Evaluating the Impact of Recipe Guided Format on DIY Tutorials

Alexander Wing, Emily Zhu, Faculty Mentor: Kathleen McDermott

New York University department of Technology, Culture, and Society

New York, New York, United States

alexwing@gatech.edu ez682@nyu.edu kmcdermott@nyu.edu

ABSTRACT

Do-It-Yourself (DIY) culture is gaining popularity in entertainment, education, and hobbyism, and has been heralded as having the potential to democratize technology and empower individuals. Research within STS and Accessibility Studies has contributed to the emergence of Critical Making, a field which seeks conceptual grounding within DIY practices. While DIY culture has been widely interrogated in a philosophical context, more can be learned in the area of evaluating DIY content.

This research focuses on the authorship of DIY physical computing tutorials, pertaining to how authorship may be improved, through qualities such as design, layout, and presentation of information. Our experiences with successful and unsuccessful tutorial completion aligns with existing literature, which finds incomplete, disorganized, or inaccurate information to be common barriers to tutorial completion. In our efforts to improve tutorial authorship, we identified recipes as a historically tested and robust format. We identified tutorials which were consistently rated as difficult to follow on knowledge-sharing platforms, and created iterations of these tutorials guided by a recipe format. We then ran a preliminary study to evaluate this design based on user-comprehension and rate of tutorial completion. Our results may offer useful suggestions for tutorial authors and provide insights for future research in DIY education.

LITERATURE REVIEW

We began this research by conducting a literature review. We immediately noticed the website instructables.com as a highly mentioned repository for tutorials. Much literature we found discussed the nature of DIY and the role of tutorials, but few evaluated the effectiveness of DIY tutorials themselves.

An exception was found in Ron Wakkary et al.'s paper, "Tutorial Authorship and Hybrid Designers: The Joy (and Frustration) of DIY Tutorials." Their team completed a range of tutorials and identified the following qualities

for making effective tutorials: "Ensure information is accurate; Do not omit necessary tools and components; Clearly identify necessary tools and components; Identify prerequisite and necessary competences; Clearly sequence tasks and required information; Divide tasks into manageable steps; Communicate through texts and images in proximity to each other and relevant tasks; Provide quality images with consistent orientation."1

In addition, we perused previous research on frustration related to online learning and found that frustration can be caused by: learner errors/failures, slow speed, and generally being withheld from a goal.2

Another important precedent for this research is Dalton et al.'s paper, "From DIY Tutorials to DIY Recipes," which discusses translating tutorials into a traditional recipe format, similar to those followed in cookbooks. Similarly to Dalton et al., our team identified numerous properties in recipe layouts, that seemed likely to improve the intelligibility of online tutorials. In our research, we focused on modern online recipe formats from popular websites as opposed to a traditional cookbook style recipe used in Dalton et al.'s study. This would avoid issues Dalton et al.'s team ran into such as the inability to include rich media.3

Our research is also keenly focused on the layout, format and visual design of a tutorial and their respective effects on the effectiveness of tutorials.

CONTENT REVIEW

After our literature review, we reviewed, completed, and discussed a diverse set of physical computing tutorials from various websites, most notably Instructables, Make Magazine, and Arduino Project Hub. We focused on popular yet difficult tutorials and noted any effective features and points of confusion based on tutorial comments and our own experiences. Our findings essentially aligned with Ron Wakkary et al.'s research, regarding the importance of tutorials providing complete and accurate information in manageable, steps with strong visual aids. We identified Arduino-based robotic arms as an engaging and challenging project for beginners, because it has elements of circuit layout, programming, and physical assembly of the arm structure. Finally, we took our favorite aspects from multiple robotic arm tutorials, to create a new tutorial, for an easy to use robotic arm that can consistently be built in under two hours.

We also reviewed popular and easy to follow recipe websites — Bon Appetite's Basically, Chefsteps, New York Times, and more — and took note of features that we felt were relatively uncommon amongst the tutorials we found and could be of benefit to such tutorials. The most important qualities we decided to use in our study were: including images in the initial materials section; writing lots of very short and concise steps as opposed to fewer, longer steps; still and moving

pictures of each finished step; organizing information in a "mise en place" style (a common recipe motif in which individual parts are depicted or demonstrated before assembly); and including steps for troubleshooting.

PRELIMINARY STUDY

On instructables, we created a tutorial for our robotic arm guided by the recipe qualities we identified and a control tutorial which contained the same information, but laid out in a way more similar to other tutorials we'd encountered online: few but longs step with many images tightly packed together. Further, we created graphic elements to help improve the visual appeal and clarity of the recipe-guided tutorial . Both the control and the designed versions were hosted on a private site and were used in our preliminary study. Prior to executing the study, we iterated on the tutorial design and tested it on friends to attempt to weed out any obvious problems such as any incomplete information.

