CRAEFT

care, judgment, dexterity

6.1 P1 - Education & Training

Project Acronym	Craeft
Project Title	Craft Understanding, Education, Training, and Preservation for Posterity and Prosperity
Project Number	101094349
Deliverable Number	6.1
Deliverable Title	Education and training: results of experimentation with co-creating user scenarios and pedagogical methodologies
Work Package	6
Authors	David ARNAUD, Noël CRESCENZO, Patricia HEE
Number of pages	235

This project has received funding from the European Commission, under the Horizon Europe research and innovation programme, Grant Agreement No 101094349.
http://www.craeft.eu/

Executive summary

The Pilot 1 experiment continued based on the work carried out in the first year of the project, where the foundations were laid by recording and understanding the craftmanship gestures and compiling a collection of contents of the workshops, tools and machines used in the various RCIs.

Our approach has been to refine the educational methodology by defining usage scenarios so that each digital tool can be optimally integrated into existing learning programmes. We also looked at how to assess the impact of digital tools on existing curricula. Finally, in the spirit of an inductive learning approach, we proposed methods and tools inspired by active pedagogy, to best mobilise the interest and motivation of learners.

Experiment for RCI 1, glassblowing with a pipe.

In June 2024, we presented the Craeft project to apprentices entering the second year of the Certificate of Professional Competence (CPC) course [exempt from general subjects and working on a personal project], and organised a creative workshop with them to discuss their expectations, issues and proposals.

What emerged was a maturity of posture, questioning the challenges of digitising craft skills and the added value of digital tools in terms of practical use in workshops and apprenticeships.

Additional modules have been developed on the e-learning platform for cross-disciplinary subjects, HSE, general technology and technical drawing, as well as a module on the important concepts to know before entering the workshop. We have taken care to diversify the learning aids: texts, images, diagrams, videos and audio. We broke down the knowledge to be acquired in a way that respected the principles of cognitive load theory, and in particular proposed preliminary quizzes for each module created to personalise the learning path and ensure that learners remained motivated.

In collaboration with our partners, a VR glassblowing simulator has been developed, focusing on the act of gathering glass with a pipe.

In September and November 2024, we experimented with second-year CPC apprentices in various glass specialities. Two cohorts were established, one using Craeft digital tools in addition to the existing curriculum, the test group, Traditionnel Augmenté - TA, focused on a glassblower with a pipe, the other being in a traditional curriculum, the control group, Traditionnel -T. A trial of the e-learning platform and the VR glassblowing workshop simulation was carried out with the TA group. Evaluation questionnaires and individual interviews were done to measure the impact of the Craeft digital tools on learning.

The Craeft project evaluations cover several areas.

A quantitative field analysis of the results of evaluations with their trainer and at the CPC diploma to compare the results of the two cohorts. Partial results to date, as the school year is still underway.

A qualitative field, with questionnaires on mastery, appropriation and satisfaction with the use of Craeft tools, e-learning and the VR glassblowing simulator.

A peripheral and qualitative field, with individual interviews on the use of Craeft or non-Craeft digital tools in carrying out their project, to gain a better understanding of the perception, culture and use of digital tools in general by the learners.

Initial results show that the digital tools have been well accepted and mastered. The e-learning platform is seen as a complementary tool to the courses given by the trainers, making it easier to memorise and review concepts. The VR glassblowing simulator is seen as a good tool for discovery, but an expectation of hyperrealism in the immersive experience and precision in the rendering of gestures does not position this tool as a learning tool in its current state of maturity in their eyes.

The tools are perceived and used in a very pragmatic way depending on the practical interest they bring, and a high level of expectation about their improvement is expressed, which indicates their appropriation. Key findings include:

- The e-learning platform was widely accepted as a revision tool, aiding in knowledge retention.
- The VR glassblowing simulator was effective for introducing skills but lacked the realism necessary for advanced training.
- Digital tools structured learning effectively, enabling personalised and interactive content delivery.
- Preliminary quizzes and multimodal content (text, video, diagrams, and audio) aligned with cognitive load theory, ensuring better knowledge retention.
- Apprentices in the TA cohort demonstrated slightly better performance in formative assessments compared to the T cohort, though further analysis is required for conclusive results.
- The effectiveness of digital tools depended on their integration with hands-on practice rather than replacing traditional workshop experiences.
- VR tools were useful for familiarisation but lacked the precision and material interaction necessary for craft mastery.
- Some apprentices found learning digital tools an additional challenge, requiring significant effort without clear immediate benefits.

Finally, we exchanged with our partners the elements implemented for the pilot 1 glassblowing experiment with a pipe so that they could adapt it to their different RCIs.

An experiment was carried out on RCI 2 porcelain in Limoges, on the contribution of the ghost gestures to the acquisition of the gesture and the creative capacity that this can stimulate. For RCI 4, marble carving Tinos, and RCI 6, silversmithing in Ioannina, the aim was to test the memorisation of a museum visit by school groups, with and without digital tools to help them

discover the museum. RCI 5 on wood carving has set up a training plan using the e-learning platform, which will be tested in 2025. For RCI 7, tapestry in Aubusson, specifications have been defined and content identified, which will enable the development of an e-learning platform that takes into account the specific features of this activity.

In all cases, experimentation will continue in the various RCIs, depending on their specific features and constraints.

As with RCI 1, it is clear that learners are aware of the advantages of digital tools, and want them to enhance their workshop experience but not take them away from it.

This means that the educational scenarios need to be fine-tuned to ensure that there is a strong integration and synergy between digital tools and situational learning.

This initial positive trial has given us some ways to improve the scenarios and digital Craeft tools used in education and training.

The deliverable is accompanied by 8 annexes and a User Guide, providing additional data and resources:

- Annexes 1-3: Organisational details, including timelines, cluster structures, and project presentations.
- Annexes 4a & 4b: Assessment documents for the TA and T cohorts, including questionnaires and evaluation forms.
- Annex 5: A coding framework for analysing qualitative feedback, categorising themes such as pedagogical effectiveness, user experience, and tool ergonomics.
- Annexes 6a & 6b: Evaluation results of the e-learning platform and VR tools.
- Annex 7: Raw data from user feedback.
- Annexes 8a & 8b: Additional assessments of digital tools, including detailed insights from later phases of experimentation.

The User Guide serves as an educational toolkit for future experiments, providing:

- Scenario-based learning approaches.
- Step-by-step methodological recommendations.
- Assessment frameworks to measure impact.

The Craeft User Guide offers a structured methodology for educators to integrate digital tools into craft training, promoting a balanced approach that ensures digital learning enhances, rather than replaces, real-world craftsmanship. Covering everything from content creation to session execution and assessment, the guide is a practical resource for instructors implementing digital tools in craft education.

Document history

Date	Author	Affiliation	Comment
14/2/2025	David ARNAUD Noël CRESCENZO Patricia HEE	Cerfav	Production of deliverable 6.1 for Pilot 1
28/2/2024	Xenophon Zabulis	FORTH	Formatting

Abbreviations

Abbreviation	Definition
CLT	e-learning platform linked to Craeft Studio
AS	Apprentice Studio application, virtual workshop learning
DS	Design studio application, design and 3D/XR modelling.
CPC	Certificate of Professional Competence - French level 3 certification.
CS	Craeft Studio application incorporating a virtual training workshop.
CAP	Craeft Authoring Platform, a portal providing access to CLT, DS, AS and Craeft Studio.
HSE	Health, Safety, Environment
MOOC	Massive Open Online Courses
RCI	Representative Craft Instance
XR	extended reality, including virtual reality, mixed reality and augmented reality.

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Note

The pilot 1 experiment was based on a model proposed by the CERFAV. As a training organisation and a player in research into digital tools, CERFAV can integrate and evaluate digital tools in learning for the Craeft project.

We discussed with our partners the elements implemented during the pilot 1 experiment in glassblowing with a pipe so that they could adapt them in turn for each RCI. Discussions focused on the objectives and methodology for setting up pilot 1, with the support of the educational kit. The RCIs produced a proposal based on their specific characteristics, in particular their activity, how knowledge is passed on, their partnership with 'support' structures and their geographical location.

Depending on the case, the experiment has already produced results (RCIs 1, 4, 6), or is being set up and has not yet been evaluated. Indeed, some RCIs are backed by training structures (e.g. RCI2 porcelain / ENSAD), others by cultural foundations, or are technology centres. It is therefore important to take into account the specific nature of each structure in terms of its ability to implement the pilot. In some cases, the distance between production centres and training centres, if they exist, has made it difficult to set up the evaluation of digital tools, (e.g. RCI 3).

1 RCI 1 - Glassblowing with pipe (Pilot 1)

1.1 Context

1.1.1 Goal:

Measure the impact of digital tools on the learning process.

1.1.2 Participants

Pilot 1 experiment - glassblowing with a pipe, is being carried out with second-year apprentices preparing for their Certificate of Professional Competence (CPC), which they will pass in June 2025. The apprenticeship takes place over two years, alternating between time spent in the company with the apprenticeship master and time spent in the training centre, which we will call cluster. It is during some of these training centre clusters that Pilot 1 will be tested.

The Craeft experiment was made with apprentices who were exempt from general subjects and volunteered to be part of a TA or T cohort.

TA cohort (Traditional Augmented) is a test group using the Craeft digital tools.

T cohort (Traditional) is a control group not using Craeft digital tools.

1.1.3 Digital material

The Craeft digital materials are an eLearning platform and VR glassblowing workshop simulator.

All apprentices in the T and TA cohorts have access to the non-Craeft digital tools available at Cerfav, such as FabLab for example.

1.1.4 Timeline

Pilot 1 experiment - glassblowing with a pipe, was done in several phases linked with clusters dates of CPC second-year apprentices.

The assessment of the impact of Craeft tools was carried out on the two first clusters of the school year in September and October/November 2024.

An additional assessment has been done to assess the first improvement of digital tools in January 2025.

- presentation of project and experimentation of the Craeft, on 24 June 2024
- cluster No. 7 - on 20, 24, 25 and 26 September 2024
- cluster No. 8 - on 28, 29, 30, 31 October and 7 and 8 November 2024
- cluster No. 9 - on 14, 15, 16 and 17 January 2025

The experiment was carried out during personal project time so as not to penalise the learners in the TA cohort in their learning of the subjects assessed in the CPC.

Two or three sessions of two hours were scheduled with the TA cohort for each cluster to experiment with Craeft digital tools. as well as the follow-up interviews for individual projects for cohort T and TA.

