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articoli

Creare scenari pedagogico-didattici che sfruttino la tecnologia per promuovere le competenze di osservazione delle apprendiste sarte

Creating technology-enhanced scenarios to promote observation skills of fashion-design students

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Abstract

Saper osservare è una competenza rilevante per i professionisti in diversi settori. Tuttavia, allo stato attuale, si è dedicata poca attenzione alle modalità pedagogico-didattiche con cui promuovere l'acquisizione di questa competenza nella formazione professionale di base. In questo studio, vengono proposti due scenari didattici per favorire l'acquisizione di competenze di osservazione nelle scuole di sartoria. Ciascuno dei due scenari è stato implementato prima in versione cartacea e poi ricorrendo alla tecnologia, in modo da indagare in che misura quest'ultima possa contribuire alla promozione dell'osservazione. Ventotto attività didattiche sono state monitorate in due scuole di sartoria per un intero semestre; le attività hanno coinvolto sei insegnanti e 71 studenti. La raccolta dei dati è stata effettuata attraverso interviste semi-strutturate, focus group e video-registrazioni delle attività. I dati sono stati analizzati utilizzando un approccio di analisi del contenuto. I risultati mostrano che l'uso della tecnologia è percepito come un valore aggiunto nell'aumentare la qualità dell'insegnamento e nell'attivare gli interventi degli studenti in seno alla discussione di classe.

Parole chiave: osservazione; scenari pedagogici; formazione professionale; sviluppo professionale; sartoria.

Abstract

Observation is an important skill for professionals in many fields. However, so far, little pedagogical attention has been paid to instructional methods that promote the acquisition of this skill in initial Vocational Education and Training (VET) systems. In this study, we suggest two instructional scenarios to foster the development of observational skills in schools of fashion design. Each of the two scenarios was implemented first in a paper-based version and then in a technology-enhanced one in order to investigate to what extent technology can contribute to the promotion of observation. Twenty-eight learning activities were run in two fashion designer schools over one semester; they involved six teachers and 71 students. Data were collected through semi-structured interviews and focus groups. All activities were video recorded. The data were analysed using a structuring content analysis approach. The findings show that the use of technology is perceived as an added value that increases the quality of teaching and triggers student participation in classroom discussions.

Keywords: observational skills; instructional scenarios; vocational education; competence development; fashion design.

1. Introduction

Observational skills are essential for several professions as they are necessary for professional success. Medical doctors and nurses, for instance, need effective observation skills to recognize patterns, discern meaningful details and develop a diagnostic reasoning (Jasani & Saks, 2013; Pellico, Friedlaender & Fennie, 2009). Teachers also need good observational skills in order to notice classroom events that negatively or positively influence student learning (Seidel & Stürmer, 2014; Sherin, 2007; van Es & Sherin, 2002). In fact, observing is not merely seeing; it is goal-oriented seeing (Boudreau, Cassell & Fuks, 2008), and training should help students not only observe at a surface level but also think beyond that level (Stengelhofen, 1993). In this respect, Goodwin (1994) introduced the concept of "professional vision" which "consists of socially organized ways of seeing and understanding events that are answerable to the distinctive interests of a particular social group" (p. 606). According to the author, three practices can be used to develop such vision, namely coding – used to classify events in a profession-relevant way –, highlighting – making specific details salient – and producing and articulating graphic representations. These three practices should inspire teachers to design instructional activities aiming at helping newcomers to the field develop professional vision.

Several studies have also suggested that teaching visual literacy could be an effective way to support observation (Naghshineh et al., 2008). Visual literacy is defined as "the ability to construct meaning from visual images" (Giorgis et al., 1999, p. 146). As "visualizing" complex objects might be difficult for novices, scholars have suggested several specific instructional strategies, such as overlaying (Gleicher et al., 2011), contrasting cases (Schwartz & Bransford, 1998), or visual cueing (Renkl & Scheiter, 2015; Tullis & Benjamin, 2015).

In the profession of fashion design, good observational skills are needed to precisely analyse a piece of clothing, to find out whether it might meet customer demand and to eventually reproduce it and adjust it to a given size and body shape. Despite the importance of this skill, to the best of our knowledge, the question of how to teach it to beginners in the field has not been explicitly addressed, nor has the potential of technology been involved in such a reflection.

