Chapter 5

Annotating experience: The clothing designers' story and beyond

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The previous chapters demonstrate the importance of images in various professions' communication systems, as well as their potential for the training of newcomers in the field. But as we heard from various professions, VET teachers are not only happy to work 'with' images, they also like to work 'on' images. This chapter explores how learning technologies can help them go further in that direction and how teachers of different professions can make use of picture annotations, labelling or contrasting to foster apprentices' specific professional visions.

We know how important visual information is for human beings. Also, from a psychophysiological point of view, on average, about 50% of the brain's resources are dedicated to constantly selecting, elaborating on and interpreting visual information. On top of that, we all live in an image-based society. We are surrounded by pictures, whether in a static or a dynamic format. Many social networks specialise in picture sharing – Flickr, Picasa Pinterest, Instagram. Platforms such as YouTube constantly appear on the podium of the most accessed Internet website and most of our daily communication tools, WhatsApp, for example, allow us to modify and interact with pictures.

In the previous chapters, we observed how teachers used these kinds of pictures with chefs, bakers and painters and discussed them with their apprentices, prompting them to look for similarities and differences in workplace practices and to compare processes and detect products' qualities and defaults. We often noticed that an image that might look insignificant to a non-expert often included several interesting and meaningful details for a professional. Teachers can highlight these details to apprentices and draw their attention to them, so fostering a professional-specific way of looking at images.

Also, we saw that in several cases, teachers chose to do further work on images, for example, pasting to-be-commented pictures into a PowerPoint presentation in order to add labels, markers, notes or other indications, and building a sort of visual summary of technical information to be learnt. To speak the Erfahrraum language, we would say that in these cases, raw artefacts are 'augmented' through the addition of successive layers of information, for example, by focusing attention on relevant information or by integrating comments and analysis by community members, or by adding elements of theoretical knowledge to practical experiences as a result of a discussion orchestrated by the teacher.

These two general considerations brought us to deepen two different topics, one related to how observation takes place (professional vision) and the other related to how observation skills can be improved (annotation).

Observation as a professional practice

In 1994, Charles Goodwin published a paper simply entitled 'professional vision'. It referred to how professionals embody specific visual practices, depending on their vocation. Professional vision refers to 'socially organised ways of seeing and understanding events that are answerable to the distinctive interest of a particular group' (Goodwin, 1994, p. 606). In other words, visual practices – including actions such as coding, highlighting and producing practice-related visual materials – are context-bound and profession-specific. Valentina Caruso and Alessia Coppi, two collaborators who developed PhDs on this topic as part of the Dual-T project, documented these definitions in their thesis (Caruso, 2017; Coppi, 2021). They adopted Goodwin's definition to investigate how observation takes place within a professional community and took into account a huge literature applying a similar concept to teacher training. In this case, scholars spoke about 'noticing' (e.g. Seidel & Stürmer, 2014; Sherin et al., 2011; Stürmer, et al., 2013; van Es et al., 2017), meaning a two-sided competence, combining both the capacity to identify and discern the relevant details of an observed phenomenon by effectively directing and focusing one's attention on it, and the capacity to draw connections between the elements observed and one's knowledge so to be able to reason about what is observed in meaningful ways and accordingly decide how to react. We are insisting on these premises because of their link to our pedagogical model – and to our related research activities. Indeed, what we recognise here is a kind of tripartite activity, as we need an objective referent (collect: visualisation), we need to identify it explicitly (prepare: perception and description), and then we can infer an explanation and predictions (exploit: (cognitively and socially determined) reflection). We recognise these three elements in the examples we present in this chapter.

Let us start with our story. We will look at the case of clothing designers first and how and what they observe. Then we will look at the instructional means we used to teach clothing design apprentices to observe in compliance with our model.

How does the observation of experts and novices differ in VET?

When studying observation, several scholars have investigated whether experts and novices proceed in the same way when practising their profession. In recent years, this has been further empowered by the availability of eye-tracking technologies and techniques, allowing one to follow and track the gaze of a subject. Several professional fields have benefited from these studies, which have always focused on white-collar professions. That is, little to no attention has been devoted to vocational education. This is quite inexplicable considering how observation skills are central to many craft and industrial professions. This was also confirmed for us by the analysis of several VET training plans. Our attention was initially focused on garment makers or clothing designers.

