

Sketchnoting, a Visual Way to Improve Creative Confidence and Critical Thinking in the Virtual Environment

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Abstract—This Innovative Practice Workshop aims to expose engineering educators and students to the basics of sketchnoting as a creative and non-traditional visual listening and idea generation methodology. It has shown to foster in-class engagement during lectures especially in the virtual environment, when lectures are paced accordingly. When applied in an engineering learning environment it has been investigated to foster subject matter comprehension and retention; based on the premise that in order to visualize a concept it has to be understood.

The session participants will actively learn, practice, and develop basic sketchnoting skills, addressing the conference theme of convergence in engineering education by exposing students and faculty to this low-fidelity visualization technique originated in design disciplines. The session will provide an introduction to the building blocks for visual notetaking focusing on engineering and scientific disciplines. The session will be interactive and hands-on covering the process from learning the basics, to developing an understanding for sketchnoting and how to apply it.

Keywords—*sketchnoting, visual thinking, critical thinking, creative confidence*

I. WORKSHOP CONTEXT

Sketchnoting was originally conceived as a way to turn linear, written notes into visual presentations thereof [1]. Placing information in clusters on the page, drawing simple frames around the text and connecting the text through lines, arrows and adding simple visuals to add meaning [2][3]. When sketchnoting one often connects words and images in ways that could be described as the active outlet of dual coding [4][5] where two different, yet connected systems process visual and verbal stimuli simultaneously. This processing of visual and verbal stimuli has been discussed to foster memory and retention [4][6][7].

Sketchnotes can contain mainly words and do not necessarily require imagery. However, they can turn traditional notes into meaningful synthesized interpretations of discussions, lectures, debates, and the like. These notes are taken in real time such as during lectures or presentations, be applied to study notes, and can serve as a more generative activity for team or individual idea exploration [1][3][8][9]. In previous studies sketchnoting has shown to foster subject matter understanding as opposed to simply memorizing [10]. Hayes [11] discusses the common process of notetaking mostly being an activity of

copying, rather than comprehension. She goes further by stating: “*Creative notetaking requires extraction and reaction. The students’ ability to extract and explain core ideas, concepts, and factual details is revealed in their notes. The students’ ability to sort and classify these extractions is central to their comprehension of the text’s meaning.*” [11, p 53]

The embellishing involved in sketchnoting through the use of one or two colors and a grey marker adds to the meaning of the sketchnoted visual maps. This form of interaction with one’s sketchnotes creates an additional layer of comprehension and meaning, it aids in retention of information as well as adds elements of fun, pleasure and accomplishment [1][3][5].

II. PRESENTER QUALIFICATION

Verena Paepcke-Hjeltness, IDSA is Assistant Professor of Industrial Design at Iowa State University and Education Director and Board Member at the Industrial Designers Society of America (IDSA). Her research focuses on the diffusion of design thinking and doing practices in design and non-design-oriented disciplines, with a focus on exploring visualization as a gateway to learning, comprehension and creative confidence. She plans and facilitates workshops on sketchnoting, design thinking and strategic planning in both academia and industry. Since 2015 she introduced sketchnoting to more than 1,500 students, faculty, university staff and professionals from diverse disciplines.

Mani Mina, Associate Professor in Industrial Design and Electrical and Computer Engineering at Iowa State University. He is an engineering educator and researcher whose work has been focused on reflective practice in engineering education, empathy in engineering, technological literacy, development of design and multiliteracies for engineering and non-engineering students. He is an active member of IEEE education society and has led variety of workshops, and sessions on design, design metaphors, Engineering education and philosophical perspectives. He and Professor Paepcke-Hjeltness have introduced research papers on Sketchnoting and applications in engineering classes at FIE, as well as ASEE conferences since 2017.

III. EXPECTED INTERACTION & PROCESS

Participants will be guided through a very hands-on work session, introducing them to the basic framework of

sketchnoting. The workshop participants will be guided through the following agenda:

- **Introduction to Session and Facilitators (10min).**
- **Benchmark Sketch & Survey (10min).** Participants will be asked to respond to a short survey and sketch prompt.
- **Warm up, drawing with intention (10min).** Thinking through drawing, minimizing the threshold to visualizing ideas through a shift in fidelity from realism to schematic representation.
- **Fundamental building blocks of sketchnoting (45min).** Exploring lettering, frames, connectors and basic visuals pertaining to general notetaking, engineering and education.
- **Developing a visual library (15 min).** Process overview and practicing of how to develop low-fidelity visuals.
- **Reflection Sketchnotes (50min).** Responding to prompts in a provided template, participants facilitate each other's reflection through sketchnotes.
- **Benchmark Sketch (5min).** Closing the session with a sketch prompt.
- **Discussion and wrap up (30min).** Implementing sketchnoting in the curriculum.

IV. ANTICIPATED AUDIENCE

This workshop is open to all conference participants, students, faculty, staff and professionals. Audience size can range from 10-30 participants.

V. TAKE-AWAY SKILL & MATERIALS

When sketchnoting one synthesizes information in real time, thus prioritizing what was heard and seen into visual maps. [1] These visualizations create a kinesthetic connection. There are several advantages that can be derived from sketchnoting [3][6][7][12]:

- Practicing to synthesize information in real time
- Making visual connections and discovering patterns
- Promoting engaged note taking, (especially pertinent in the virtual environment)
- Relaying information to others
- Retaining information
- Fostering subject matter understanding
- Addressing the five pillars of visual literacy theory as defined by Avgerinou and Pettersson [13]

It has to be noted, that although sketchnoting is fairly easy to learn (for most), it requires practice. Not everybody takes to it equally fast, or at all. When sketchnoting class lectures the pace of the lecture itself is important to consider and additional practice time is advised [14]. When sketchnoting study notes it should be anticipated to take longer than traditional handwritten

notes, however, the learning and retention will likely be deeper [7][10].

With practice, participants will be able to take notes and communicate on paper in a more visual fashion. They will leave the session with a set of basic building blocks in the form of their own visual library as well as a hand out to share with students. Participants will have a starting point and a set of references to begin practicing and teaching the format of low fidelity visual communication. A study conducted with two electrical engineering students showed that using sketchnoting for study notes fostered memory and retention of information and a deeper understanding of the subject matter [10].

VI. SESSION GOALS

Participants will:

- Learn the basics of sketchnoting in form of the building blocks, lettering, frames, dividers, simple visuals
- Develop their own first visual library
- Practice a sketchnote activity in form of a reflection sketchnote that can be used in their own courses, or study
- Be exposed to sketchnoting as a low fidelity visualization as a legitimate communication tool
- Be encouraged to expand their creative confidence and critical thinking through practicing sketchnoting

VII. SPECIAL REQUIREMENTS

Each participant needs a table surface that accommodates an 11x17 inch size paper.

Two video projectors, one for the presentation and one for a document camera the facilitator will use to demonstrate.

A document camera if possible, such as an Elmo, that has high enough resolution to show sketches.

Capability to use audio.

VIII. ADDITIONAL FEES

Participants can be provided with pens and papers or purchase their own prior.

Cost per person approx.: \$6-8

This material is based upon work supported by the National Science Foundation (NSF) under award EEC-1623125. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the NSF.

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