

SKETCHING COMPLEXITY: TEACHING STUDENTS TO VISUALISE TANGIBLE AND INTANGIBLE SYSTEMIC RELATIONSHIPS

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ABSTRACT

The design discipline has for some time been concerned with matters beyond traditional physical products. Increasing interest in systemic design leads to design activities that include elements of intangibility, relational aspects, and an increasing complexity. Therefore sketching education, as a foundational competence for industrial design engineers, also has to evolve.

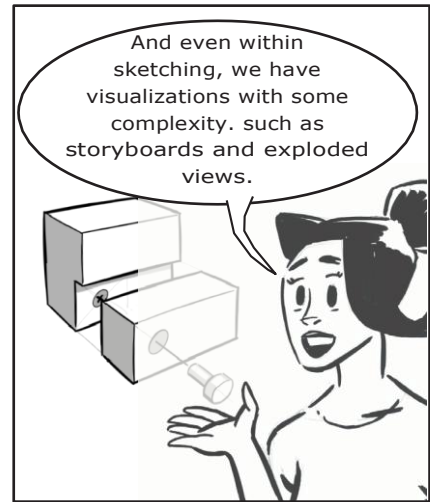
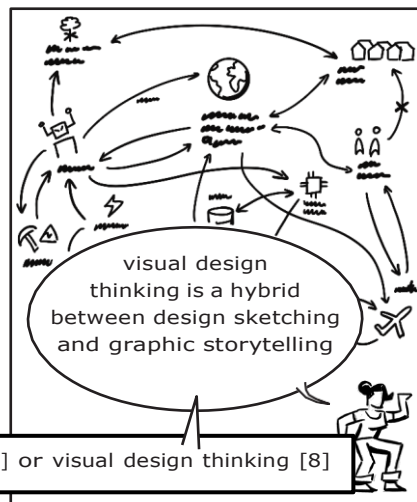
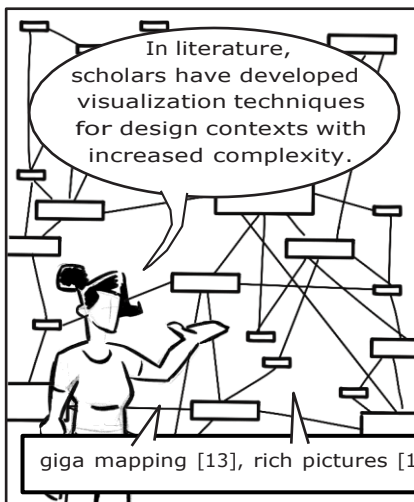
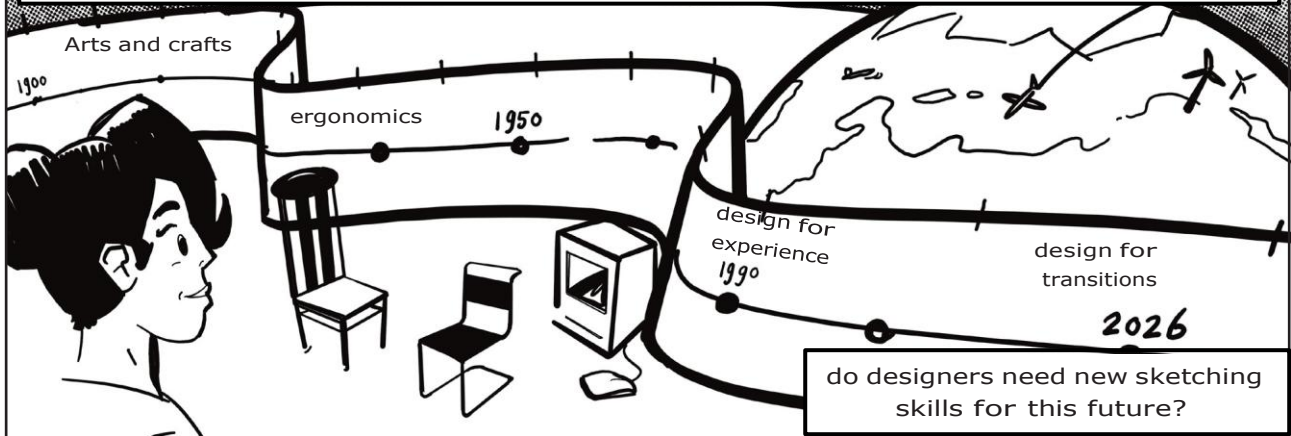
In this visual paper, we describe a new design sketching course that uses the foundational assessment criteria of traditional product design sketching, such as: perspective, construction, marker shading and composition. Ten of these criteria are revised for the new course to expand the sketching skillset of first year Industrial Design Engineering students. The list of new criteria includes: viewpoint, material selection, sequence, visual thinking and figuration. This course allows the design sketching skills that industrial design engineers traditionally have to expand to include the complexity and intangibility of future design practice.