In the profession of fashion design, good observational skills are relevant, as these skills help fashion designers precisely analyse a piece of clothing, ultimately resulting in good product creation. When creating and reproducing new clothes, fashion designers must identify specific visual information, usually represented by a picture or by that specific technical drawing called 'pattern'.
In the first study (Caruso et al., 2017), we asked a group of ten teachers and a group of 71 apprentices to tell us what relevant visual information they paid attention to when analysing and creating clothes. We considered teachers as expert professionals because, in this case, fashion design schools also act as companies, tailoring clothes for external customers, and because the involved teachers are still or have been professionals. Results show that clothing designers consider three main types of visual information when observing garments: 1) the details and patterns necessary for reproducing clothes; 2) the defects in manufacturing, quality and wearability; and 3) the characteristics of the customer's body. However, the extent to which novices and experts pay attention these three categories differs between the two groups. Before commenting on this point, let us add a second element: to measure a possible difference between the two groups, we also administered them a test. We showed the participants a set of ten pictures, including several categories of defects, and asked them to fill in a table, identifying for each picture 1) the categories of defects identified; 2) the defects description; and 3) the possible corrections. The analysis revealed that not only did significant differences exist between teachers and learners when looking at pictures of garments, but also among the learners, depending on the school year they were in: the more advanced tended to behave more like experts do (See tables 5-1 and 5-2 in the Appendix for statistical data).

The full picture is represented in Figure 5-1. In looking at profession-related visual information, the teachers concentrated on identifying the details and patterns useful for making clothes, mentally disassembling the image, and used their prior knowledge to make sense of what they observed and to predict the necessary work procedure. On the other hand, the learners concentrated on identifying the potential defects in the final clothes; their limited technical knowledge led them to focus mostly on easily noticeable elements, such as defects, hindering them from identifying other more relevant information (e.g. different types of patterns) or from connecting this information with the specific actions required in practice to produce a garment.