Therefore, the aim of this study is to develop powerful scenarios for the teaching of observation skills in this domain together with vocational school teachers, exploiting some of the abovementioned strategies, and to test if and how technology could add value to the implementation of the same scenarios using only paper and pencil.

2. Supporting observational skills through visual cueing and image overlay

Building on Goodwin (1994), several studies have confirmed that visual cueing and image overlay can be two efficient strategies to support the development of observational skills.

In particular, recent studies have highlighted cueing as an efficient approach for making information more visually prominent (Boucheix, Lowe, Putri & Groff, 2013). For example, reviewing successful approaches of cueing, de Koning Tabbers, Rikers & Paas (2009) suggested that cueing involves three functions: selection – guiding attention to the relevant points –, organization – focusing on the structure – and integration – stressing the relationships among the elements. They concluded that attentional cueing can facilitate student identification of relevant information and improve learning. On that foundation,

Lin, Atkinson, Savenye and Nelson (2014) analysed the impact of visual cues and different types of self-explanation prompts on learning, cognitive load and intrinsic motivation in an interactive multimedia environment. By assigning 126 college students to different conditions (cueing vs. no cueing and prediction prompts vs. reflection prompts vs. no prompts), this study showed that cued animations improved both learning and intrinsic motivation more than any other conditions. In an investigation of why cues are powerful, Tullis and Benjamin (2015) concluded that the highest impact on learning comes from cues generated by the students themselves in accordance with their own idiosyncratic encoding and personal experiences. Self-generated cues actually support mnemonic performance better than any other cues.

Other studies have demonstrated the impact of techniques that facilitate the comparison of objects. Roberts (2004) examined three specific techniques that allow multiple views of an object to be linked: replacement, replication and overlay. Overlay allows "different representations of the same information in the same display to be layered together" (p. 155). Gleicher et al. (2011) show that overlay is a useful method for detecting similarities and differences between objects which are similar enough to be compared on the same plane.

Following these promising examples, we decided to adopt student-generated visual cues and image overlay as basis for the development of two scenarios aiming at supporting the development of observational skills in fashion design students.

3. Methods

3.1. Participants

Two schools of fashion design in the Italian-speaking part of Switzerland participated in the study. Six teachers agreed to participate, as did 71 students (65 females and six males). Forty participants were in their first year of training at that time (four classes), 10 were in their second year (one class) and 21 were in their third and final year of training (two classes).

3.2. Procedure

The researchers and teachers held several meetings to design two parallel learning scenarios. The two scenarios corresponded to two daily activities in most schools for this profession: adaption of existing patterns and analysis of a piece of clothing. For each of the seven classes involved, each scenario was implemented twice: once with paper-and-pencil drawings and once using an online platform called Realto. In total, 28 learning activities were carried out over one semester. With Realto, teachers and students can share productions, annotate and comment on them to highlight important features; additionally, Realto provides some specific tools to help teachers conduct classroom activities. Two of these tools were used in this study: image overlay and annotation tools.

Scenario 1: Overlaying pictures. The scenario starts with the teacher assigning a task: the students have to adapt a skirt pattern to the needs of a hypothetical customer. The students work on this task individually, completing the pattern using three measurements: waist, total length and width. The teacher then groups the patterns based on the mistakes they contain. She also scans the patterns and creates transparencies of each scan so that she can project them on top of her own pattern, which is used as a background to provide a model

image. The students' drawings are then corrected in plenary. The teacher projects her own pattern on an A4 sheet to the entire class. She then asks the students how to make the changes required by the customer. The students suggest possible ways to proceed. Depending on their suggestions, the teacher overlays the corresponding incorrect transparencies on top of her own pattern. The classroom discussion and, more specifically, the students' observation are stimulated through reflective prompts (e.g. What do you notice here? Is anything missing?). Although the transparencies make it possible to superpose two to three drawings, more than three cannot be superimposed, so the teachers has to constantly change the overlaid drawings as new ideas are discussed.

The same scenario is also done using Realto. Unlike the paper-based version, Realto automatically makes the students' patterns semi-transparent and allows teachers to display and remove them by clicking on their authors' names on the list on the right of the screen (Figure 1). More than one student pattern can easily be displayed in parallel, and moving from the one to the other is done with a simple click. This part, however, is not directly visible on the students' profiles, since this function is only accessible to teachers. Therefore, the teacher connects her computer screen to the projector so that every student can see the overlaid patterns on the classroom screen.