Keywords: Design sketching, design education, systemic design, visual design thinking

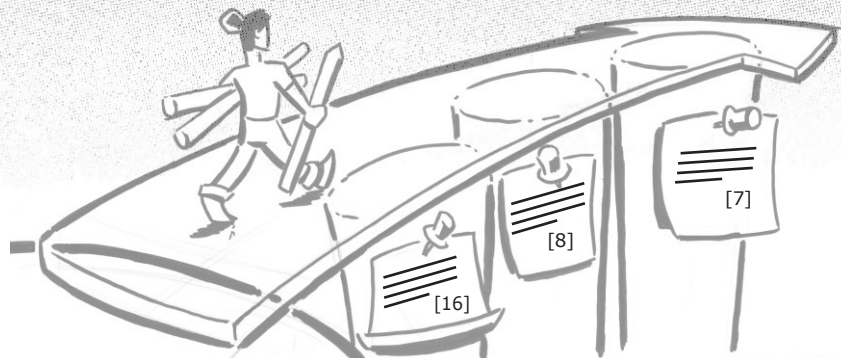
1 INTRODUCTION



...But the world of design is always expanding. and the future of design will be different [9], [10], [11], [12].



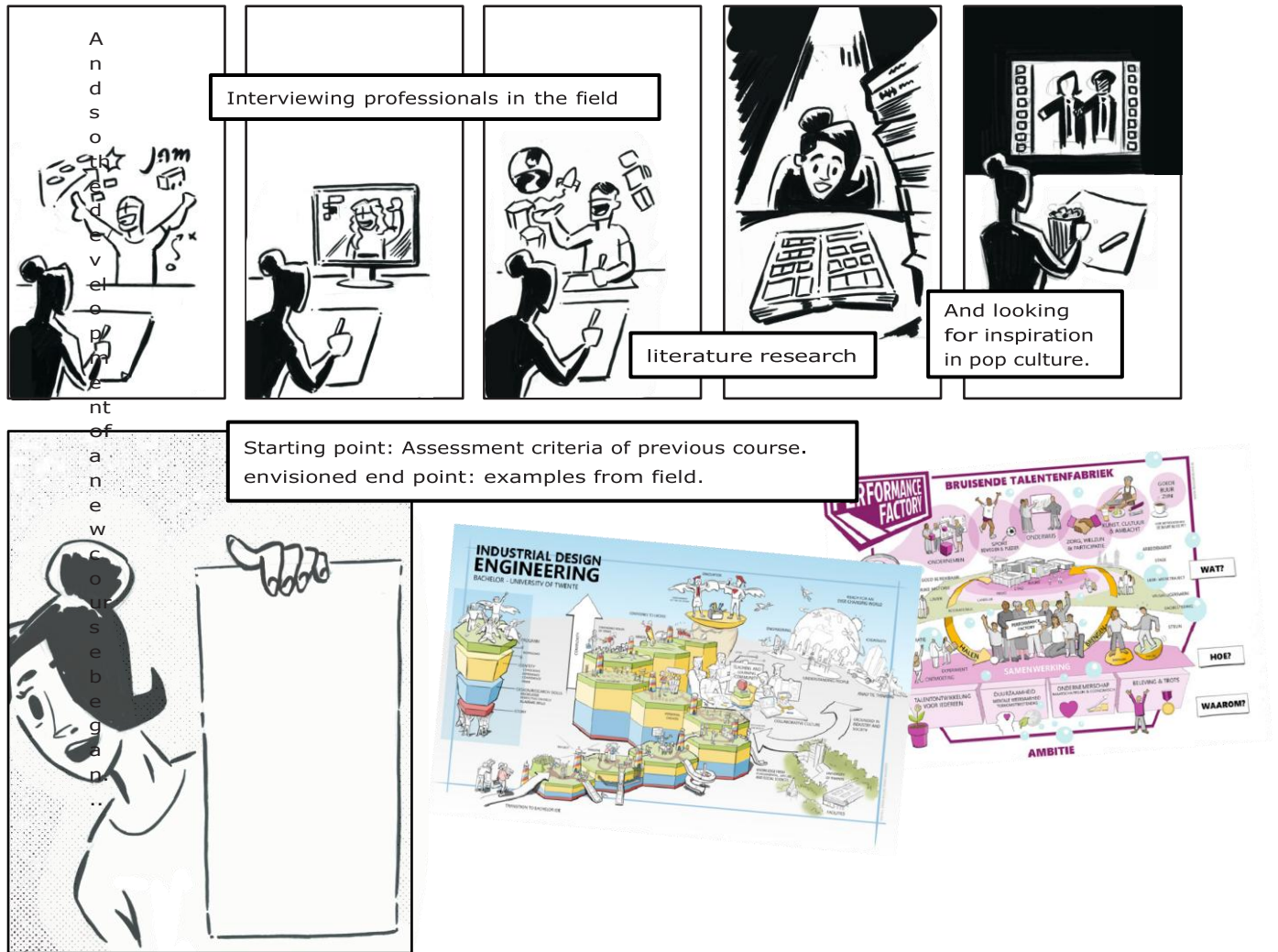
Sketching is a universal set of skills that designers can use to draw anything they imagine. We developed a first year sketching course around sketching for intangibility and systemic complexity based on this idea. this course follows up a previous foundations course earlier in the first year [15].