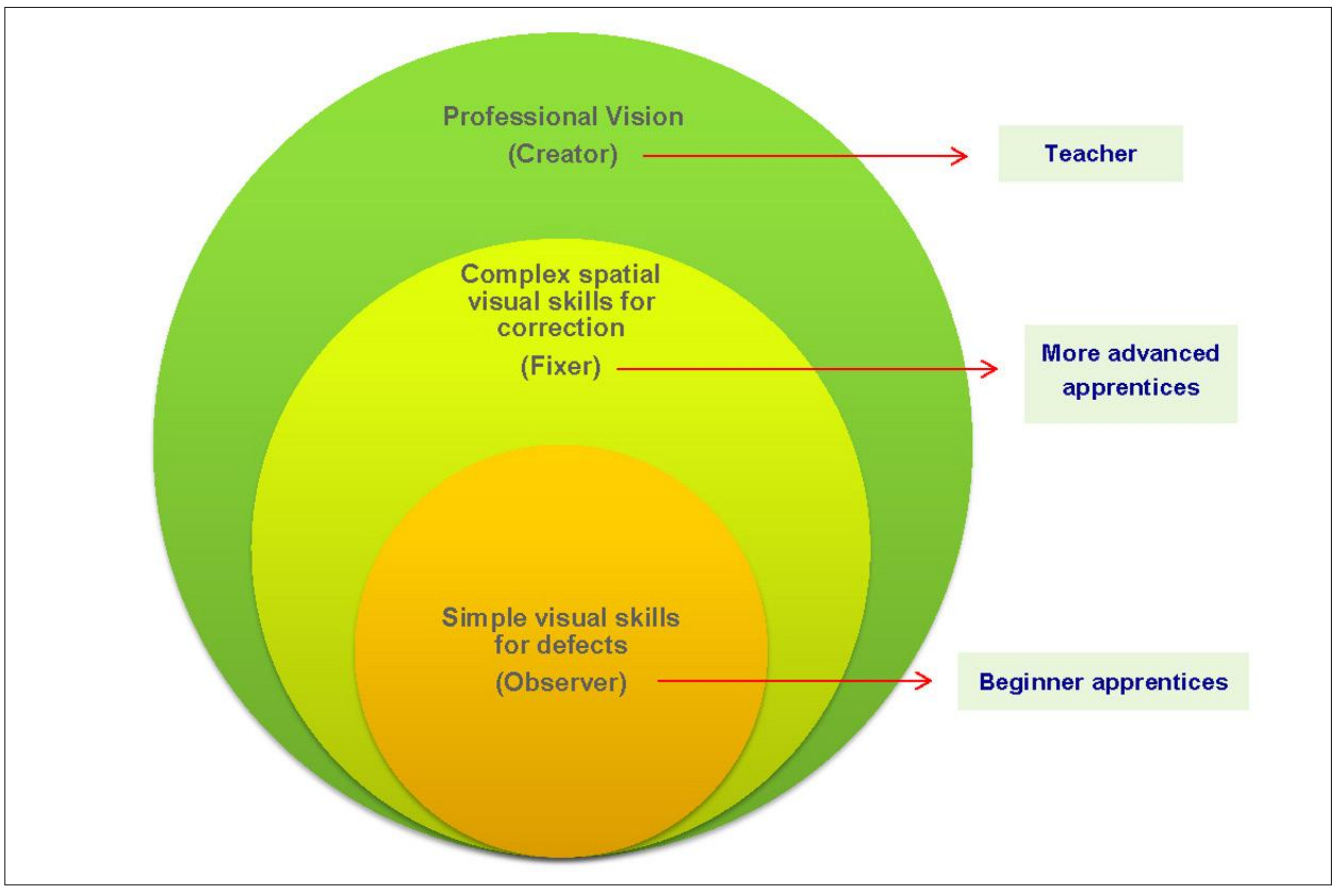

Figure 5-1 · How observation evolves among fashion designers

Observing clothes professionally is a holistic process that involves complex cognitive skills; beginners can only spot defects but not see their origin. As they progress in their training, however, they start reflecting on corrections to fix the problems.

Additionally, a crucial component of a professional vision for clothing designers involves the visual-spatial skill of mentally transforming a three-dimensional shape (i.e. the garment) into a two-dimensional image (i.e. a pattern), and vice versa. This is an even more specific skill distinguishing experts from novices.

How best to develop observation skills?

Although it is a clear objective of the training, no clear procedure is defined either in the clothing designers' curriculum or in that of other VET professions to make apprentices acquire these skills. Teachers, therefore, tend to develop their own material and strategy to try and make this happen. We discussed this further with some of them, with the idea of investigating how learning sciences and technologies could help increase the potential of their strategy and material to develop professional vision among apprentices. The next three examples illustrate what this collaboration leads to.

The theoretical background for the activities came from the simple but powerful principles of the learning sciences, such as the signalling principle of the cognitive theory of multimedia learning by Mayer (2001, 2014) and the already mentioned principle related to contrasting cases by Bransford et al. (2000). As per the former, we conducted an experiment with an eye-tracking tool (Coppi et al., 2021) to assess the effectiveness of visual cues to focus the learners' attention on specific elements of a garment. Despite our more finely grained hypothesis not being completely confirmed and some difficulties related to the nature of the study – being realised in a real school context – a general effect of visual cues could be confirmed.

Example 1. Picture annotation with clothing designers

Continuing our collaboration with clothing designers, we started by observing some of the activities they did at school and identified two common practices related to the analysis of garments and their patterns. Together with Prisca Cattani, a teacher at the school of Viganello and with Sabrina Solari, a teacher at the school of Biasca, we further discussed how these activities could profit from technology and co-designed two scenarios supported by Realto, to be contrasted with the traditional ones (Figure 5-2).