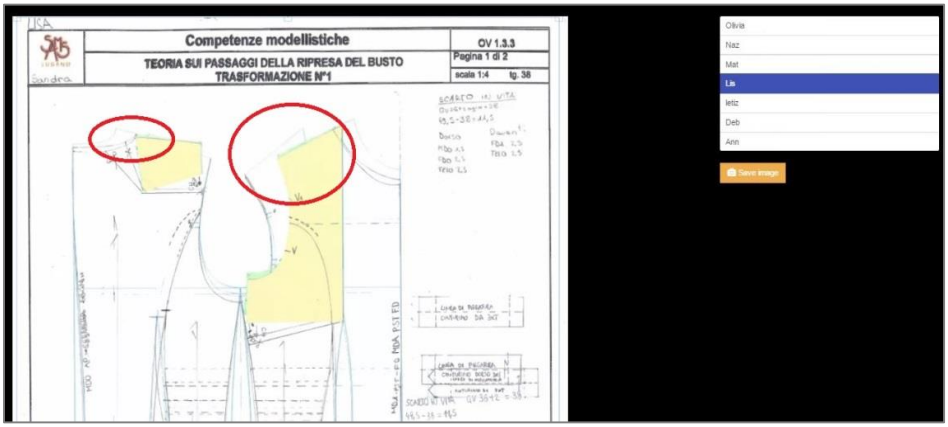

Figure 1. The overlay feature.

Scenario 2: Cueing pictures. The second scenario focuses on cueing different parts of a piece of clothing (e.g. a skirt or trousers) and identifying the manufacturing defects visible in the picture. The first implementation of the cueing activity is done using paper and pencil. The teacher provides each student with a sheet showing two pictures of the same piece of clothing (i.e. front and back) and asks the students to: i) identify each part of the item using a coloured pencil to draw arrows, ii) identify the type of clothing by indicating its defining features and iii) indicate possible manufacturing defects using arrows, circles and text. To ensure image quality, the teacher connects her computer screen to the projector so that students can see the two images on the big screen as well. She then gives the students 20 minutes to work on the task individually. When they finished, the students give the teacher their cued images, and she puts them on her desk so they are visible for the correction. The teacher then starts the discussion, dealing first with the upper part of the piece of clothing and then with the bottom part. In this case as well, the teacher guides the students' observations using prompts (e.g. Why this part is not parallel to this one?). In this first implementation, only one student picture can be shown at one time.

In contrast, the technology-enhanced implementation allows multiple annotated pictures to be superposed simultaneously on the class screen. The structure of the scenario is the same as in the paper-and-pencil implementation except for the use of Realto, both in the students' individual work and during the discussion. The annotation feature allows the students to annotate any picture using arrows, circles, text, etc. While the students work individually, the teacher can observe their work on her own screen. She can also keep their work hidden from their peers until they finished the task. When the activity is closed, the teacher can display 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 all the corresponding annotations appear on the same (resulting) picture (Figure 2).