It is important that, like the design field itself, we expand the current paradigm rather than replace it. We use the sketching ability that students possess from the earlier course.

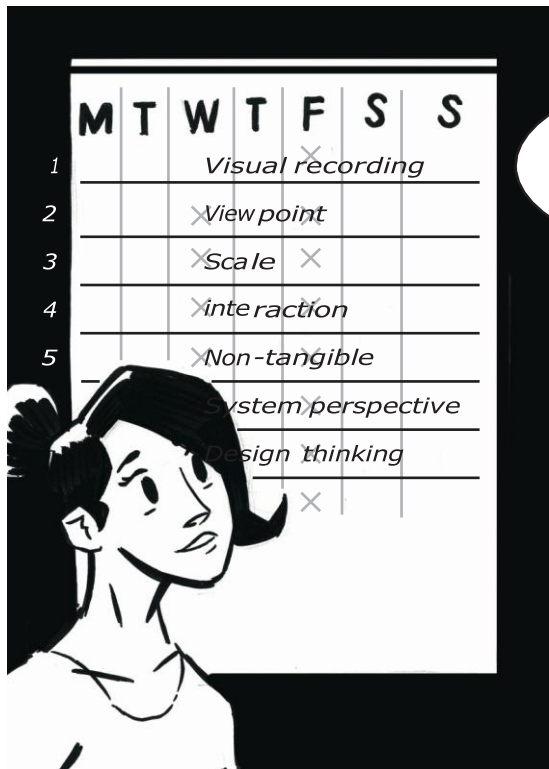


2 THE STRUCTURE OF THE NEW COURSE



- Shading
- Composition
- Lay-out
- Line dynamics
- Speed
- Perspective
- Material use
- Construction
- Accuracy
- Marker technique

Figure 1 (left): System visualisation of the bachelor curriculum IDE. Figure 2 (right): Vision visualisation of a cultural organisation by Tekenafdeling



Students follow lectures that contain both theory and assignments two times per week. each week has a theme.



At the core of our sketching course is practicing the theory by doing assignments. here are some examples of assignments early in the course, around the middle of the course and near the end.



3 Near the end of the course we let the students visualise research presented by one of our university colleagues in a real design case.



2 In the middle of the course. Students sketch an obstacle course overview with zoom-in views of specific actions. (theme: interaction)



1 early in the course an assignment is to visualise a set of chess pieces performing an interaction within a chessboard sketched as a landscape. (theme: scale)

3 ASSESSMENT CRITERIA OF THE NEW COURSE



compared to the previous course, we have three categories of criteria.