1.2 Methodology

1.2.1 Project's presentation:

The Craeft project of the experimental process and of the proposed digital tools was presented to a full group of apprentices, followed by a discussion of their first impressions.

A workshop was carried out in sub-groups with a large-group restitution on these three axes, expectations, issues and fears, and proposals, concerning digital tools.

Craeft project presentation phase:

- Craeft project presentation
- Craeft digital tools, brief presentation without experiment
- Workshop on the representation of digital tools

1.2.2 Experiment

The experimentation with the Craeft tools, the e-learning platform and the VR glassblowing simulator consisted of representing the tools in terms of their principles and operation and having them used independently by the learners in the presence of the trainers. Feedback on first impressions was collected. Questionnaires on the appropriation and mastery of the tools and satisfaction were completed during the last experimentation session for each cluster, for the TA cohort.

During the individual interviews, the project follow-up form was presented, to note down the tools used to develop the projects during the several clusters. The objective was to measure the use and perception of digital tools, beyond the Craeft tools, in the T and TA cohorts. For the TA cohort, feedback on their experience of the Craeft tools was also collected.

In addition, the results of formative assessments carried out during the cluster on one of the cross-cutting subjects, general technology, health, safety and environment or technical drawing, are analysed quantitatively to compare the results between the T and TA cohorts. Here, is an assessment of general technology.

Figure 1. VR studio experiment, cluster N°7.

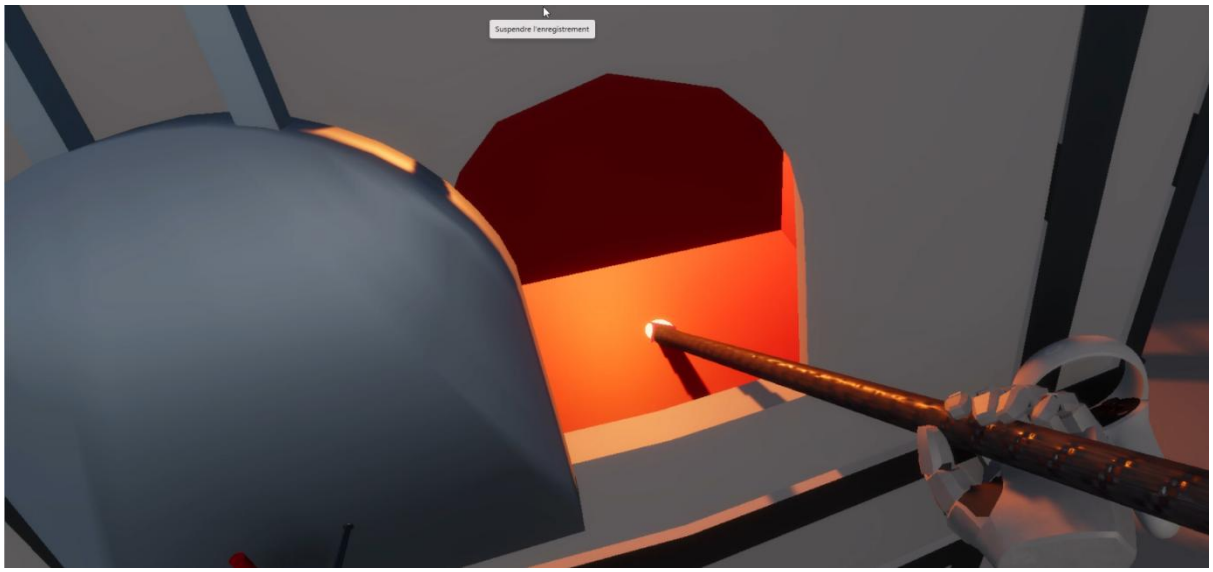


Figure 2. VR studio experiment, a screenshot of the simulator.

Several phases have been planned:

- a reminder of the Craeft project and appointments for one-to-one meetings. (T+TA)
- discovering and using Craeft digital tools (TA)
- individual interviews (T+TA)
- workshop time for the project (T+TA)

1.2.3 Assessment

The evaluation was carried out using various documents to measure the impact of Craeft's digital tools, both qualitatively and quantitatively.

System and documents used for assessing Craeft digital tools:

- **On-the-spot feedback [first impressions] -** in a large group, during the presentation and first experiment of tools (TA - qualitative - with each user, throughout the clusters).
- **Questionnaire on the initial state of skills** - Evaluate pedagogical progress through the acquisition of professional skills (statistical comparison between cohort T and TA - quantitative - beginning of scholar year-end)
- **Self-assessment questionnaire on the mastery of tools** - To assess the appropriation and mastery of Craeft digital tools - (TA - qualitative - throughout clusters if necessary)
- **Personal project follow-up form and interviews** - via a project follow-up form and individual interviews to identify the impact of digital tools - (T + TA - qualitative - at each cluster, put the results into perspective - project follow-up form)
- **Comparison of the results of formative assessments** - carried out by cross-disciplinary subject trainers and collected to measure the impact of the e-learning platform (T + TA - quantitative - throughout the clusters)
- **Satisfaction survey** - to assess the appropriation of the tools and to gather suggestions for improvement (TA - quantitative - throughout the groupings if necessary)

Note: for the questionnaire of initial state of skills: this questionnaire was filled during cluster N°7 and will be proposed again in June on cluster N°12, just before the CPC exam. The result of it will be included in the final rapport due to the missing data for the present one.

Note for individual interviews:

- (N°7) Presentation of the project follow-up sheet
- (N°8-N°9) Gathering of experiences, workflow, adherence to the initial project idea, questioning about the place of digital tools in general (Craeft and non-Craeft tools) in project development.

1.2.4 Methodology for analysing qualitative data

To analyse the qualitative documents, on-the-spot feedback, satisfaction surveys and individual interviews to identify the dominant themes, work was carried out in several stages:

- copying the data into tables, one table per document with data divided into three columns
  - positive points
  - points for improvement
  - comments
- highlight dominant themes, identify and classify the data according to similar semantic fields and then summarise the dominant themes
- create a coding system so that the analysis can be traced back to the data. To this end, it will be possible to identify which themes correspond to which data and make the link between the two instances of theme/data.
- carry out a statistical study to measure the weight of each theme identified.

See: Annex 5 - coding and data.

1.3 Results

1.3.1 Results - project's presentation.

See also Annex 3.

1.3.1.1 Feedback on Tools Presentation

The following data are based on the apprentices' feedback on the presentation of the Craeft project and the pilot 1 experiment. The feedback has been classified according to the themes selected for the workshop that followed the presentation.

Expectations

- tips and advice
- manufacturing processes
- information on glass chemistry, temperature curves for annealing, understanding stresses in glass
- video examples associated with the tools, the tool in action
- having contacts, being able to find out more
- have a contextualised database on the craft by trade
- be able to become more aware of your actions, step back and analyse your practice (video elicitation)

Issues and fears

- The agreement for digitalisation of the people who cultivated and developed the techniques
- What are the intentions behind the project? Stealing the techniques?
- Dispossession of the relationship with matter

Comments

- for workshop presentations, a simple video is enough and 3D is not useful in itself.
- the tools are good for discovering the trade, at first approach (editor's note - not when you already know the trade).
- how can they be used to introduce children to the trade?

1.3.1.2 Synthesis of workshop

The creative workshop was divided into two parts, one for sub-group work and the other for a large-group feedback session.

The answers to the questions posed were put on post-it notes and then mapped onto two axes, one 'desirable' and the other 'achievable'.

Questions:

- How do you see Craeft's digital tools?
- What are your expectations?
- What you could do with them
- How would you like to use them?
- What are your fears?
- Why do you want to experiment and use these tools?
- What ideas do you have?

The data below is a compilation of the results.

Expectations

Relevance of tools versus maturity:

- Improve the physical rendering of VR (credibility)
- Discover a profession as accurately as possible
- Modelling technical aids, link with workshop production

Accessibility

- Publicising the project
- Enabling everyone to discover
- Ease of use
- Affordable

Reference portal

- Index, repository, overview of techniques (possibilities)
- Mapping of glass crops
- Accuracy of techniques, peer review, sources, credibility

Issues and fears

Digital technology: an additional constraint?

- On the use of digital technology
- The digital tool adds to the difficulties for me = because it takes time to adapt and learn the techniques (not necessarily instinctive)

Disconnection between simulations and the reality of the workshop - maturity of VR tools

- Lack of precision in certain techniques
- Only visual support
- Not facing up to the real constraints of what you discover because of the virtual medium
- The rendering is ‘grotesque’ compared to the real visuals

Doubts about preserving and perpetuating craft trades

- Craftspeople might see it as a threat and the project might not be used, causing a rift between the community and the project

- Forgetting some technical particularity or specificity

Proposals

Hyper-realistic VR

- Develop equipment of the right weight and adapt it to provide a truly realistic experience (realistic but expensive sensors, etc.).

Interactive e-learning

- Go deeper into the questions asked in the interactive video
- Create a medium with a butterfly effect (e.g. if the answer is wrong, the stained-glass panel will break when cut).
- Vary the means and methods (for discovering trades/techniques)

Have a reference portal on 'my trade'.

- Opening up to glass techniques other than glassblowing
- Develop a 'bible of glass'
    - Vocabulary
    - Practical information (kiln manufacture, maintenance, annealing)

1.3.1.3 Overall synthesis of Craeft project presentation

The apprentices were very interested in the project. An exchange of views began very quickly at the start of the presentation and continued throughout.

They asked questions about the medium- and long-term objectives and challenges of this type of project aimed at digitising skills. The relevance of digital tools in learning their trade. The usefulness of the proposed tools, particularly in terms of their maturity.

The following summary of the feedback on the Craeft presentation positively challenges the project, and if the feedback and overall acceptance are mixed, there is one observation at a given moment, which it is interesting to put into perspective with the feedback from the following groups during the actual experimentation of the Craeft digital tools.

- Little support for the TA cohort - for the Craeft project?
- Questions about the challenges of digitising craft skills, what use will be made of them in the future, and fear of being dispossessed.
- Workshop simulation, negative feedback from people with previous experience.
- Simulation too far removed from the reality of the workshop, need to be in touch with the material for apprentice craftsmen.
- No concrete, usable results, especially for 3D tools.
- Need for a design tool linked to production.
- What's it going to do for me?
- Digital tools are not mature enough.
- Expectation of a portal, reference to techniques.
- Attachment to project follow-up.