In our preliminary study, we setup a workshop environment and divided our 9 participants randomly into two groups: A (n=5) and B (n=4). We provided both groups with the same pre-workshop survey. Then, Group A received our experimental tutorial while Group B received our control tutorial. The participants were provided all the necessary materials and were instructed to complete the tutorials as if they were at home, and to avoid asking questions and discussing the tutorial amongst others in the workshop. All participants started working at the same time. While the participants were working, we took qualitative notes of any interesting occurrences and participants' progress or mistakes. After a participant finished their tutorial, we asked the participant to fill a post-workshop survey before answering any of their questions.

FINDINGS

(Did not include any stats tests yet also need to include survey results.) Most participants made the same small yet serious error: they would not align wires properly on the same row on the breadboard. However, once we informed the participants about this error and helped them correct it, all participants but one were able to complete the tutorial completely. This was surprising since all workshop attendees were beginners and some had little to no experience with physical computing.

From our survey data, this workshop experience seemed to make both group A and B more interested in electronics. We think that the choice of a robotic arm for our tutorial served to be effective as an engaging project. Participants in group A found the tutorial less challenging and less frustrating. Since group A's tutorial appears to be much longer and less condensed, we were expecting participants to find tutorial A more intimidating but they found tutorial A to be less intimidating. We would like to perform

more research with a larger sample and more refined tutorials to confirm our findings.

From our qualitative notes, we noticed that the format difference made a surprisingly small difference in the completability of the tutorials between group A and B. Most of the problems of the tutorials seem to be totally unrelated to the format, for example not perfectly aligning wires in the breadboard or having lots of trouble screwing on servos horns. Additionally, participants seemed to focus the majority of their attention on pictures, which were identical in both tutorials, rather than the text. However, the text seemed to be important to the participants for small but important details. Most significantly, each participant completed the tutorials in very different ways. For example, some completed the steps out of order, some utilized google more than others, and some seemed to test more often than others.

Overall, we still believe that online recipes can serve as an effective guide for the format and design of online tutorials as it seemed to improve the ease of identifying materials and may reduce frustration.

FUTURE TOPICS OF INTEREST

While we initially began this research with the intention of identifying a format that can consistently improve the legibility of online tutorials, and while our initial findings indicate that the recipe-guided format could be marginally helpful, the most important factor in tutorial success remains the completeness of the educational content. Despite the fact that we created numerous iterations of the same tutorial, during the preliminary study, participants still identified two mistakes on our part; a fact which forces us to acknowledge the difficulty in creating a tutorial with no content errors. With this in mind, as well as our observations regarding the diversity of participants' approaches to engaging with the online content, we believe that rather than attempting to identify a "perfect," tutorial format, further research may be more beneficial in the area of identifying or creating a tutorial format that accounts for and better accommodates the variety of ways people use tutorials One possible avenue we were considering is to make a metaphorical cookbook format for recipes where basic information such as how to use a breadboard would be presented at the beginning of the metaphorical cookbook and linked to where appropriate throughout all the cookbook recipes (tutorials), giving participants the option to seek more detailed information when needed, but not overwhelming them by presenting of all of the necessary content on one page We also believe that more can be gained in the field of tutorials and electronics by investigating recipes.

We were also considering more graphic heavy tutorial formats that use significantly less text than the average tutorial as users did not seem to care so much about the text. We would also

like to investigate the approachability of tutorials and their correlation to the length of the tutorial.

REFERENCES

[1] Wakkary, Ron, Markus Lorenz Schilling, Matthew A. Dalton, Sabrina Hauser, Audrey Desjardins, Xiao Zhang, and Henry W.j. Lin. "Tutorial Authorship and Hybrid Designers." Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems - CHI 15, 2015. https://doi.org/10.1145/2702123.2702550.

[2] Ceaparu, Irina, Jonathan Lazar, Katie Bessiere, John Robinson, and Ben Shneiderman. "Determining Causes and Severity of End-User Frustration." International Journal of Human-Computer Interaction17, no. 3 (2004): 333–56. https://doi.org/10.1207/s15327590ijhc1703_3.

[3] Dalton, Matthew A., Audrey Desjardins, and Ron Wakkary. "From DIY Tutorials to DIY Recipes." Proceedings of the Extended Abstracts of the 32nd Annual ACM Conference on Human Factors in Computing Systems - CHI EA 14, 2014. https://doi.org/10.1145/2559206.2581238.