Categories

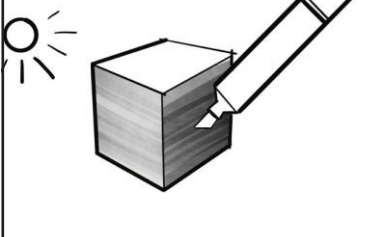
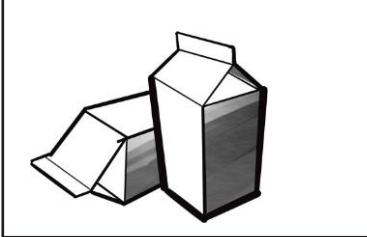
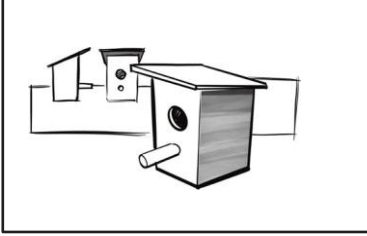
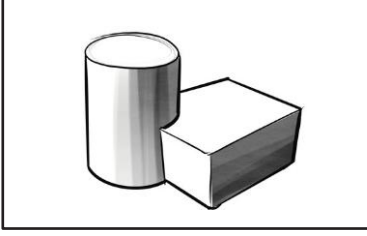
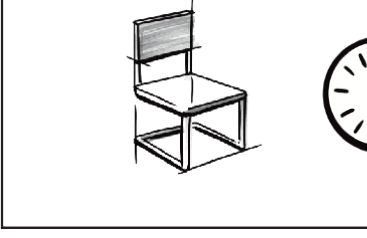
- Increased complexity
- Adapted
- new



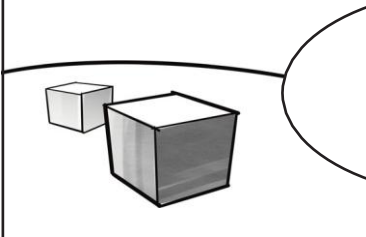
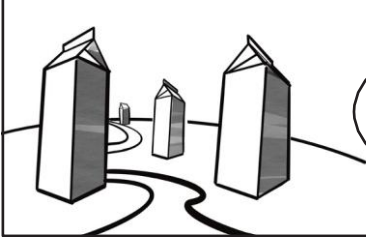
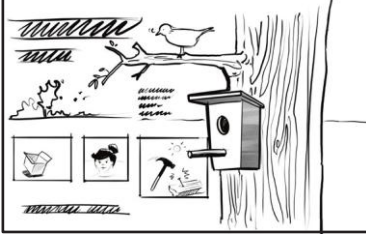
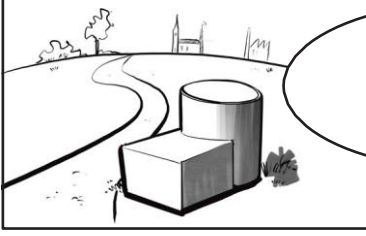
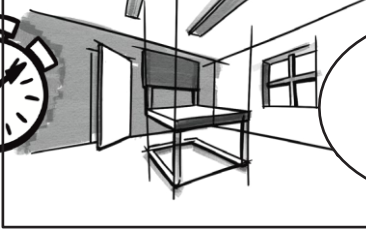
the first category contains five criteria that are similar to the previous version albeit with increased complexity.