1.3.2 Cluster N°7 - Analysis and results of the evaluation of Craeft digital tools.

1.3.2.1 E-learning platform - results of project assessment documents

The following analysis shows the main themes to emerge from the feedback and satisfaction survey questionnaire for the e-learning platform.

You can find the full coding in Annex 5 and the coded raw data in Annex 6a.

Identified themes:

1- Pedagogical and didactic effectiveness [PDE]: This theme covers the relevance of learning methods, the educational progression and the effectiveness of formative assessments. It reveals a strong match with the objectives of preparing for the CAP, thanks in particular to the complementary nature of the educational aids.

For example:

'The questionnaires and explanatory videos are the site's best asset' [PDE-1] is a good illustration of the effectiveness of multimodal teaching aids. This feedback is reinforced by the observation *of 'interactive videos, initial tests'* [PDE-1], demonstrating the positive impact of interactive elements on learning.

2- Ergonomics and accessibility [ERA]: this dimension covers the architecture of the platform, the fluidity of navigation, and the organisation of educational resources. Feedback highlights opportunities for optimising the user experience to facilitate access to content.

For example:

'No breadcrumb trail, no possibility of going back in the tree structure when you are in a course' [ERA-1]. This observation highlights a navigation issue. Similarly, 'Quite complicated to find your way around the platform, I find it a bit scattered' [ERA-2] reveals areas for improvement in course structure.

3- Exhaustiveness and completeness of content [EXC]: This theme covers the enrichment needs identified, particularly in terms of technical drawing, art history and specific technical content. It also includes aspects relating to the internationalisation of content.

For example:

'In some courses, things are missing [technical drawing], there are gaps, a video is not enough to understand everything' [EXC-1], feedback concerning desirable improvements to content. The suggestion 'It would be interesting to add the other specialisations and art history' [EXC-3] indicates a relevant pathway for enrichment.

4- Linking theory and practice [LTP]: This dimension explores the connection between theoretical learning and its concrete application in the workshop, underlining the importance of being anchored in professional reality.

For example:

'Making the link between the videos and the workshop' [LTP-1] is an essential requirement for the transfer of learning.

Statistical analysis:

The statistical analysis highlights the weight of each theme to identify the most often occurring and important. This approach avoids the risk of a marginal theme emerging at the same level as another more relevant to understanding apprentices' concerns.

Code	Theme	Occurrences	Percentage	Rank
PDE	Pedagogical and didactic effectiveness	33	46%	1
PDE-1	Quality of learning materials	18	25%	1
PDE-2	Educational Progress	11	15%	3
PDE-3	Assessment of learning	4	6%	6
ERA	Ergonomics and accessibility	20	28%	2
ERA-1	Navigation and interface	14	20%	2
ERA-2	Organisation of content	4	6%	6
ERA-3	Technical accessibility	2	3%	8
EXC	Exhaustiveness of content	14	20%	3
EXC-1	Core content	9	13%	4
EXC-2	Specific technical aspects	5	7%	5
LTP	Linking theory and practice	4	6%	4
LTP-1	Transfer of learning	2	3%	8
LTP-2	Professional Contextualisation	2	3%	8
Total		71	100%	

Figure 3. Table of statistical analysis for e-learning, cluster N°7.

Caption: Top four rankings

From this analysis of e-learning data, it can be seen that the four themes most frequently mentioned are, in order of rank, the quality of the learning materials, the navigation and interface, the learning progression and the core contents.

These four issues merit particular attention as input to implementing improvements to the e-learning platform.

This can be seen in the continued attention paid to the variety of materials, the clear identification of training modules in the learning progression, and the need to supplement and enrich fundamental contents.

The other aspect is improving the site's navigation and interface.

Overview of the self-assessment questionnaire on Craeft tools usage - e-learning.

E-learning platform

The self-assessment questionnaire on the use of the e-learning platform gathers learners' perceptions of their mastery of the tool; it is personal and subjective feedback, not a test of real mastery. It aims to measure how comfortable learners are using the tool and where improvements can be made.

The questionnaire consists of closed questions, the answers to which are shown in the graphs below. Responses to the open-ended comments question are compiled in the 'Comments' box.

The answers to the question of the usefulness of the personal project are logical insofar as it is a learning tool and not a design or production tool.

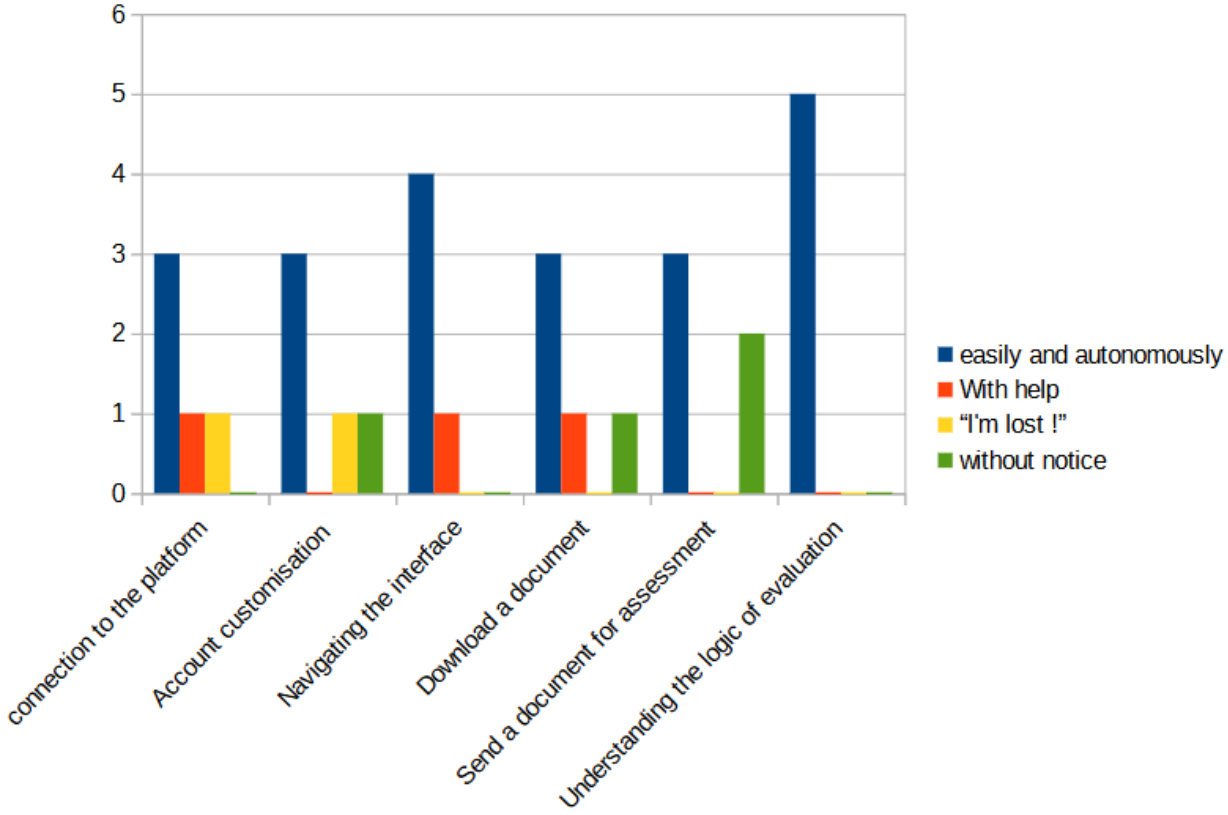


Figure 4. E-learning self-assessment questionnaire graph, cluster N°7.

Comments:

- Navigating the interface: 'To go back, you have to go back to the course list.'
- Understanding the logic of assessments: For interactive videos, display multiple answers. A little scattered.

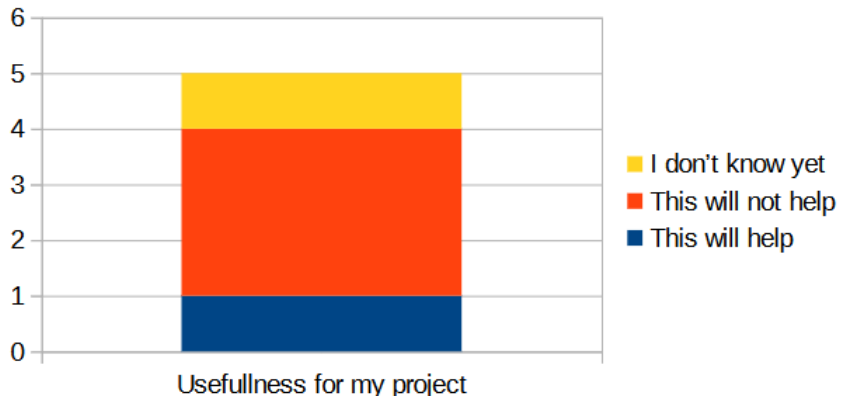


Figure 5. E-learning, usefulness question, cluster N°7.

The results show an overall good acceptance and mastery of digital tools in general and e-learning platforms in particular.

The average results for questions about logging on to the platform or personalising an account are due to first-time use. Navigating the interface did not pose any major problems for the apprentices, but they did ask for a general breadcrumb trail to show where they were in the site tree structure.

Understanding the logic of the assessments was a notable positive point, as the 'quiz first' system of prior assessment and the use of quizzes as training tools were generally appreciated, with a request for systematic feedback on 'correct answers' in the results.

Note: the number of apprentices in the TA cohort is five, and this limits the representativity of the statistical approach.

1.3.2.2 VR glassblowing workshop simulator - results of project assessment documents

The following analysis shows the main themes to emerge from the feedback and individual interviews.

You can find the full coding in Annex 5 and the coded raw data in Annex 6b.

Figure 6. VR studio experiment, cluster N°7.

Identified themes:

1- Videogame pedagogical engineering [PEN]: This theme covers the structuring of learning, pedagogical progression and the integration of explicit objectives. It emphasises the importance of appropriate guidance in the virtual environment.

For example:

'Setting objectives (small tasks), e.g. making a glass drop' [PEN-1] is a structuring suggestion for learning. 'Having tutorials - e.g. making a cup guided through the steps (process)' [PEN-2] reinforces this progressive teaching approach.

2- Technical and professional fidelity [FIT]: This dimension concerns the quality of the physical simulation and the reproduction of professional gestures, crucial elements for an apprenticeship in a craft.

