D printing and other new technologies, we were handed a small, roughly hewn representation of a human head. It was a copy of an Assyrian artifact remade from a 3-D printer in strangely light, off-white plastic. By layering thin strips of this plastic, the printer had reproduced the sculpted head from a composite, many-sided scan.

Part of what made this plastic copy misshapen and uneven was the damage that the original artifact had weathered over millennia. The other part had to do with what our workshop instructors described as "pixelation." When their equipment scanned and reproduced the sculpture, some of the detail got lost, resulting in a three-dimensional equivalent of a grainy photograph. The two forms of roughness — historical and printer-induced — did not clash with each other. Indeed, as we took turns holding the plastic head and taking pictures of it, we felt that its computer-generated zigzag edges were helping us understand how far the object reproduced had traveled in order to reach us, and how intense and fragile was the manual labor it originally involved. We were drawn in by this experience: Two inconceivably distant media and periods had unexpectedly touched borders, and illuminated each other. Oddly

enough, the imperfection of 3-D printers and scanners also answered the question we had brought to the workshop: Would we be able to use such technologies in a humanities classroom without reducing them to a sideshow or gimmick?



Eric Petersen for The Chronicle

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As we confirmed by introducing these technologies into our teaching, their buggy unfamiliarity could help students see with fresh eyes older media that they might have otherwise taken for granted. For a year prior, the two of us had been developing an

undergraduate course at our institution, Yale University, called "Selfhood, Race, Class, and Gender." The course had two aims. First, we planned to set abstract theories of the self in conversation with reflections on how particular social identities shape who we are. Second, we wanted to help our students see how accounts of the self that emphasize people's similarities and those that insist on the differences can mutually illuminate each other. To this end, we decided to have our students read Plato and Augustine alongside anti-colonial writers such as Frantz Fanon and feminists such as Sara Ahmed; the sonnets and comedies of Shakespeare alongside the *ghazals* of the Persian poet Hafez and the plays of the Sanskrit dramatist Kalidasa.

Just a few months before this course was scheduled, we received an unexpected invitation. Yale had joined a pilot program sponsored by HP to test equipment for "blended reality." Would we want our students to participate in these tests? We weren't sure what blended reality was, but we were eager to find out. Neither of us is a skilled digital humanist, but we have both worked on histories of media and science, and here was a type of craftsmanship that we hadn't seen before. We decided to give it a shot.

To learn more about blended reality, we watched some instruction videos and attended workshops like the one where we marveled at the reproduced Assyrian artifact. We found that it's a branch of digital technology devoted to enhancing the realism and precision with which we can reproduce, model, and recreate our environments and everyday objects on a computer screen, and making these experiences as immersive as possible. The makers of these tools describe them as "blending" reality because they feed parts of our environments into computers, improve them virtually, and pop them back out all ready for use.

The equipment involved consists of 3-D scanners, high-tech design software, and 3-D printers. You feed your chosen objects into the scanner by taking many overlapping 2-D pictures that the software integrates into a single 3-D model. Once the model is up, you modify it virtually. Then you print the final form in your chosen size and material, which can include various colors of plastic as well as platinum, silver, or gold.

We found out that the purposes of these technologies can vary widely: from the creation of better virtual-reality gaming environments to the production of personalized prosthetics, humane taxidermy specimens, and wedding rings. (One of our instructors proudly displayed an instance of the latter, which he had designed himself.) In the process, we also discovered that 3-D technology is becoming shockingly affordable. Scanning apps for smartphones, such as Autodesk's ReCap360 and Meshmixer, convert photographs into 3-D models; and you no longer need to own and maintain a 3-D printer, which can be noisy and noxious, when online "printing farms" such as Shapeways permit rapid and affordable products.

We were skeptical of the glamorous aura around this equipment and deeply conscious of our own lack of expertise. But we latched onto our experience of the Assyrian head and its revealing imperfections. We decided to use blended-reality tools — which we felt were excitingly unfamiliar — to get our students to think about their own selves, as well as the more canonical genres and media we would be studying, in new ways.

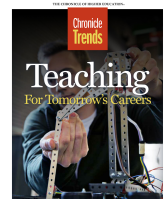
As we hoped, the bugginess of blended reality piqued our students' interest. One of them discovered — to much collective excitement — that the process of slowly turning an object on the scanner, necessary for the machine to capture it from all angles, could be manipulated to produce monstrous, usually unprintable variants on the original. Another student, who tried to replicate a childhood memento, soon realized that 3-D scanners are bad at recognizing shiny surfaces. Her precious pink barrette was rendered as an indistinct blob.

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It might seem that this exercise would only breed technophobia. Instead, it gave our students a bolder critical edge. They began to speak of particular genres and media as each having their specific, not necessarily interchangeable capacities and functions.

Instead of trying to adapt themselves to the current features of these genres and media, they speculated about what combinations of such features would most ideally suit their ideas and needs.

In a brainstorming exercise on "what is blended reality?," students reflected on the difficulty of separating "reality" and its representations, and on how their individual realities were constantly in dialogue with others' perspectives and narratives. In an exercise on analyzing their own selfies — a response to the philosopher Simon Blackburn's critique of the narcissism of selfie culture — they articulated the complex self-consciousness and critical suspicion behind their apparent embrace of Snapchat or Facebook. The older media and genres to which we exposed them — plays, letters, films, and philosophical dialogues — also gained sharpness in their minds, as malleable expressive and technological choices.

As we brought questions about technology, society, and selfhood into the heart of our course, we realized that tech in teaching can mean more than testing a suite of new educational apps, using the quantitative tools of digital humanities, or engaging in the historical work of media archaeology. Our experiment — which we ended up calling "Born Digital" — was a play on materiality and imagination, on the gleam of virtual possibilities and the textual stuff of the historical record. The phrase itself captures the early utopian promise of the internet, and refers quite specifically to material that has only a virtual presence. But as a number of scholars have shown, even these seemingly ephemeral, evanescent digital objects leave physical traces.

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"Born Digital" for us was thus a humanistic play on words that captured how technology can forge ties between a range of environments and communities both past and present. It was also an expression of an equally humanistic hope that our technologies, old and new, can speak to each other rather than merely supersede each other. Opening ourselves onto a widening range of them ultimately increases the sensitivity and care with which we approach each one. In our case, it helped students read more deeply, write more insightfully, and articulate their intuitive sophistication about media and technology more boldly than we'd expected or hoped.

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