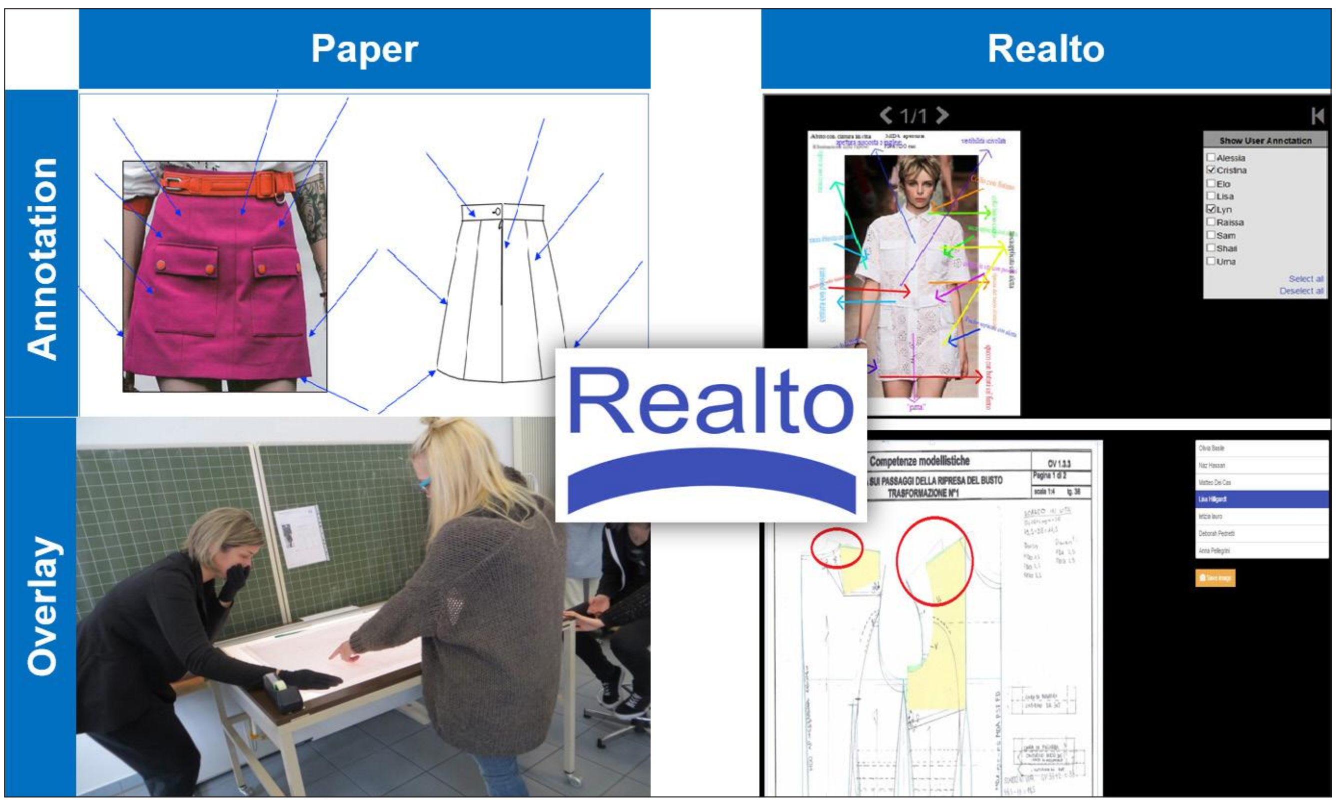

Figure 5-2 · Examples of activities focusing on strengthening observation skills of apprentice clothing designers, using Realto or paper only.

The first scenario concerned *overlaying patterns*. This was a scenario that Prisca and Sabrina were already using with paper and pencil. In this task, the students are asked adapt a skirt pattern to the needs of a hypothetical customer by working individually on it. The students' patterns are then printed on transparencies so they can be projected on a light table, around which the students can gather. The teacher's pattern is placed in the background, as a model, which allows students to identify and comment on mistakes, as well as to discuss how to correct them and how to be compliant with the customers' requests. In this version of the activity, two to three drawings can be superimposed, but not more. The teacher must constantly change the overlaid drawings as soon as new ideas are discussed. We decided to implement the same scenario using Realto. Students were given the same task but instead of turning their results over physically to the teacher, they submitted them online on Realto. Realto then automatically made the patterns semi-transparent, which allowed the teacher to display and remove them from what she projects to the entire class by simply clicking on the authors' names on the list of names that appears on the right of the screen (see Figure 5-2, bottom-right).