For example:

'For the evolution of the viscosity of glass as a function of temperature, if this cannot be modelled continuously, allow for stages' [FIT-1] represents precise and constructive technical feedback.

3- VR Ergonomics and user interface [EVR]: This theme covers aspects relating to navigation in the virtual environment and the accessibility of functionalities, which are essential for a learning experience.

For example:

'Being able to relaunch the application via a menu' [EVR-1] underlines the importance of accessibility of functionalities.

4 - Practical aspects and security [PAS]: This dimension covers the integration of good professional security practices and the management of virtual equipment.

For example:

'Having a seal to put the pipe in at the end of work' [PAS-2] demonstrates the attention paid to good professional practice.

Statistical analysis:

Statistical analysis of VR glassblowing simulator data tables

Code	Theme	Occurrences	Percentage	Rank
PEN	Pedagogical Engineering	7	44%	1
PEN-1	Learning structure	4	25%	1
PEN-2	Pedagogical objectives	2	13%	4
PEN-3	Assessment system	1	6%	6
FIT	Technical Fidelity	6	38%	2
FIT1	Physical simulation	3	19%	2
FIT-2	Reproduction of movements	3	19%	2
EVR	Ergonomic VR	2	13%	3
EVR-1	User interface	2	13%	4
PAS	Practical Aspects and Security	1	6%	4
PAS-2	Hardware management	1	6%	6
Total		16	100%	

Figure 7. - table of statistical analysis for VR studio, cluster N°7.

Caption: Top four rankings - Expert ranking

It emerges from this analysis of the data concerning the VR blowing workshop simulation, that the dominant theme is the learning structure, in equal second place, the themes linked to technical fidelity, physical simulation and reproduction of gestures. Finally, the themes linked to educational objectives and the user interface, are also tied for 4th place.

Here again, these issues deserve particular attention when it comes to implementing improvements to VR workshop simulation.

We can note the importance of structuring learning and processes, even before fidelity to technical gestures and the physical simulation of the environment. The themes of learning objectives and the user interface highlight the need for learners to situate themselves in their learning progression.

Overview of the self-assessment questionnaire on Craeft tools usage - VR studio.

VR glassblowing workshop simulator

The self-assessment questionnaire on the appropriation of the VR glassblowing workshop simulator, collects the learners' perception of their mastery of the tool, in the same way as for the e-learning platform, it is a personal and subjective feedback. The aim is to measure the degree to which the trainees have taken ownership of the tool and are comfortable using it, and to identify areas for improvement.

The questionnaire consists of closed questions, the answers to which are shown in the graphs below. Responses to the open-ended comments question are compiled in the 'Comments' box.

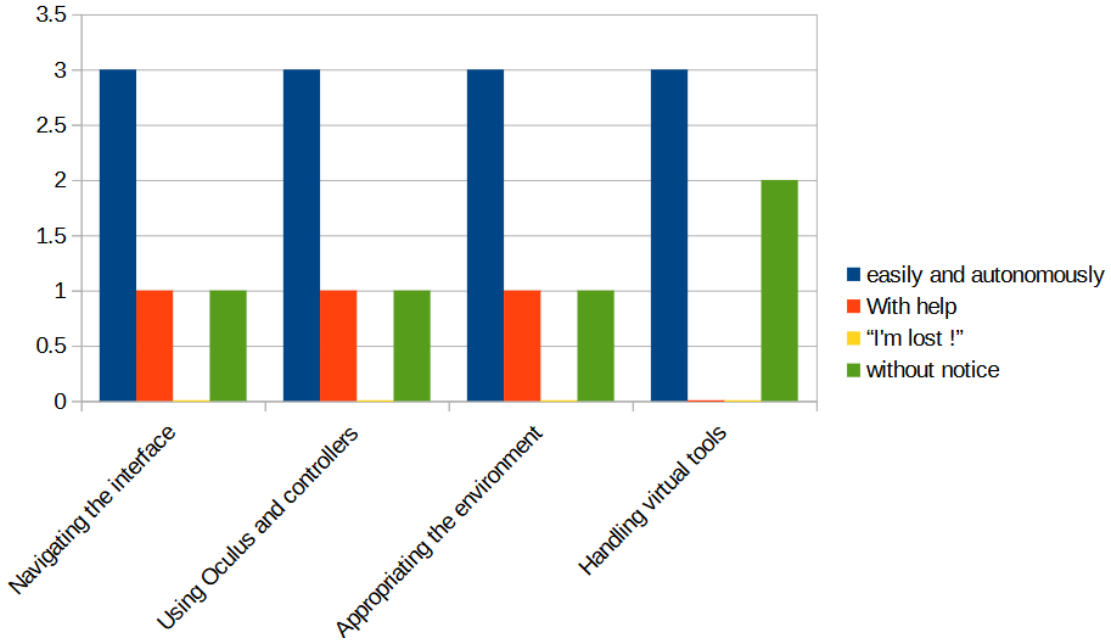


Figure 8. VR studio self-assessment questionnaire graph, cluster N°7.

Comments:

Navigating the interface: Easy, but requires a little training.

Using the headset and controllers: add a tutorial to help you understand the possible commands and actions.

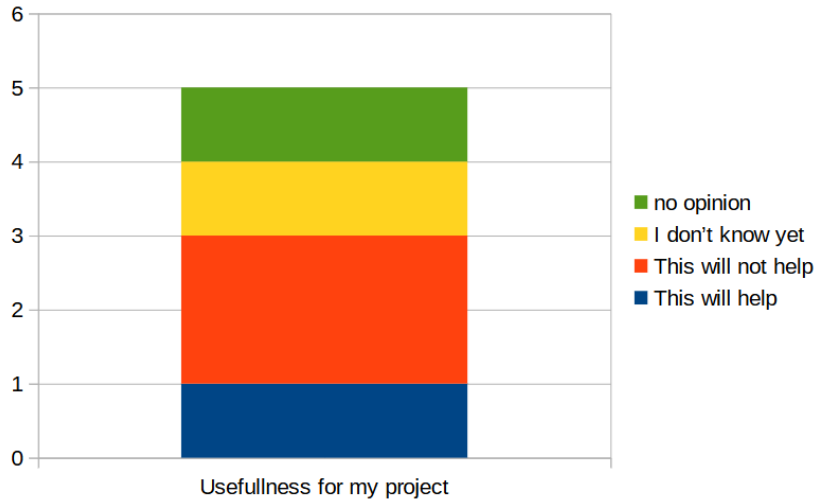


Figure 9. VR studio, usefulness question, cluster N°7.

As for the e-learning platform, the results show an overall good acceptance and mastering of the VR glassblowing simulator.

Navigating the interface, using an Oculus headset and controllers, and appropriating the environment, are mainly good for TA cohort apprentices.

The score of handling virtual tools is less high than the other aspect of VR studio, due to the imprecision of grabbing tools and the physics of simulation. Another aspect of this feedback is the gap between the real physics of the workshop and the virtual physics.

1.3.2.3 Comparative results of formative assessment in general technology

General technology course is part of cross-cutting matters implemented in the e-learning platform. This comparison of formative assessment results aims to measure the impact of e-learning platforms on knowledge acquisition.

This assessment of general technology was carried out on 27 September, the evaluation is rated on 20 and the graph below shows a comparison of the results between the T and TA groups.

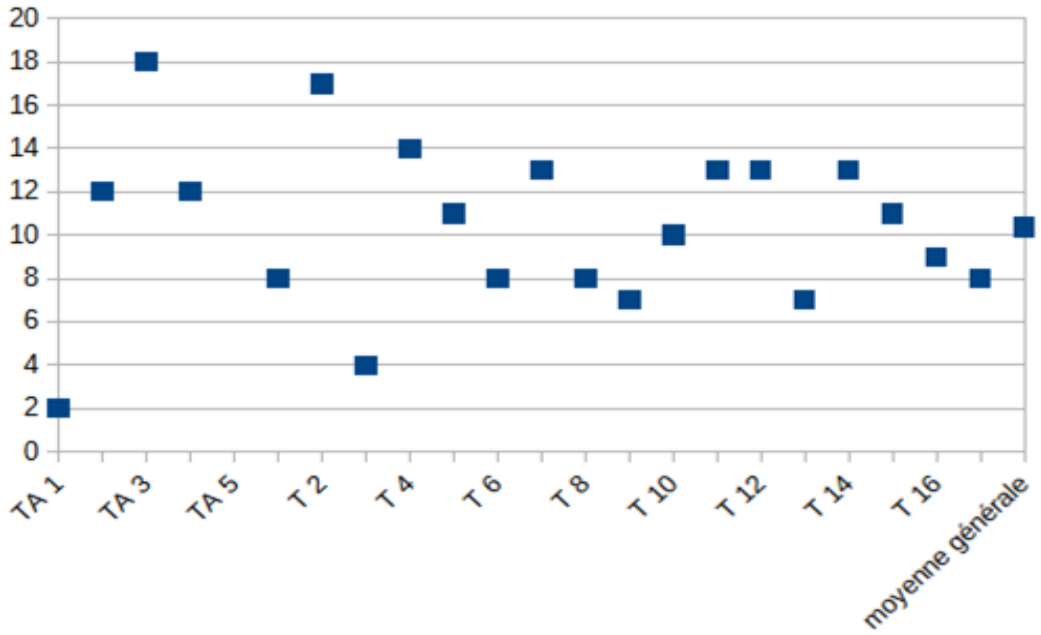


Figure 10. TA and T cohorts general technology assessment results graph.

Table of TA and T cohorts scores means and standard deviation:

TA Group	
TA 1	2
TA 2	12
TA 3	18
TA 4	12
TA 5	

T Group		T Group		T Group	
T 1	8	T 7	13	T 13	7
T 2	17	T 8	8	T 14	13
T 3	4	T 9	7	T 15	11
T 4	14	T 10	10	T 16	9
T 5	11	T 11	13	T 17	8
T 6	8	T 12	13		

TA mean	11.00

	T mean	10.18

Overall mean	10.38

TA std. deviation	6.63

T	std. deviation	3.09

Figure 11. Table of TA and T cohorts score in TG formative assessment.