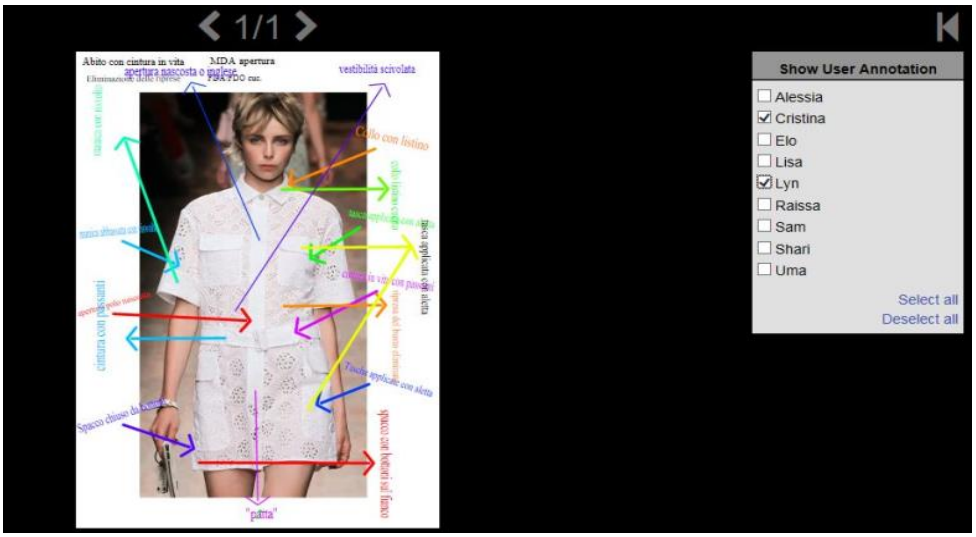

Figure 2. The classroom annotation feature.

3.3. Measures

To evaluate the possible added value of the technology, data were collected by video recording the classroom activities and through semi-structured interviews with each of the teachers (N = 6 individually) as well as seven explorative focus groups (Bloor, Frankland, Thomas & Robson, 2001) with the students (one focus group per class). The participants in the focus groups included 63 students (59 females and 4 males) divided into groups on the basis of their grade. The average number of participants per each group was nine. Each focus group was then conducted in the classroom setting and moderated by one of the authors. The teacher interviews lasted an average of 50 minutes (min = 38'; max = 62'), while the focus groups took 38 minutes on average (min = 19'; max = 70'). The interviews and the focus groups addressed the pros and cons of image overlay and visual cueing and the added value of technology. In particular, all the interviews and focus groups were audiotaped and transcribed verbatim. Data were analysed using NVivo software for structuring content analysis (Miles & Huberman, 1994) through the application of three macro-thematic categories mostly responding to the topics on which the interviews were developed: i) usefulness of the overlay and cueing techniques independently from the paper or the technology condition; ii) comparisons of paper-based and technology-based learning scenarios (i.e. pro and cons of image overlay and visual cueing); iii) added value of technology (e.g. satisfaction of participants, quality of teaching, specific features only supported by technology). Due to privacy constraints, only nine activities of the twenty-eight conducted were videotaped. The sections of the videos considered here lasted

between 30 and 42 minutes and concerned only the part of the activities aimed at correcting the students' work. So far, four video recordings have been transcribed in their entirety using the Behavioral Observation Research Interactive Software (Boris) and coded by applying four categories created by the authors after Flanders (1966): teacher's explanations (given either as an answer to one of students' questions or to provide more detail on the concept under study), spontaneous observation (made by the students without any prompts from the teacher), induced observation (made by the students as a reaction to a teacher's hint) and student's interjection (spontaneous student comment during classroom discussion not related to the observations). For each category, the frequency of occurrence and its duration (both total and mean) were also indicated. The total speech time for the teacher and for the students respectively were also computed in each activity.

4. Results

In this section, we will report the results of the analysis of the aforementioned categories. We will start by presenting the results of the interviews and the focus groups, and then we will present the analysis of the video recordings of the lessons.

4.1. Interviews and focus groups

As the interviews and the focus groups were conducted in Italian, the quotations presented here are translations made by the authors. Every translation was discussed quite thoroughly, but there might be some slight differences in wording; furthermore, in some cases, verbal expressions had to be edited slightly for the sake of clarity.

Images overlay

Whatever the condition (paper-and-pencil or technology-enhanced), teachers and students stated that comparing different patterns in a semi-transparent way not only helped them better visualize the mistakes, it also helped them see where to intervene in order to fix the problem:

"For example, if you draw the hip line with a tip, when you overlay you see the tip and this is not good, so you have to fix it. You can see it." (first-year student)

Furthermore, overlaying multiple patterns on the same plan helped students be more aware of the differences between their suggestions and the shape they had to produce:

"It helps you understand what mistakes you make and the difference between your idea of the pattern and how it really is." (first-year student)

Teachers and students considered overlay a useful way to share different observations on the same piece of clothing. Image overlay motivates students to actively participate in the classroom discussion and also opens new arguments for teachers to discuss. Furthermore, as some students pointed out, overlay makes the teacher's feedback visible. In fact, receiving feedback based on visible elements helps students understand their mistakes better than a grade or a written explanation:

"I understood more where the mistake was; that is, by seeing the right one and my mistake, I understood better where the mistake was and how I could fix it. The teacher [before using the overlay, *nda*] used to draw a red line and tell you it was wrong, but you could not understand it properly because you had to correct it at home, and at the end the teacher is not there with you." (first-year student)