The second scenario focuses on cueing different parts of a piece of clothing (e.g. a skirt or trousers) and identifying the manufacturing defects detectable in the picture. In the paper-pencil condition, students are given two pictures of a garment (front and back) on paper and have first to identify each part of the garment using a coloured pencil to draw arrows and then must indicate possible manufacturing defects using arrows, circles and text. The teacher can project the annotated picture of a single student to the class using a beamer and again discuss with them, analysing the piece of clothing and guiding the students' observations. The paper-pencil solution restricts the teacher to showing one sheet of paper at a time, while the Realto-based solution allows for multiple annotated pictures to be superposed simultaneously on the class screen. The teacher can then display or hide any student's work to the whole class by ticking that student's name in the box on the right. The selected layers are displayed on top of each other so that the corresponding annotations possibly appear on the same (resulting) picture (Figure 5-2, top-right).

Both activities were implemented in seven different classes coming from two different schools. When possible, the activities were videotaped for analysis. Overall (for detail, see Caruso et al., 2017), the data showed that students made more spontaneous observations when using Realto than when using paper and pencil and that its use made students more actively and spontaneously engaged in the task than the use of paper and pencil (see tables 5-3 and 5-4 in the Appendix for the statistical results).

On top of these results, interviews with teachers and students allowed us to identify the perceived benefits of using Realto. For the teachers, these were: (1) encouraging creative teaching activities, which is generally not possible with other 'generic' technologies, (2) easily and more effectively supporting task correction, saving time, (3) focusing students' attention through cueing functions provided by the annotation tool, (4) engaging students in a variety of visual activities, and (5) improving the quality of the teaching materials.

The students, on their part, particularly appreciated the possibility of learning by sharing and seeing, getting immediate visual feedback, and being able to easily review their learning materials stored on the platform.

After these activities, clothing designers continued to use Realto independently, progressively integrating the use of the learning documentation (see Cattani, 2021; Basile, 2021 for additional learning activities implemented at school).

Example 2. Picture annotation with beauticians

A second experience took place within the profession of beauticians, for whom observation skills are very important too. Beauticians must learn how to perform skin analyses to identify most skin diseases and provide correct treatment, as well as to differentiate severe anomalies requiring a medical intervention from mild anomalies. Observing some of their lessons, we realised once again that some of the activities already conducted in normal classes could be enhanced by the use of Realto – through visual cues – again combining the use of annotations with image description (we previously spoke about description as the first step in a deep, reflective, analytical process). With respect to the activities promoted in the clothing designers' school, we were able to prepare a longer and more articulated treatment, and to better differentiate, in a learning scenario, annotations performed by the teacher as an instructional means, and annotations performed directly by the learners. For almost a whole semester, Claudia Berri and Luisa Broggini proposed activities for an intact class that served as our experimental group. Their lessons, run with Realto, were organised according to three main steps: 1) they presented pictures of skin anomalies uploaded in Realto to the students and directly annotated them (e.g., with circles and arrows) to explain how to identify specific anomalies and how to differentiate them from similar ones, 2) they asked the students to annotate a second set of images using Realto and to write a professional description for each image, 3) finally, they showed the class the students' annotations (see Figure 5-3) – also profiting from the Realto function that allows them to superimpose multiple images (see above) – and corrected them with the students.