The mean, but also the standard deviation, is higher in the TA cohort. Globally the result of TA Cohort is sensitively better than the results of the T cohort. The higher note for TA is 18/20 and for T is 17/20. The lower rate of both cohorts is in the TA cohort 2/20 versus 4/20 for the T cohort. We hypothesise the importance of apprentices adopting the digital tool, in this case, the e-learning platform, if it is to have a beneficial effect on training. Once again, the number of apprentices in the TA cohort is not large enough to consolidate a definitive result, but it does allow us to identify a trend.

1.3.2.4 Analysis and summary of cluster N°7

From the data analysed above, we can identify several themes that stand out and will be refined in the overall analysis of Pilot 1.

- Good overall acceptance of the tools
- E-learning platform is perceived as a good tool for exam revision
- Quiz as a good tool for memorisation
- VR glassblowing simulator is perceived as a good discovering tool
- High level of expectation for tool improvement

1.3.3 Cluster N°8 - Analysis and evaluation results of the Craeft digital tools

Figure 12. VR experiment during cluster N°8.

1.3.3.1 Overall feedback on Craeft digital tools

There was no particular feedback for the e-learning tools and the VR glassblowing workshop simulator, as the tools had not changed much between clusters No. 7 and No. 8.

The apprentices did not want to try out the apprentice's studio or the new version of the VR workshop because it was too close to the previous version.

In addition, tools developed in parallel were presented, such as the 'apprentice studio' and the 'community portal' website. As these tools could not be presented during cluster No. 7 and were not finalised for cluster No. 9, they may not be evaluated in this report; they will be evaluated in the final version. However, their presentation to the apprentices will enable us to involve them in the development of the tools and to obtain useful feedback for their improvement.

1.3.3.2 Feedback on the Apprentices Studio Presentation

- interesting breakdown of the manufacturing process by stage, but with an additional stage to do or see all the stages from A to Z.

1.3.3.3 Feedback on VR glassblowing workshop simulator

- good improvements, information on cane temperature before grabbing them for gathering.
- Tooling information well received
- avatar with predefined scenes OK if gestures are precise

1.3.3.4 Feedback for the "Community Portal" site

The site was presented to a large group, followed by a question-and-answer session.

The results show that, while Snapchat and Instagram are the social networks most commonly used, a platform dedicated to the craft trades is attracting interest from a wide range of users, A platform dedicated to the craft trades is attracting interest for:

- find out more
- find another craftsman to work with
- ask for advice when faced with a technical problem
- exchange with trusted peers on a professional forum
- more reassuring than other 'all-comers' social networks
- → access to business referrers

This implies:

- to label the technical level of people: trainees, self-taught, experts, etc.
- have moderation and levels between members, administrator, editor, reader

Other comments:

- interesting for anyone, retraining, those interested in crafts
- access [be able to discover] different professions
- have one translation per language - not everyone speaks English

1.3.3.5 Return of personal project follow-ups

reminder: project follow-up aims to record the tools used to develop the projects during the successive groupings. The aim is to measure the use and perception of digital tools for the T and TA cohorts, in addition to the Craeft tools.

TA cohort

Of the five apprentices in the TA cohort, four plan to use a digital tool to develop their project: ELM - laser cutting, LV - parametric 3D modelling, AL - parametric 3D modelling, OR - organic 3D VR modelling.

Of these four students, two have undertaken 3D modelling in VR, and one has finalised her shape and will be using it in her project.

What stands out:

You need to learn how to use digital tools. → additional learning that takes time. [DTL]

- ELM - 3D model a lot of effort for not much, start learning a tool to do.
- LV - 3D modelling test, takes too long to finish modelling properly.
- LV - knowledge of the tool plus 3D vision, first full year to become familiar with the 3D tool. 3D VR is an experiment.
- OR - 3D modelling [VR Adobe modeller] nice, easy to handle, difficult to get what you want, to get the details right
- LP - Not bad in VR, no time to get to grips with the software completely.

A pragmatic, blended approach based on needs, using the most appropriate, most effective digital or traditional tool. [MXU]

- ELM - modelling is not complicated, but production is more difficult
- ELM - preference for cleaner, stronger laser cutting. [digital drawing required].
- LV - [Maybe] theatre modelled in 3D with Fusion and the help of the FabLab trainer, because it has to be dismantled with a laser-cut base.
- AL - use of digital tools to obtain a model for the assembly of the greenhouse, seen with the FabLab trainer for production [editor's note - parametric 3D modelling].
- LP - VR is a better option in terms of working time, wax is better for detail.
- OR- just the flowers in VR 3D modelling + 3D printing at the FabLab.
- GOLD - The flower is simple, and faster [in 3D modelling] than with wax. Simple wax too, for more complicated modelling VR allows you to go faster. And allows you to go directly to glass paste, and direct mould on PLA.
- LP - Not bad in VR with few limits, compared to the constraints of the material. Aren't the constraints there afterwards? No, for example, I start 3D printing while I'm doing something else.

A choice based on the pleasure of making, the relationship with the material. [RTM]

- LP - VR more practical, faster but not the feel of the material. Faster than wax once the software is in hand (hypothesis not tested).

Cohort T

Of the thirteen apprentices in cohort T, four used the digital modelling tool to complete their project. JD - 3D modelling and printing, NA - 2D modelling for the stained-glass structure, EG- 2.5D modelling for animation support.

AT's project is on the theme of digital art, and it uses a mixed approach, with the computer being used to produce digital material but the production remaining centred on traditional techniques.

The themes that emerge are similar to those of the TA cohort, plus the questioning of the relevance of digital tools and their access for all:

You need to learn how to use digital tools. [DTL] → additional learning that takes time.

- LP - The glass pastes will be ready by the end of the grouping, no time to learn the digital tool.

A pragmatic, blended approach based on needs, using the most appropriate, most effective digital or traditional tool. [MXU]

- JD - 3D mould for a more precise shape versus a plaster model that is not precise enough.
- MM - No use of digital tools except for page layout.
- NA - I used manual techniques, models, sketches, tests, research → and positioning the stones. Modelling on AutoCAD, plans and dimensions.
  My project does not involve the use of XR techniques. I tend to use manual techniques and very few computerised methods.
- AT - digital and manual. Creating digital material on the computer with bugs, choice, and then re-transcription into stained glass. "Transcribing digital material into reality".
  Q1- Manual techniques, drawing, collage, sketching. Digital techniques, scans, digital copies [screen copies] plus experience with bugs [when opening files].
  Q3- Very quick sketches reworked on computer, digital collage. It takes more time but develops my motivation.
- LP - Drawings and waxes are easier to modify than on a computer, it's easier to make clean things more quickly, no series, it suits me like that.
- EG - Observation, visits to sites and works, sound recordings, feelings, note-taking, books, drawings. Modelling the stained-glass window on Blender from a scan of a hand-drawn image, using AI to create animations.
- LF - Paper document, [...] already a lot of tools, why add more, ecology?

A choice based on the pleasure of making, the relationship with the material. [RTM]

- BL - I don't plan to use digital tools; I prefer to do everything by hand on paper.
- LP - modelling my waxes, the question of 3D modelling, not at ease with software, I go faster because I'm used to waxing, more pleasant.

Relevance and access for all? [AXS]

- LF - [e-learning] more of a platform where you put documents, the political trend to remove teachers, removes a lot of things, useful human to review [knowledge], in terms of unemployment... Everything on screen, tired, a lot of time on screen, for the eyes, the brain, relationship, not sure it's better?
- LF- Inequality between those who have a tablet and those who have a computer, equal opportunities.
  My computer isn't powerful enough for 3D modelling, work here [at Cerfav on group time] is more complex in terms of organising time.

1.3.3.6 Analysis and summary - cluster N°8

- e-learning
  - waiting for an advanced version
- Apprentice studio and virtual blow-moulding workshop
  - interest in learning about work processes
  - different inputs expected for processes, step by step, from A to Z
  - waiting for precision in the simulation, VR manipulation or avatar.
- Community portal, interest in:
  - a reference site on their profession, open to other arts and crafts.

- access to technical data, a "business bible
- talk to expert professionals
- multilingual access

Overall, a critical maturity and a good knowledge of digital tools. The effective use of digital tools is a learning process in itself, but not necessarily a desirable one. A pragmatic and mixed use of digital and traditional tools, if they are useful to them. An attachment to the relationship with matter.

1.3.4 Cluster N°9 - Analysis and results of the evaluation of Craeft digital tools.

1.3.4.1 E-learning platform - results of project assessment documents

The analysis of the hot feedback documents and the satisfaction questionnaire for Cluster 9 reveals the same main themes as those identified for Cluster 7.

You can find the full coding in Annex 5 and the coded raw data in Annex 8a.

Topics and quotes:

1- Pedagogical and didactic effectiveness [PDE]

PDE-1 (Quality of learning material)

For example:

- ‘Good for TG revision’.
- ‘The course materials (text, video images) helped with understanding’.
- ‘The video of the workshop with Jean-Pierre making the decanter’.

PDE-2 (Educational progress)

For example:

- ‘The course gave you an understanding of glassblowing.
- ‘Discover the concepts of technical drawing’.

PDE-3 (Assessment of Learning)

For example:

- ‘Quizzes: why a quiz on each part and not an overall quiz?’
- ‘The questions are always the same, it would be nice if they were given randomly’.
- ‘Quizzes + auto-correction’ [is appreciated].

2- Ergonomics and accessibility [ERA]

ERA-1 (Navigation and interface):

For example:

- ‘Organisation not super clear if you don't know the site’.
- ‘The sign-up button to access the courses is a bit special’.
- ‘A bit hard to find your way around and know where to go at first’.

ERA-2 (Organisation of content):

For example:

- ‘It's very easy to find your way around the different courses’.
- ‘The sessions are well organised’.
- ‘Course structure and organisation of sessions (chapters)’

3- Exhaustiveness of content [EXC]

EXC-1 (Core content):

For example:

- ‘All the explanations are easy to understand and useful for progress’.

EXC-2 (Specific technical aspects):

For example:

- ‘Video of the oval layout too fast → difficult to understand’.
- ‘They could be more detailed, especially about how they work’ [description of the machines].
- ‘The names [of the tools and machines] are missing.

EXC-3 (Educational supplements):

For example:

- ‘Add a general culture or art history section’.