Technology-based overlay vs. paper-based overlay

An overlay with Realto is more practical than the paper-and-pencil version of the scenario, since it allows overcome some limitations of the paper. In particular, teachers and students stated that the overlay with Realto makes it much easier to handle and retrieve the papers for comparison. They also commented that students' submissions can be compared more quickly and precisely since the comparison can be done with just a click. The overlay is therefore more convenient using Realto as it also reduces the teacher's workload in terms of time needed to organize the materials to be corrected:

"I was not supposed to correct each pattern before [the lecture, *nda*], line by line, but there I had the matrix below and by overlaying their work, I could see immediately whether the skirt was completely wrong. Also, it was quicker to explain, to help the pupils see the mistakes… so I repeat, it was very fast" (teacher)

Students and teachers also pointed out the power of technology to allow "immediate" and "better" visualization of a pattern's details and mistakes. Additionally, teachers appreciated the technology's extra features, such as image projecting and zooming in, that involved all the students in the visualization process at the same time. According to the teachers, the students were more actively engaged in correcting their own work as well as that of their peers when overlaying with Realto:

"Let's say that when overlaying with Realto, I see more active, motivated pupils, because I see that they are much tougher on their own work and also that on that of their classmates. They observe much more than maybe when I gave them the task." (teacher)

Despite the aforementioned advantages of Realto, teachers and students also mentioned issues related to the graphic resolution on the screen, especially when "lighter lines" were drawn on the patterns. Other comments allude to the obligation introduced by the computer to work only on "small details" and not on the whole production at the same time.

Visual cueing

Teachers and students agreed that the visual cueing technique made it easier for students to immediately identify the composition of a piece of clothing and to memorize relevant aspects of a picture. In particular, using bright colours and combining pictorial and textual cues helped focus the students' attention, saving time when they needed to find the parts of a piece of clothing or when they looked at the information several months after the completion of an activity:

"If I draw an arrow and I write the notes too, it draws my eye directly. If, on the other hand, I have written the notes on a separate sheet and I have to search for the picture and the exact annotated point, there is also the possibility that after a few months, my memory won't help me a lot." (first-year student)

Visual cues were therefore defined by the students as "immediate notes" that help them analyse a piece of clothing by synthesizing the concepts under investigation in their minds and fixing them in their memories.

According to the teachers, visual cues also enable students to plan how to create an item of clothing by making it immediately visible how many parts that item consists of. Finally, teachers stated that annotating using cueing can also accommodate different learning styles, supporting more visual students in their analysis and understanding of a piece of clothing.

Technology-based cueing vs. paper-based cueing

Teachers and students state that Realto is better than paper-based systems for comparing different annotations simultaneously. In particular, the technology's ability to overlap different cues and to visually share mistakes or successful examples motivates students. This also helps them to "understand more" through a faster visualization of the details of an item and to avoid the same mistakes in the future:

"If one puts a thing in the same place as you put it but you missed the place while he puts it right... then you remember: 'Ok, the next time I'd better write it so'. For example, almost all of us wrote 'armhole down' when the lowered armhole said 'elongated shoulder' or 'shortened shoulder'." (third-year student)

Teachers also found that cueing with Realto saved time when correcting the students' work. In fact, although the paper-and-pencil technique is immediate – you simply take the pencil and do it –, it could be challenging to compare different paper submissions due to the number of papers and the mess that they generate; Realto, on the other hand, makes this task faster and lets the students and the teachers select and overlap all the visual cues produced by all users in one click. Furthermore, this method for visually sharing cues is more motivating since students feel encouraged to actively take part in the classroom discussion:

"Usually, when we correct the classwork, I never know anything; that is, I don't want to think about an answer [to the teacher, *nda*]. However, when there is such a heated discussion, it's nicer, more active." (first-year student)

Additionally, from a technical perspective, students state that cueing with Realto makes it easier to describe an item of clothing, too, since they can easily edit or delete anything written on a picture. Finally, teachers consider the annotation tool useful for writing or cueing in a way that is easily decipherable by everyone.