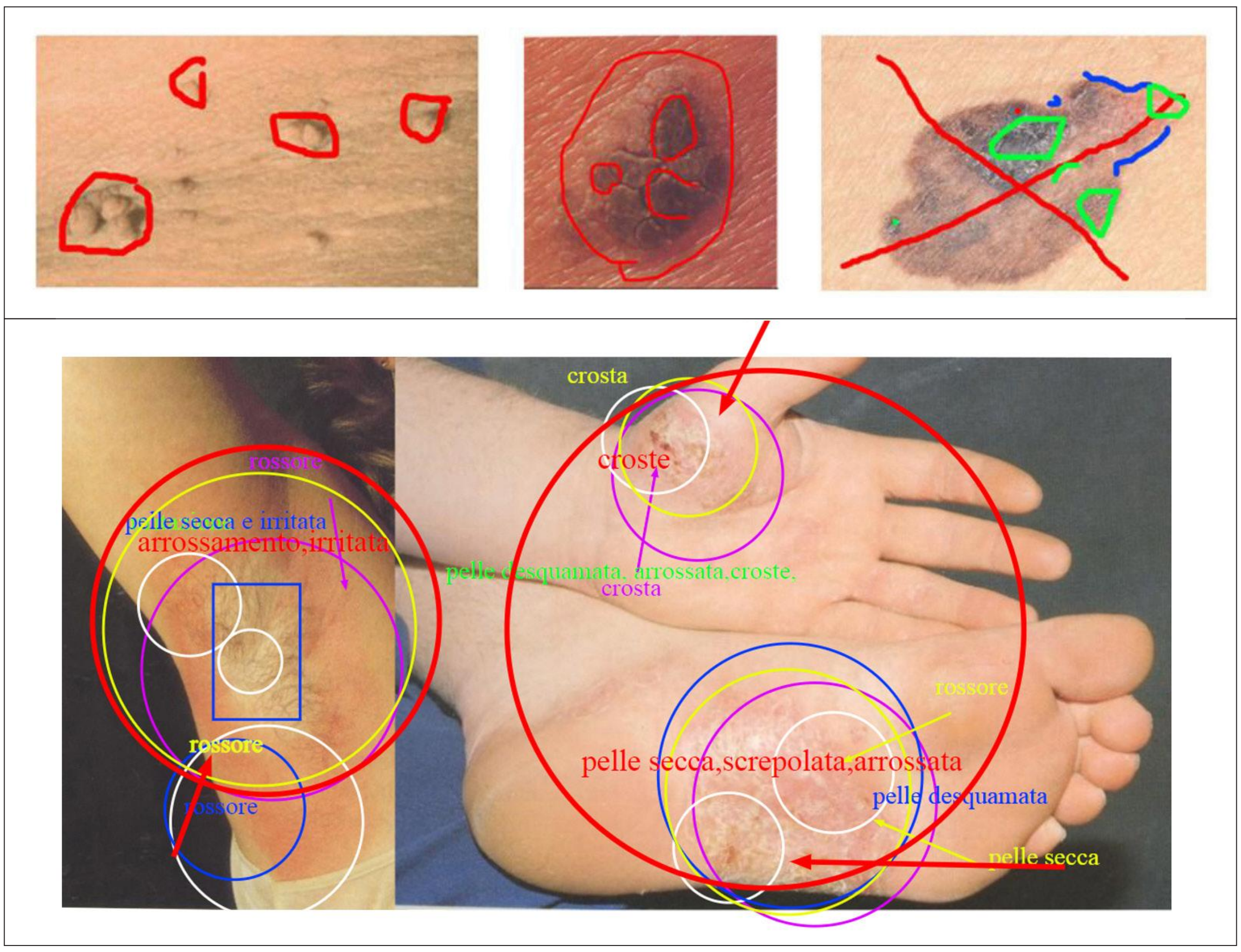

Figure 5-3 · Teachers' driven (above) and students' driven, overlapped annotations (below).

In contrast with the baseline group which only looked at pictures without annotations, we could see that the Realto-based approach was effective for sustaining the students in writing better and longer descriptions. Students also perceived the use of annotations and descriptions as a very powerful and useful tool for developing their observation skills, although not distinguishing between the effectiveness of the teacher's annotations and their own, self-managed ones (for more details, see Coppi & Cattaneo, 2021).

Example 3. Video annotation across professions

So far, we have only dealt with pictures. However, annotating can also be very fruitful when applied to videos, especially for reflecting on what the video displays in its amount of detail (Evi-Colombo et al., 2020).
We had already used video annotation with a dozen classes of office clerks in a previous phase of Dual-T (see Cattaneo & Boldrini, 2016). Classes were asked to simulate customer consultations and to video record (collect) them. Then the classes had to review their videos and track down what they considered to be bad consultation practices (exploitation through reflection). Thanks to the use of the video annotation tool which we provided them with, they could mark these passages directly on the film. The study aimed at showing the effectiveness of learning from errors compared to learning from the analysis of correct behaviours only. The results were successful, and other experiences like this one were promoted across different curricula.