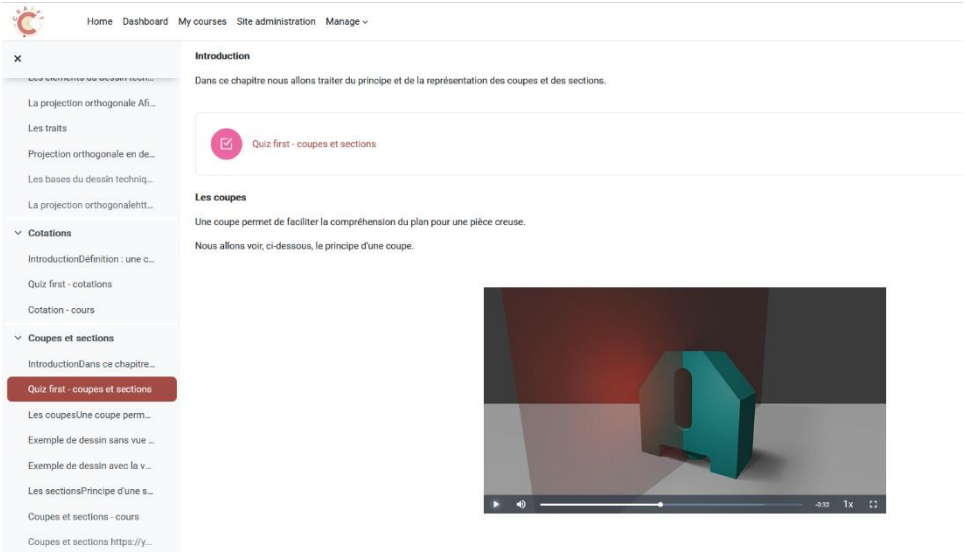


Figure 13. Learning platform, technical drawing course.

Statistical analysis:

We have decided to develop a statistical analysis of Cluster 7. To assess the weight of each theme and identify whether their occurrence is a positive point, a point for improvement or a comment.

Code	Theme	Occurrences	Positive points	Points for improvement	Comments
PDE	Pedagogical and didactic effectiveness	21	17	2	2
PDE-1	Quality of learning materials	14	14		
PDE-2	Educational Progress	2	2		
PDE-3	Assessment of learning	5	1	2	2
ERA	Ergonomics and accessibility	16	11	5	
ERA-1	Navigation and interface	8	5	3	0
ERA-2	Organisation of content	8	6	2	0
EXC	Exhaustiveness of content	8	3	5	
EXC-1	Core content	3	3		
EXC-2	Specific technical aspects	2		2	
EXC-3	Educational Supplements	3		3	
LTP	Linking theory and practice	1	1		
LTP-1	Transfer of learning	1	1		
Total		46			

Figure 14. Statistical analysis of e-learning themes, cluster 9.

From the table above, we can see that the theme of the quality of teaching materials carries a great deal of weight, with a high satisfaction rate. For the ergonomics and accessibility theme, we can see a fair satisfaction rate with an expectation of improvement. The core content was appreciated, but there was a demand for additional information on specific technical aspects or complementary modules such as art history or glass culture.

Overview of the self-assessment questionnaire on Craeft tools usage - e-learning.

E-learning platform

As a reminder, the self-assessment questionnaire on the use of the e-learning platform is personal and subjective feedback and not a test of real mastery of the tool.

The questionnaire consists of closed questions, the answers to which are presented in the graphs below. The answers to the open-ended question are compiled in the 'Comments' box.

This questionnaire, which had already been submitted to the apprentices during Cluster 7, was presented to them again to measure changes in their perceptions.

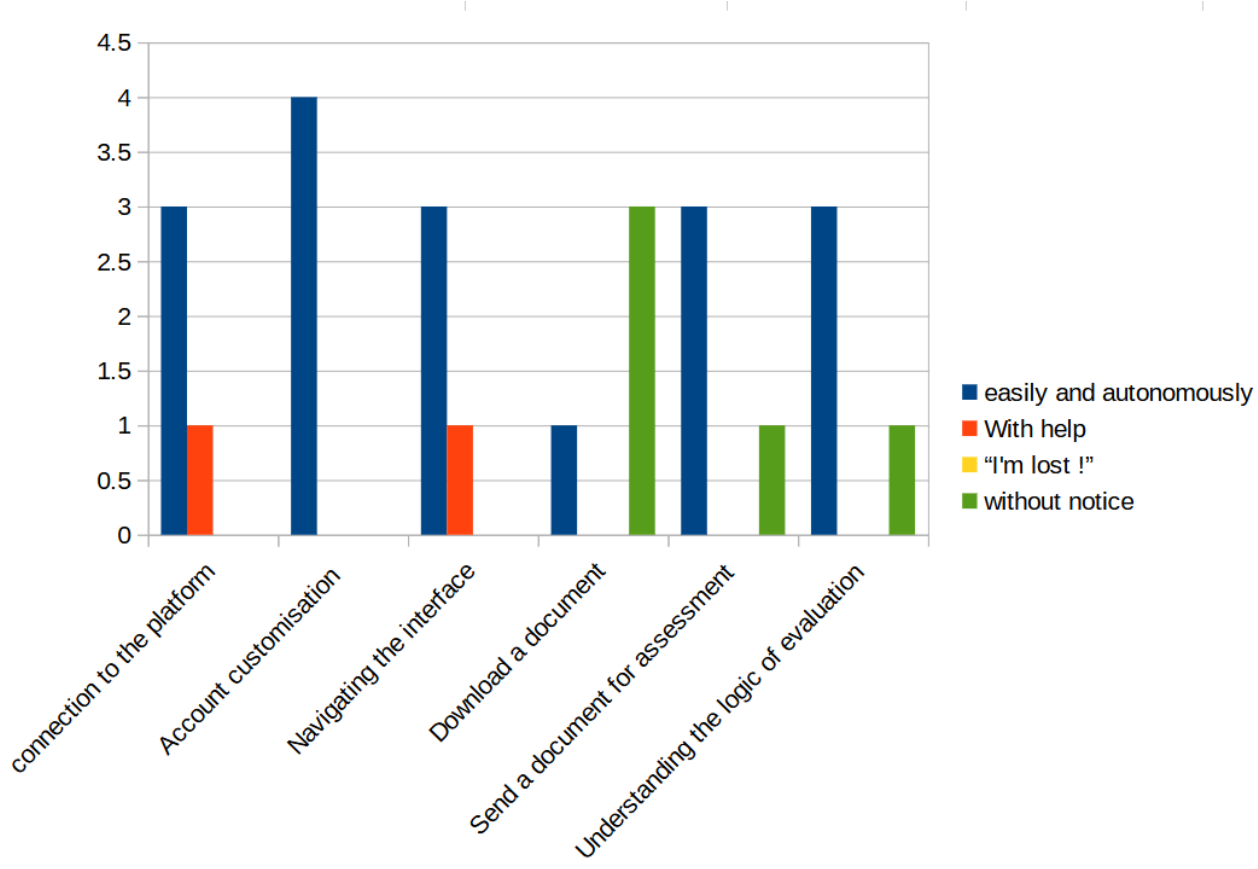


Figure 15. E-learning self-assessment questionnaire graph, cluster N°9.

Comments	
Question	Comment
Connection to the platform	'No problem'

Account customisation	'Easy to use'
Navigating the interface	'Everything is well detailed'
Download a document	
Send a document for assessment.	'The button is present at the end of each assessment, so it's simple'
Understanding the logic of evaluation	'I think it's great that there are assessments for every subject.'

Figure 16. E-learning self-assessment questionnaire comments, cluster N°9.

Notes:

1. The question on the usefulness of the e-learning platform in the personal project was deleted as irrelevant since it is a learning tool and not a creation or production tool.
2. Due to the absence of one of the apprentices, the maximum scores are based on 4 and not 5 participants.

In summary, we could observe a stability of usage perception on the e-learning platform. Especially on 'connection on the platform' and 'navigation on the interface'. 'Account customisation' has progressed, and 'understanding of the logic of evaluation' is slightly lower due to the without-notice answer. For downloading or sending documents the without notice answer is understandable because it was not experimented with a lot.

1.3.4.2 - VR glassblowing workshop simulator - results of project assessment documents

Summary and analysis of feedback and satisfaction questionnaires for VR glassblowing workshop simulator. You can find the full coding in Annex 5 and the coded raw data in Annex 8b.

Figure 17. VR glassblowing simulator experiment cluster N°9.