The use of technology instead of the traditional paper-and-pencil modality also motivated the students to use different colours and pictorial cues, such as arrows and circles, allowing them to better memorize clothing details:

"We can remember it better, because there are different colours, and also because you do it directly on the image." (third-year student)

Last but not least, using Realto reduces the school's printing budget, as explicitly mentioned by a teacher, and also makes the material available anytime and everywhere:

"It is also true that with Realto you can see the image and the colours better, because in the classroom, because of the cost, we don't print colour photocopies. We use black and white, and then maybe the photocopy is left at home, while with Realto, you always have it. Also, it's big, and with the colours, the students can definitely see it better." (teacher)

Despite the aforementioned advantages, some students admitted that they still prefer paper and pencil since they feel that they can memorize their cues better when they have written them by hand rather than on the computer. However, most of the respondents who prefer cueing by hand are usually not familiar with the computers. This was confirmed by a teacher, who admitted that the students sometimes lacked technological skills:

"The main difficulty is that you think that kids today are [expert, *nda*] in computer literacy, but they are not." (teacher)

Acknowledged overall potential and limitations of Realto when teaching fashion designers

As stated by teachers and students, Realto makes teaching more inclusive since it enables everyone to participate in classroom discussions. In fact, the possibility to work on and to share different views on the same resource at the same time creates a learning dynamic where everybody feels encouraged to express his opinion, without fear of mistakes. For the same reason, students consider work created on Realto to belong to the school and to be inherent to their profession:

"Let's say that it's something of ours, and we can share our things... that is, we know that we invented them ourselves; they are not things that you take from a round stylist for reproducing his own things." (first-year student)

Students therefore believe Realto is not messy, and they find it useful for discussing their personal work with their peers and teachers. In particular, the sharing option is valuable for overcoming the dichotomy teacher-student, by making classroom discussions more participative:

"The wonderful thing about Realto is that... at the beginning of the year, everything was entirely individual; no one shared opinions with the entire class, people would just ask their friends if they could look at their work, and maybe the other friend did it wrong... It was completely individual, I and the teacher, she and the teacher…" (first-year student)

The teachers also pointed out that Realto allows an "obstinate" students' participation to notice, to understand and to correct their mistakes better than paper-based activities. They also noticed that Realto triggers the "students' curiosity, which is necessary in this profession". Furthermore, the teachers found that the technology helped them give more focused explanations of the topics under study. The teachers also felt that they were able to cover all the topics in more detail:

"[The discussion, *nda*] seemed shorter to me with the computer system. With the paper, it was more scattered; I had to focus on not missing anything... it was more targeted, in the sense that I didn't have the feeling of having missed something." (teacher)

When comparing other tools commonly used by fashion designers, the teachers stated that those tools only give you the possibility to search pictures, while Realto has several functions that enable creative activities based on visuals:

"On the other sites, I can see and capture the image but nothing else; you cannot annotate, because they are just websites linked to fashion trends. With Realto you can annotate, you can exchange ideas with your classmates, and you can also ask questions if you have a specific question or some doubts about how to use a pattern." (teacher)

Therefore, Realto lets teachers experiment with new teaching methods and lets them be creative:

"It's true that with the paper we have already tried thousands of things. Perhaps Realto leaves a little more to the imagination; maybe we can come up with new ideas, so it can be stimulating for us as well when creating new lessons." (teacher)

It also supports teachers by making it easier to create, manage and re-use activities.

One other function that the teachers appreciated was the fact that they could monitor students while they were doing the activity. In fact, instead of walking through the class to check students' work, the teachers could select each student on the screen and observe them without disrupting them. Teachers could also give students access to observe each other's work.

Although Realto was found to be useful for many classroom activities, the fact that it is still under development caused some technical problems, which demotivated the students a bit. A lack of consistent use at school is another limitation of the tool.

4.2. Analysis of the video recordings of the lessons

Classroom dynamics in both conditions for the image overlay scenario

The data clearly show that students made more spontaneous observations when using Realto to compare overlays than when using paper and pencil (Figure 3). Students made more induced observations when using the paper-and-pencil overlay, and the teachers offered more explanations under this condition as well. A t-test procedure revealed significant differences between the two conditions with respect to the mean duration of spontaneous observations, induced observations and teacher explanations; no significant differences were identified, however, in the mean duration of students' interjection. Finally, the data also show that teacher explanations were less frequent with Realto than with paper and pencil. Overall, the findings suggest that the use of Realto made students more actively and spontaneously engaged in the task than the use of paper and pencil.