If a more restrictive definition considers annotation as the result of a writing activity, a larger definition looks at video annotation as a process that enriches the video with additional materials, for example, through hyperlinks, to build a hypervideo (Cattaneo et al., 2018; Sauli et al., 2018). In this direction, we want to briefly mention two additional experiences, the first with student nurses, the second with chef apprentices. In the former case, nurses had to learn how to insert a urinary catheter. To collect their experiences, we video recorded their simulated practice with mannequins. In the latter case, some apprentices produced authentic videos in their workplaces, which were used as a basis for a classroom scenario. The videos dealt with the topic 'basic creams'. In both cases, students worked in groups, with the task of enriching the raw video and preparing a hypervideo containing all the important information to learn and concretely manage the procedure. We had a real control group with the nurses, which was not the case with the chefs. For all the specifications, see Evi-Colombo et al. (2021) and Gianetti (2021). The main finding to highlight here is the high effectiveness of this learning-by-design approach for learning.

Through our work across different fields, we found that picture annotation mainly has three functions in didactical situations: (a) *highlighting* a peculiarity of an object, a tool or a situation displayed by the picture (b) *labelling* it so as to increase the viewer's understanding and memorising of it, and (c) *educating the viewer's observation* so that they will learn the appropriate, profession-specific way to look at things.

Annotations to highlight particularities of a given situation or element **and direct the viewer's attention** to a specific point in the picture. We saw this function being used in particular by teachers who wanted to address the specific problems of a garment (clothing designers), to make learners pay attention to early signs of a given disease (beauticians and gardeners) or to a potential risk in a construction project (road builders). But we are convinced that this function could be used in many other vocational education situations. Teachers could choose to do the annotations on the pictures shown to the learners, or to ask the learners to annotate the picture provided, having an equivalent impact on the apprentices' learning and motivation (Coppi & Cattaneo, 2021).

Of course, one can use annotation to perform this function on any picture in any format; the picture does not need to be presented on a screen or the activity to be conducted on tech-based support. Any drawing or photo can serve as the basis of such an activity. You just have to copy it and distribute it to the learners. The teachers we worked with acknowledged, however, that the didactic potential of annotation was much richer and time- and cost-saving with technology than with paper and pencil. Technology allowed the annotated pictures sent by each student to be projected on the classroom screen, to be superimposed on top of each other, and contrast them more convincingly by selecting and deselecting the work of any student to emphasise their similarities or differences.

Annotation to ease understanding and stimulate remembering. This function is particularly evident in teachers' activities involving labelling the different parts of an object and the different components of a situation; this function is often used by the teachers either by introducing the labels themselves on a given picture or by asking the learners to add labels to a picture they are shown. This activity is considered by teachers as a profitable way to stimulate the acquisition of the technical vocabulary each profession has and which every professional acting within that field should master; but it also represents a good way to increase pattern recognition as well as the learner's technical thinking. Instead of names, teachers sometimes asked for numbers to be put onto these labels, so as to indicate in which order pieces need to be assembled (construction workers) or mounted (clothing designers). In a few cases, the labels had to receive arrows figuring the direction in which water will run (plumbers) or a pulley will rotate (car mechanics) for instance.

Here again, technology is not required to achieve this function of annotation. Playing it on technological supports extends, however, the potential of such activities, teachers acknowledged, by allowing, for instance, the object presented in the picture to rotate on the screen, with the labels moving accordingly or by allowing annotation of an evolving situation displayed on video. When the task consists of predicting which direction a flow will run or a pulley will rotate, technology again beats paper by allowing students to receive direct feedback on the validity of their prediction through animation or by letting the video run.

Annotation to educate observation (in a profession-specific way). In a sense, this third function of picture annotation is the final aim the other two functions tend to move towards. We learned that using pictures finally impacts learners' observation competence, and turns it into a professional vision, that is, it progressively bends beginners' rather naïve way to look at things into what professionals do when facing a picture or an object in their professional activity. Skin problems have a tendency to appear most frequently at certain places on a human face or body. But looking only at those places is no guarantee that no dangerous skin problem is developing. Professional clothing designers also well know that where a default becomes apparent, in the 'fall' of a dress or of a pair of pants, may not represent the origin of the problem. Being able to determine exactly how the garment has been realised, or the causes of a specific disease, clearly help the professional to direct their observation, not only at the critical points, but in conducting a more thorough, in-depth look at the entire garment, at the whole body of the patient.