- *Shading*
- *composition*
- *layout*
- *line dynamics*
- *speed*

Foundation

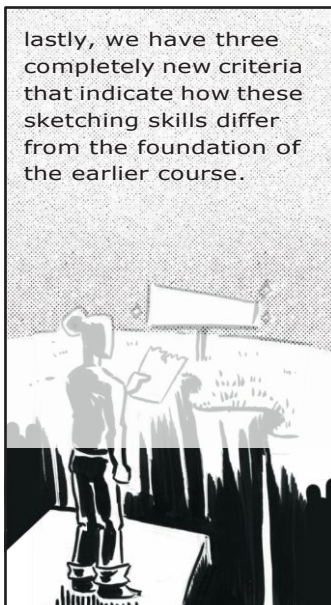
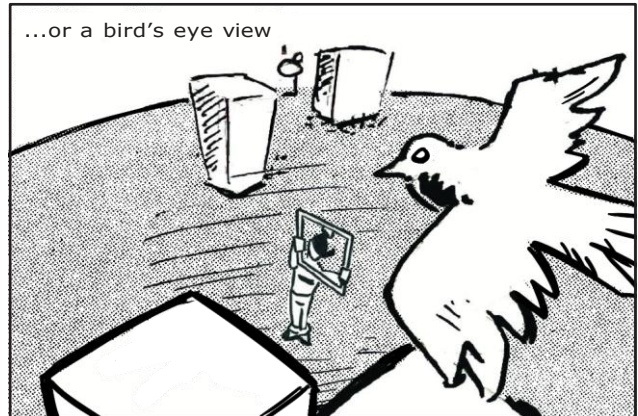
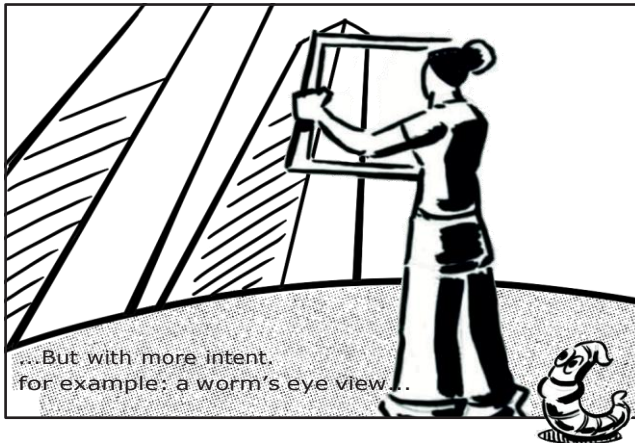
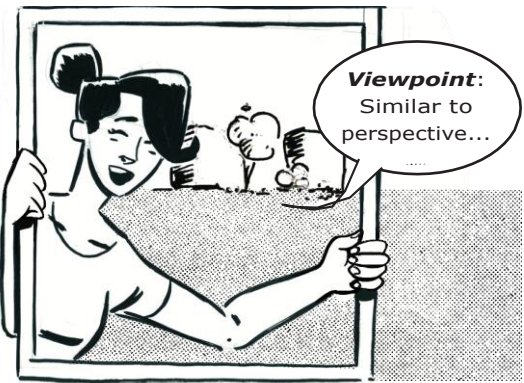
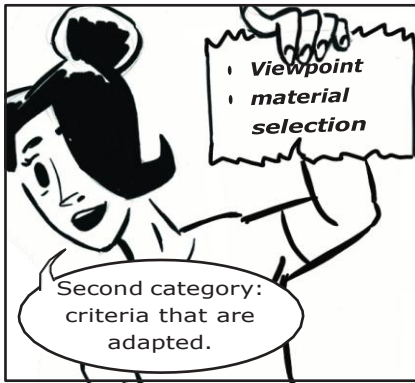






With increased complexity

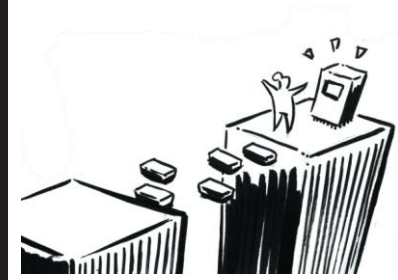
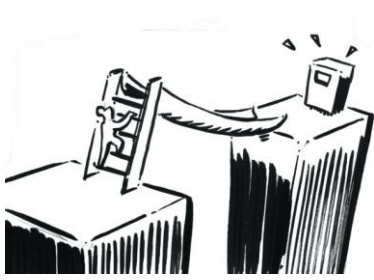








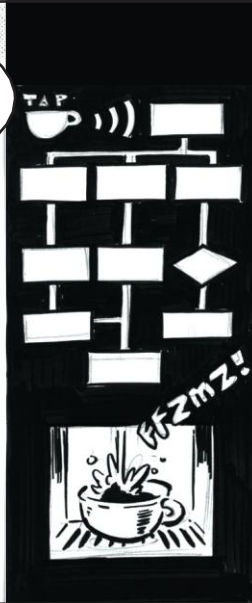
Layout: elements on a page are placed with respect for legibility and order. And with a sense of hierarchy.



each way is a different story



Sequence:
showing progression
through time in sensible
steps and time intervals
[17].