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

Note. * $p < .01$*

Figure 3. Classroom events in paper- and Realto-based overlay scenarios.

Classroom dynamics in both conditions for the cueing 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

Note. * $p < .01$*

Figure 4. Classroom events in paper- and Realto-based cueing scenarios.

Similar results were found in the cueing scenario with respect to student observations, although a t-test analysis revealed non-significant differences in this case (Figure 4). In contrast to the overlay scenarios, teacher's explanations were more frequent and longer when using Realto than when using paper and pencil. Moreover, spontaneous interjections from the students were considerably more frequent during the classroom discussion – although not longer – when using Realto than when using paper and pencil.

When total speech time (in seconds) for teachers and students in both scenarios were compared (Figures 5 and 6), the data showed that the use of Realto resulted in more student talking time in both scenarios than when paper-and-pencil only were used. It remains to be investigated why teachers talked more during the cueing scenario than during the overlay scenario, regardless of the conditions; looking at what teachers actually said during these explanations might clarify this. It might be simply due to the fact that, as shown by the larger number of student interjections, the teachers had to answer more questions when using Realto than when using paper and pencil.

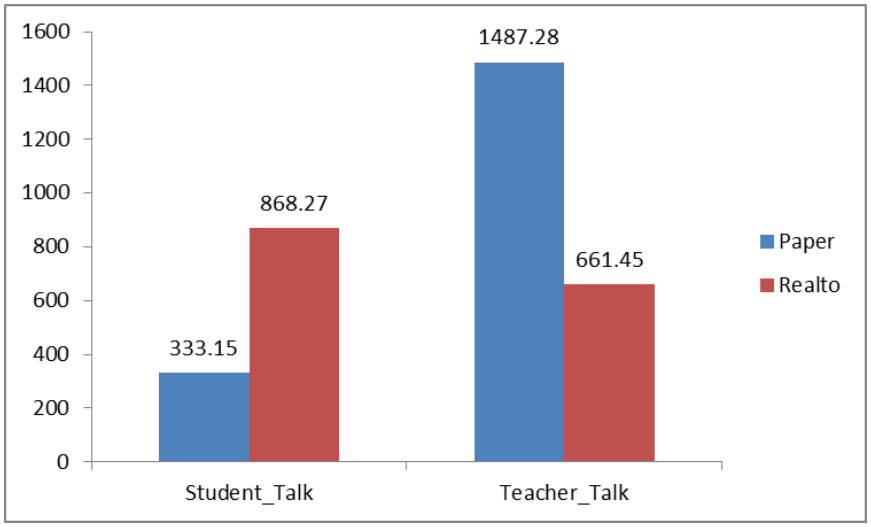

Figure 5. Timespan for teacher and student speech time in overlay (in seconds).

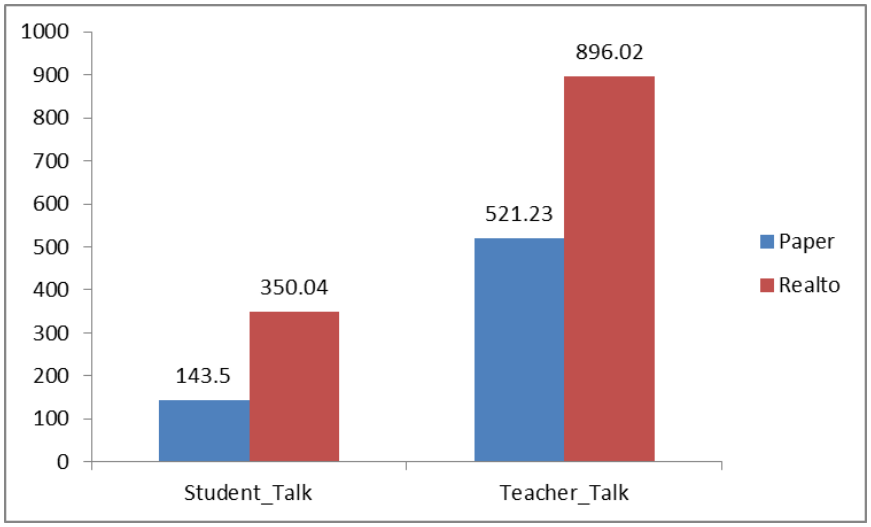

Figure 6. Timespan for teacher and student speech time in cueing (in seconds).