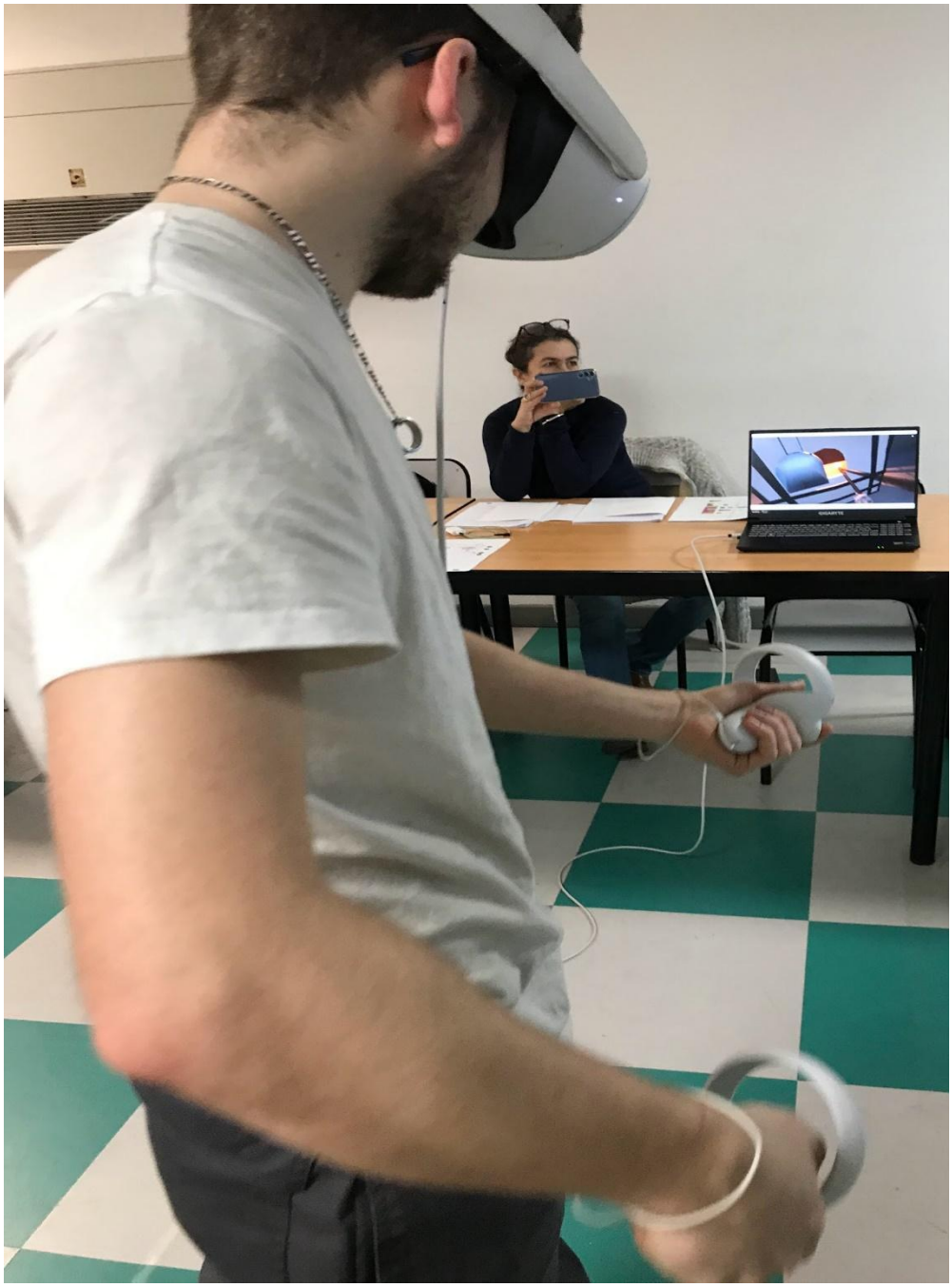


Figure 18. VR simulator, gesture and simulation, cluster N°9.

Topics and quotes:

1- Pedagogical Engineering [PEN]

PEN-1 (Learning structure)

For example:

- 'Two scenarios, discovery, learning it is OK' [preference for] 'A more guided scenario with levels of difficulty'.

- ‘Free access for those who already know and more guided access for beginners.

PEN-2 (Pedagogical objectives)

For example:

- ‘It's already taking shape.’
- ‘It's a good way to get an idea of what you're getting into before your first workshop experience’.
- [Do I find the application useful for learning and memorising gestures?] - ‘To view them, yes, but not memorise them’

2- Technical Fidelity [FIT]

FIT-1 (Physical simulation)

For example:

- ‘The glass shifts, it's funny, it doesn't stay in the centre.’

FIT-2 (Reproduction of movements)

For example:

- ‘Be able to turn the cane with the left-hand controller’.
- ‘Having magnetism for hand position on the cane for picking’
- ‘The movements are not easy to manage’
- ‘Yes, nice to use. Quite a few bugs, especially when using the canes.
- [good] ‘To visualise them, yes, but not to memorise them Real practice is better because you can feel them’.

FIT-3 (Technical accuracy)

For example:

- ‘The big pipe standing there is weird’
- ‘The irons on the ‘decor’ bench look completely smashed’.
- ‘The lid of the seal should perhaps be removed → to improve the rendering of the texture of the water’
- ’In the texture, there are different types of cane in fact’

3- VR Ergonomics [EVR]

EVR-1 (User interface)

For example:

- ‘User-friendly VR workshop simulation’
- ‘The videos are not clear’
- ‘Having a board with the tools on the wall, more than the floating panel’.

- ‘Put indications and instructions’
- ‘Information display should arrive by grabbing a coin rather than pointing at it’

EVR-2 (3D navigation)

For example:

- 'Being able to walk around the workshop’
- ‘Teleportation, the right-hand joystick that turns the pipe and teleports'

EVR-3 (Functionality accessibility)

For example:

- ‘I'd like to be able to grab and use tools with real interaction’
- ‘We need to be able to use the tools’
- ‘Grabbing the tools is a bit complicated’.
- ‘Yes, fairly simple to grab the tools is a bit complicated [to use its] movements are not easy to manage’.

Statistical analysis:

Code	Theme	Occurrences	Positive points	Points for improvement	Comments
PEN	Pedagogical Engineering	20	12	7	1
PEN-1	Learning structure	5	1	4	
PEN-2	Pedagogical objectives	15	11	3	1
FIT	Technical Fidelity	25	3	18	4
FIT-1	Physical simulation	7	1	3	3
FIT-2	Reproduction of movements	8		8	
FIT-3	Technical accuracy	10	2	7	1
EVR	VR Ergonomics	24	7	15	2
EVR-1	User interface	21	7	13	1
EVR-2	3D navigation	1		1	
EVR-3	Functionality accessibility	2		1	1

Figure 19. Statistical analysis of VR studio themes, cluster 9.

In the above table, we can see that the weight of each theme, PEN, FIT and EVR is fairly similar. The pedagogical objectives seem globally appropriated for the apprentices, with some improvements expected in the learning structure. The core expected improvement is on Technical Fidelity and VR Ergonomics.

Overview of the self-assessment questionnaire on Craeft tools usage - VR studio.

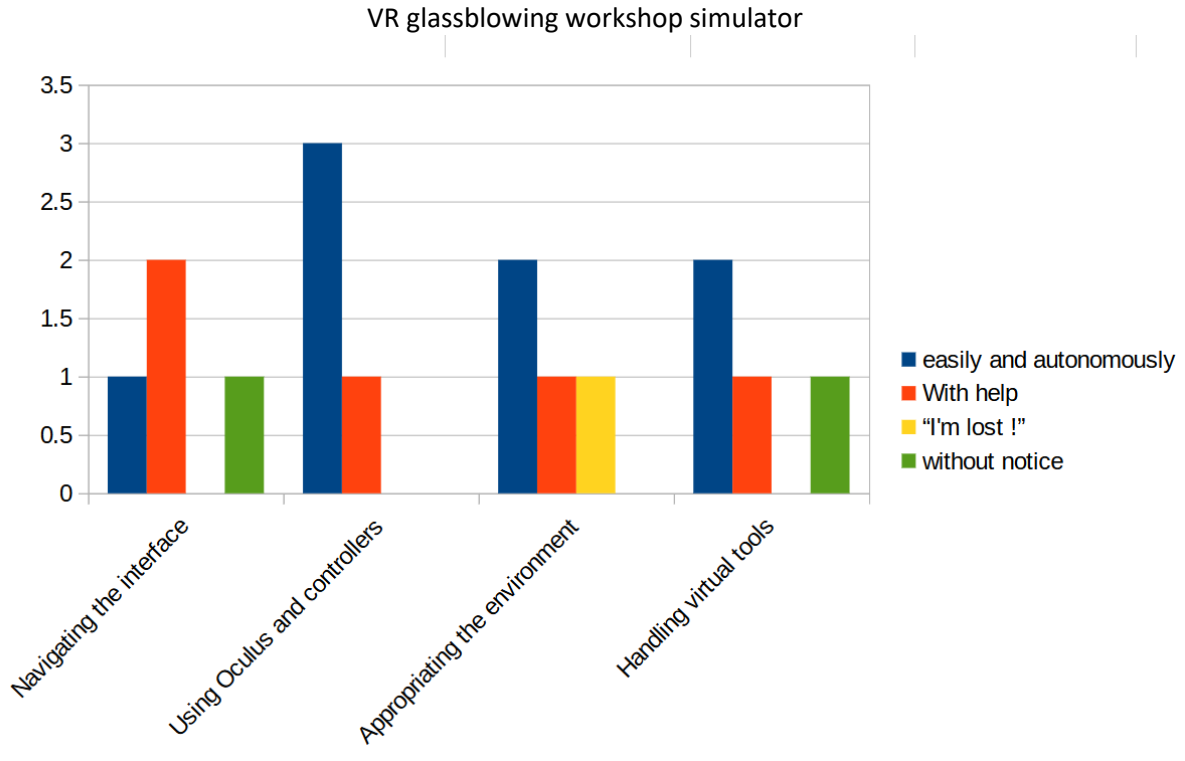


Figure 20. VR Studio self-assessment questionnaire graph, cluster N°9.

As a reminder, the self-assessment questionnaire on the use of the VR glassblowing workshop simulator is personal and subjective feedback and not a test of real mastery of the tool.

As with the e-learning platform, this questionnaire, which had already been submitted to apprentices at Cluster 7, was presented to them again to measure changes in their perceptions. Perceptions.

Comments	
Question	Comment
Appropriating the environment	'Not too intuitive'

Figure 21. VR Studio self-assessment questionnaire comments, cluster N°9.

Notes:

1. The question on the usefulness of the e-learning platform in the personal project was deleted as irrelevant since it is a learning tool and not a creation or production tool.
2. Due to the absence of one of the apprentices, the maximum scores are based on 4 and not 5 participants.

Overall, the scores for appropriation of the tools in the VR studio are lower than for cluster 7. One possible interpretation is that, paradoxically, greater attention was paid to the functions and tools on offer, as they have evolved considerably, and that more detailed exploration reveals gaps in mastery of the virtual environment.

1.3.4.3 - Return of personal project follow-ups

During cluster N°9, sixteen project follow-up interviews were carried out, 5 for the TA cohort and 11 for the T cohort. Due to the date of cluster 9 and the important amount of data, we propose here a preliminary analysis, which will be completed in the final version report. Of the analysis of interviews done during cluster N°8, four main themes emerged:

- Learning how to use digital tools.
- A pragmatic, mixed approach depending on requirements.
- A choice based on the pleasure of making, the relationship with the material.
- Access for all?

See Annex 5 - Thematic analysis coding structure

We added three others for cluster N°9:

- Opportunities and limitations of digital tools, interaction between the choice of tool and the project.
- Subcontracting the use of digital tools.
- Complexity of digital tools

TA cohort analysis

A pragmatic, mixed approach depending on requirements. - [MXU]

ELM mentions the difficulty of making cuts by hand [for sandblasting covers] and expresses its interest in alternative methods such as vinyl cutting.: *'No well this time I did it by hand but it's certain that if I can do it differently it'll be better. That's fine. It's a bit tricky with the cutter. (...) So yes, of course, if I can do it with, I don't know a cutter [vinyl cutting]. (...)'*

NC: 'So now I'm pleading for my chapel a bit, but do you think that digital tools, you know, if the next time I have to do 3D modelling, could they help me?'

LP-2: 'Or... Yeah, I don't think I'd have the time, but it could have helped me, yeah.'