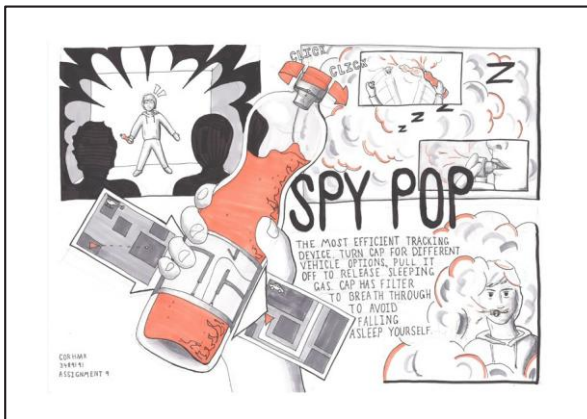


And lastly,
Visual thinking: use of a
reliable, systematic approach to
translate complexity into images
[18], [19].



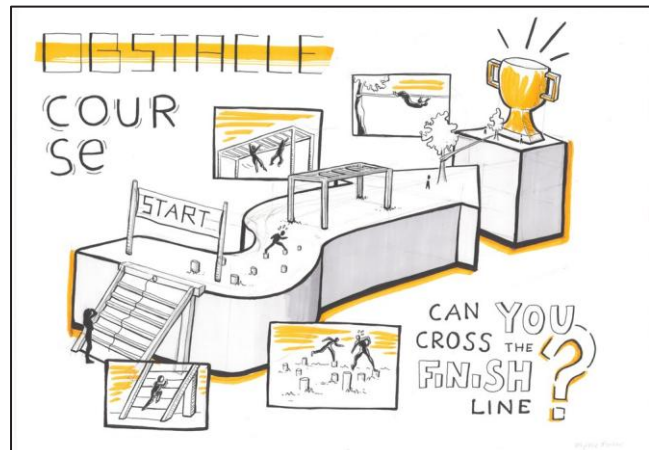
4 THE FIRST RUN OF THE COURSE: RESULTS AND EVALUATION

We taught the course using the mentioned structure and criteria. some results, with prominent criteria*



Cor Haak

- layout
- figuration

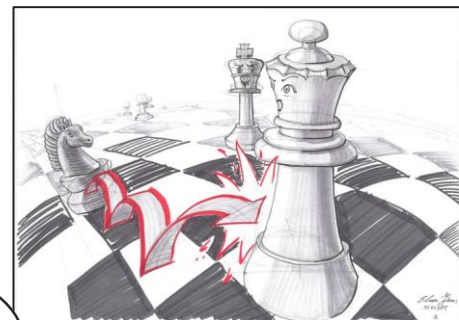


Myrthe Portier

- sequence
- figuration

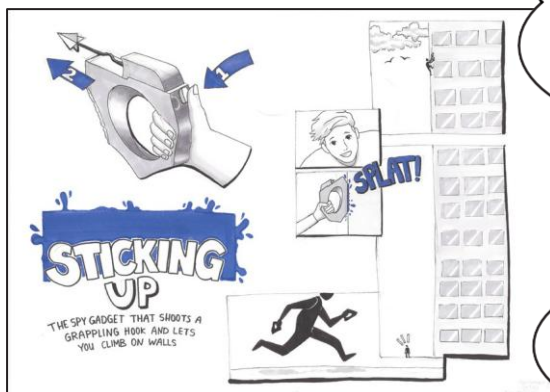
And course evaluation results [20]...

89% of students (n=54) found the course to contribute to their knowledge and understanding of related courses. (Answered strongly agree or agree on 4-point scale)



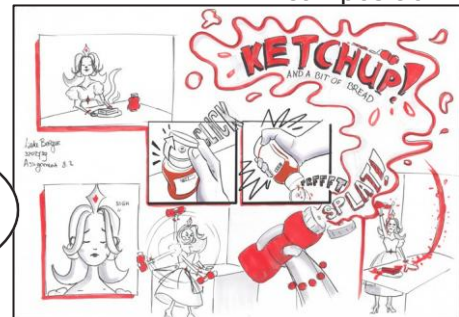
Elise Baas

- viewpoint
- composition



93% of students say they comprehend the concepts covered in the course

26% of students say that the workload of the course is hard to manage



Lieke Berger

- Sequence
- viewpoint

Lisa deRijke

- figuration
- layout

88% of students say the course increased their interest in the field of industrial design engineering