5. Discussion and Conclusion

Globally, our findings confirm the results of previous studies indicating that image overlay and student-generated visual cues help students detect and exploit meaningful pieces of information from a picture (Gleicher et al., 2011; Renkl & Scheiter, 2015). Both scenarios triggered more active student participation in the classroom discussion and new professional arguments for the teachers to discuss. Furthermore, visible feedback enabled students to better understand the manufacturing defects in the clothing and how to fix them. Students and teachers found that using Realto for overlays was easier than using paper. In fact, by improving the visual quality of the materials used, the technology enabled goal-oriented seeing (Boudreau, Cassell & Fuks, 2008), supporting better observation of the clothing presented in the pictures. The students particularly appreciated that the technology enabled them to use bright colours to add creative visual cues to the pictures. Colourful, self-generated cues improved students' observational skills by focusing their attention on relevant elements. The colourful cues also motivated students to actively participate in classroom discussions, confirming the results of other studies (Lin et al., 2014).

Video recordings of the lessons also confirmed this increase in spontaneous student participation in discussion when the technology was used.

To sum up the potentials of Realto, we can identify five added values for teachers, according to their own opinions:

- *encouraging creative teaching activities.* Unlike other tools used by the fashion designers, Realto — more than other "generic" technologies — lets teachers combine multiple resources and experiment with new ways of teaching;
- *supporting task correction.* Realto enables teachers to easily select and view different students' submissions and to look at several layers of information on a specific resource at the same time. By easily allowing teachers to switch from one student to another, Realto saves time, helps teachers focus on specific details and eliminates misunderstandings due to poor handwriting or messy drawings;
- *focusing students' attention.* The visual support provided by the overlaying and cueing functions makes it easier for teachers to draw students' attention to relevant details;
- *engaging students.* Variety in activities and the use of visuals in a technological environment triggers students to spontaneously participate in classroom discussions;
- *improving the quality of teaching materials.* Using Realto makes it easier to view teaching materials. Since fashion designers work with pictures on a daily basis, Realto adds value by improving image quality and also by cutting (economic and ecological) printing costs.

The following aspects primarily benefit the students:

- *learning by sharing.* The option of sharing different views on one topic and comparing different submissions for the same assignment helps students understand their work and also makes classroom discussions more lively;
- *learning by seeing.* Students appreciated the visual support in the teacher material. The visual cueing and overlay functions of Realto help students recognize their mistakes and gives them insights about the effects on the final products;
- *visible feedback.* By allowing teacher feedback based on visible indications, Realto enables students to better understand where mistakes occur and their nature;

- *reviewing learning materials.* All the learning materials are stored in Realto and are available anywhere and anytime, allowing students to review their work immediately or remotely.

Most of the limitations of Realto identified in this study involved technical issues. Realto is a new tool and is still under development, and it requires time to develop a stable system. Other issues were related to the discontinuity of its usage at school. When implementing new technology, it is especially important for teachers to integrate it into daily activities so that students feel comfortable with the technology rather than considering it extra work.

Our study represented a first attempt to explore the usefulness of the suggested learning scenarios for promoting observational skills in fashion designers and to investigate the added value of Realto when training professionals. Nevertheless, we are also aware of some limits. Only four videos were analysed, and the results reported here should be considered explorative in nature, since more methodological approaches need to be used to investigate additional aspects which were not addressed in this study. For example, further analysis of classroom interactions using Flanders' Interaction Analysis (1966) would be useful. Further analysis is also necessary to distinguish the dynamics of the teachers' speech by considering the type of questions they used to lead classroom discussions. Moreover, the use of eye-tracking tools would provide more insight into changes in student attention in the two scenarios with and without technology. Overall, we believe that efforts should be made support students' observational skills, both to develop this professional skill and to promote active participation in the learning process. We also believe that formally including the teaching of this skill in the school curricula could foster trainee fashion designers' ability to analyse and reproduce an item of clothing. Teachers should then be encouraged to progressively introduce different learning strategies into their own daily activities to help students become good fashion designer observers.

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