So what?

This part of the Dual-T project confirmed that observation can be shaped and moulded so as to become more professional and that picture annotation, especially when supported by adequate learning technologies as the ones Realto provides, can make a decisive contribution toward this goal in many professional domains.

Of course, novices could probably learn to reshape their naïve observation by looking at many photos, with or without the annotations of a professional. Using technologies again here proved more motivating and more efficient than just handing over photos. Enabling learners to regularly contrast their own vision with that of the teacher or their classmates, to easily zoom in on specific aspects of the picture or zoom out and access a more general image of the clothing or the client's body shape proved to be well appreciated, both by the teachers and the students, as well as being a powerful didactical tool to transmit and establish among learners a professional vision in their respective field.

As the acquisition of a professional vision is a critical skill to master in many professions and industries, developing tools that enrich annotation-based didactical scenarios is certainly a direction to consider deeply in the reflection on the use of learning technologies in VET.

Appendix

			95% CI		
Comparisons	**Total Defect Mean Difference**	**SE**	**LL**	**UL**	**Hedges' g**
First-year vs Second-year	-.32*	.11	-.61	-.05	-0.52
First-year vs Third-year	-.03	.13	-.35	.30	-0.04
Second-year vs Third-year	-.31	.14	-.05	.66	0.53
First-year vs Teacher	-3.18*	.23	-3.8	-2.57	-4.48
Second-year vs Teacher	-2.87*	.23	-3.49	-2.22	-3.31
Third-year vs Teacher	-3.17*	.25	-3.82	-2.5	-4.2

* $p < 0.05$

Table 5-1 · Bonferroni Comparisons of defects (z-scores) identified by the participants.

			95% CI		
Comparisons	**Total Defect Mean Difference**	**SE**	**LL**	**UL**	**Hedges' g**
First-year vs Second-year	-.19*	.08	-.38	-.01	-0.52
First-year vs Third-year	-.34*	.08	-.55	-.13	-0.91
Second-year vs Third-year	-.15	.09	-.38	.08	-0.38
First-year vs Teacher	-3.69*	.17	-4.13	-3.23	-6.8
Second-year vs Teacher	-3.48*	.18	-3.95	-3.01	-5.42
Third-year vs Teacher	-3.35*	.18	-3.83	-2.86	-4.52

* $p < 0.05$

Table 5-2 · Bonferroni comparisons of corrections (z-scores) as suggested by the participants.

Item	Condition	Frequency	Mean duration (seconds)	SD	t	df	Cohen's d	Total duration (seconds)
Student's Interjection	Paper Tech	25 23	4.81 6.29	4.08 4.95	-1.13	46	-0.33	120.35 144.59
Spontaneous Observation	Paper Tech	28 40	2.89 13.96	1.50 12.05	-4.82*	66	-1.28	81.01 558.35
Induced Observation	Paper Tech	47 21	2.80 7.87	1.58 5.48	-5.86*	66	-1.25	131.79 165.32
Teacher's Explanation	Paper Tech	38 30	13.22 8.37	9.47 5.44	2.49*	66	0.62	502.09 251.06

Table 5-3 · Classroom events in paper- and Realto-based modes for the overlay scenario.

Item	Condition	Frequency	Mean duration (seconds)	SD	t	df	Cohen's d	Total duration (seconds)
Student's Interjection	Paper Tech	12 45	5.57 5.46	4.96 4.30	0.78	55	0.03	66.94 245.98
Spontaneous Observation	Paper Tech	3 9	6.00 6.79	4.26 3.65	-.312	10	-0.20	18.00 61.09
Induced Observation	Paper Tech	15 12	3.91 3.58	5.93 1.95	.181	25	0.08	58.55 42.96
Teacher's Explanation	Paper Tech	23 33	13.34 16.11	13.57 14.29	-.731*	54	-0.20	306.61 531.62

Table 5-4 · Classroom events in paper- and Realto-based modes for the cueing scenario.