Student evaluation

Student course results

sketches

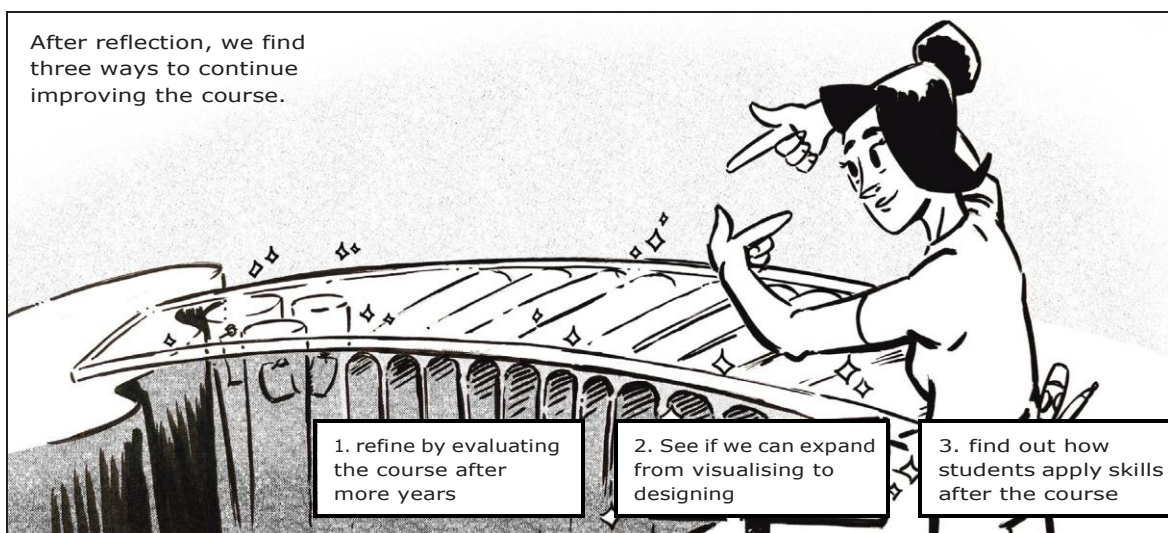
* other criteria (Speed, shading, line dynamics, material selection, visual thinking) are present in all EPDE2026/1160

Students were able
to use their
background in
design Sketching to apply the
criteria in the course results. As
expected, applying the 3 newest
criteria (figuration, sequence,
visual thinking) were most
difficult and required the most
guidance
from lecturers.

5 DISCUSSION

The course and its assessment criteria described in this paper are a shift in direction for the future of sketching for industrial design engineering. It stems from change in focus of the field and a broadening of our study programme towards designing transitions, values and systems in order to face real-world challenges [21]. The course therefore follows a larger trend, and as true designers we rather shape a future than let it happen to us. The design background of our students makes the results of the course interesting for exploring how designers visualise complexity and how the mores of design sketching hold against an increasingly intangible world. We are sure that a visual-tangible field as industrial design engineering can contribute to human understanding and understanding humans within these complex systems. Efforts to develop this (e.g. Systems Oriented Design [22]) are however not yet mainstream within industrial design engineering. Therefore, our course teaches the foundational skills of sketching intangibles and systemic contexts. However, the course in the current form lacks an essential application area of design sketching: ideation sketching. We place focus on visualisation for communication. A next step for the future of the field will be to explore how sketching cannot only be used to visualise complexity, but also to design it.

Even though the course contains sketched examples from industry, the students apply the course contents within an academic context. They sketch for researchers, not for design agencies or industry businesses. Sketching intangibles proved valuable for this academic context. However, it would be interesting to apply the skills to cases outside of the context of our university to explore what value our developments hold for design practice.



6 CONCLUSION

In a changing design landscape, designers need to change too. The future of design looks to be more systemic, complex and intangible. Our approach to this changing future is a new foundational design course that is expanding the repertoire of what is sketch-able. In this course we cover themes that are embedded in traditional design sketching, albeit with added complexity and intangibility. Student results showed that traditional design sketching skills can be adapted to provide a solid basis for sketching complex and intangible concepts.

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