Complexity of digital tools - [CDT]

NC: 'In your modelling method, what are the advantages and disadvantages of using cardboard compared to making a model directly in 3D, using 3D software?'

LV: 'I can see that using cardboard helped me to see my project in perspective because when it comes to drawing, it's not easy. Then I looked on the Internet for anything to do with dioramas, and all dioramas are normally made on paper. Most of them are made of paper or fairly hard, fairly rigid cardboard (...)'

OR: '(...) 3D modelling (.) it looks very simple at first, well when you see it but to use it is very complex, it takes time (.) it wasn't easy at first (..) um (....) then afterwards (..) like when we did a 3D print and in the end we realised that the stamens [the model is a flower] were too much and we had to change them again and the same goes for the (..) same goes for the top of the hat (..) where in fact we hadn't changed the measurements again'

Opportunities and limitations of digital tools, interaction between the choice of tool and the project. - [OLD]

AL: 'Yes, even though modelling my greenhouse took me a bit of time at first, in the end, it's made my life a lot easier because it's a lot easier to see the number of parts, each part that I have to make, to have the right dimensions straight away and it's really made cutting and listing what type of parts and how many I have to make much easier.'

AL: 'So modelling allowed me to see if the overall shape I'd decided on and the measurements suited me and to change the measurements straight away (...) to get the look I wanted without having to change each part or redo a lot of drawings. So, once I had the look I wanted, I knew the size of my pieces straight away. (...) But on the other hand, you can't... I wanted to start with Coppole's idea, that's why I tried modelling, but I quickly realised that with the modeller, everything that forms a round lead, all that, wasn't possible. So, I stuck to squares and angles.'

ELM: 'Concerning the manufacture of a wooden mould by laser cutting: Well, you need wood, not steel (...) It's more expensive and less easy to get. [steel mould]'

Subcontracting the use of digital tools. - [SCD]

LV: 'Then I have to go to the Fab Lab tomorrow to ask Aurélie [the person in charge of the Fab Lab] how I could make my box, how I could model it.'

OR: 'Well, the hat (..) it's Aurélie who does it on the computer. (..) She can't do it for me right now, but I gave her all the measurements so she could do it for me on the computer and do the laser cutting.'

T cohort analysis

A pragmatic, mixed approach depending on requirements. - [MXU]

LF: 'I make drawings that we scan, vectorise and clean up with Aurélie. Then we [laser] cut them onto vinyl.'
'For the mountains, it's more artisanal, I'd say. I've finished cutting my glass now, and then I'll try my hand at powders and plants.'

'And I wanted to stick with something that reminded me more of nature to be a bit consistent in my project. So, I tried papier-mâché, but it didn't work. Then I thought about ceramics and all that, but it wasn't really right either. So now I've gone for wood. So, I'm in the process of checking with FabLab to do the laser cutting of the fake wooden leads for the whole door. So that's what we're doing. It's also a bit consistent with the raw wood because there's wood and glass.'

AT: 'I already have a thermoformed computer keyboard, I don't know if I'll make a mouse (.) if I have fun making other elements in VR, we'll see.'

[for making the gauges] 'If that's what it's about, in fact, I've got the original [the scale and 1/1 drawing] then I scanned it and printed it out in black and white to (..) adjust it if necessary'.

NC: 'And... (..) if there was a site where you could exchange ideas with peers, fellow glassmakers or expert glassmakers, would you find it interesting?'

JD: ‘Yes, I find it interesting. It's true that... We live in a time when computers and the whole digital environment are at the heart of everything. So, it would be a shame not to use it (...)’

A choice based on the pleasure of making, the relationship with the material. - [RTM]

LP: ‘In any case, no digital tools. But each time, I've thought about other ways of doing things. Or, as I said last time, talking to other people to get other ideas.’

NA: ‘For my part, I stuck to the traditional technique of creating a stained-glass window. So, I really started withdrawing, a sketch. And then, I don't know if you can call it modelling or not, but I did everything on paper, i.e. my layout, and the templates. So, I really stuck to paper. Apart from perhaps using AutoCAD at one point to work out the dimensions, but I didn't finish that.’

Complexity of digital tools - [CDT]

BL: ‘I've never been very comfortable with a computer anyway. And then, having worked a lot on... because I was at art college before, on software such as Photoshop or other things, Illustrator, (...) I'm a bit in... In other words, these are things that don't necessarily work for me. In any case, I can't get to grips with them. (...) You're blocked in this respect. Yes, it's not very instinctive for me (...) And I'm not patient about it. I'm patient in real life, but not with computer tools.’

MM: ‘I prefer the material. I tried to... I downloaded Inscape because I wanted to try and hijack my sun to start, well, putting it on my file. I spent hours. I can't do it. So really, I'm going to concentrate on the material. (...) But for the moment, no, I don't need to. (...)’

Opportunities and limitations of digital tools, interaction between the choice of tool and the project. - [OLD]

LF: ‘For the sanding part, at the beginning, I cut all the vinyl by hand with a scalpel (...) So for one sheet, it takes me about 4 hours of drawing (...) I have maybe 5 boards to cut, it would take me the same amount of time at least. So, by going through the vinyl laser cutting process, it's a lot quicker.

Subcontracting the use of digital tools. - [SCD]

LF: ‘Then there's the whole part where I give my drawings to Aurélie, which are hand-drawn (...) And she takes them over in Photoshop, so it's a huge amount of work for her.’

NC: ‘At the time you talked to me about a 3D printing mould, did you try it or not?’

JD: ‘Well, I did it with the software, so with LF who worked on it, the problem is that she didn't have her computer at the meeting this time, so we'll have to do it over the month... [next cluster] (...) I even think we're going to do it, what Aurélie told me, is that we could send it to her outside the cluster week so that when we arrive, she'll have done it. (...) I can't wait to see the result.’

In summary, three people out of five used digital tools (No-Craeft tool) to develop their project, in the TA cohort. And three people out of eleven in T Cohort.

The low score of people using digital tools could not be interpreted for us as a rejection of digital tools, but more as a pragmatic approach in the function of the different possible approaches to developing a project, in the function of the opportunity brought by the digital solutions (MXU theme). On the other hand, the personal project is an opportunity for apprentices to practise their trade

outside the constraints of their job and it is an opportunity to relate to the matter in a freeway (RTM theme).

The highlight of cluster 9 is a balance between the complexity of using digital tools and subcontracting (CDT and SCD themes). If an apprentice needs to use a digital tool, the process is often, 1 - 'I try to be myself', 2 - 'if it is too complicated or I need to learn a tool or if it is unpleasant, I subcontract.'

1.3.4.4 - Analysis and summary - cluster N°9

E-learning

The quality of the courses and materials is generally appreciated, particularly if the documents provide a plus compared to ‘paper courses’, video + questions, animated diagrams, and platform/classroom interaction.

The strong expectation, rather than criticism, is that the site navigation should be optimised and that new content should be provided, including content that can evolve. For example, not always having the same quiz.

VR studio

The apprentices thoroughly tested the workshop simulation.

They were most interested in the workshop tour section, even though the precision of the tool pointing and the way the information is displayed still need to be improved.

As far as the know-how section, the picking, which provided a practical virtual exercise, was much appreciated.

Instinctively, apprentices who are already familiar with glass tend to want to interact with the other tools (bench, blocks, jacks, etc.) after they've picked the glass.

A process approach, detailing the steps involved in making a piece is welcomed but needs to be experimented with in more detail. The question of the level of guidance in the scenario also needs to be refined.

Project follow-up

Project follow-ups are mainly carried out to assess the digital ‘appetence’ of apprentices, whether with Craeft or non-Craeft digital tools.

As was the case for group No. 8, this shows a pragmatic approach to digital tools usage, even if it means using them via subcontracting.

A strong attachment to the relationship with the material, which is neither a rejection nor a lack of knowledge of digital tools, but a professional life choice.

1.3.5 - Conclusion of the glassblowing experiment

Experimentation with the 1 education and training pilot for glassblowing has enabled Craeft's digital tools to be tested in learning situations.

It opens up a promising pathway for the final version, notably by working on greater interaction and synergy between digital and situational learning. To be fully effective, digital tools must not be used in isolation, without any link to workshop learning.

This is what we're thinking about for the rest of the experiment, and the implementation of mixed educational methods using digital tools directly linked to the workshop experience.

Measuring the impact of digital tools, particularly in terms of successful completion of the apprenticeship and at CPC exam, will only be possible at the end of the current school year, i.e. in June 2025.

One positive point to note is that the adoption of digital tools by apprentice craftsmen is good, provided the tool brings them added value. The central issue is not the adoption of digital tools by craftsmen, but the relevance of digital tools, co-developed with them in their professional practice.

Finally, the apprentices' knowledge and use of digital tools is very mature, depending on the usefulness of the tool in question. There doesn't seem to be any technological fascination with the tool per se; the hammer and VR simulation are available in a toolbox, with reasoned use depending on the objectives.

It's worth noting that the apprentices all have a strong attachment to their relationship with the material and their physical involvement in the workshop. Digital tools are accepted as long as they are not seen as a displacement of this relationship with the material but as a means of reinforcing the workshop experience.

2 RCI 2 - Limoges Porcelain - Design Workshop

Figure 22. Ghost Gestures Workshop, Ceramic Studio, ENSAD Limoges.

2.1 Context

The RCI Porcelain Limoges Design Workshop was developed in close collaboration with professional designers and teachers from the Limoges School of Fine Arts and Design (ENSAD Limoges) and took place from 5 to 8 November 2024. The workshop was conceived and coordinated by designers based on their shared interest in the gestural dimension of know-how as a tool for transmission and exploration in the field of design. Based on the concept of 'ghost gesture' inspired by motion capture, the designers were asked to work with a series of digital tools that were specially produced by FORTH according to these requirements and interests. Focusing on a very specific sequence of the traditional porcelain production process, the plaster turning, a series of experimental models were developed to represent these gestures through different media: 3D avatar, hand tracking and skeleton-based view. The four-day workshop involved a group of first- and second-year students from the design and art sections and allowed them to explore this set of experimental digital tools. The workshop focused on the exploration of gestures and postures through the use of ceramic-related tools, integrating digital and physical methods. Starting with the observation of videos, participants analysed, reproduced and memorised gestures, which they then applied to materials such as clay and plaster. This hands-on experimentation was complemented by detailed analysis sessions of fabrication movements, which were put in dialogue with other everyday gestural repertoires to explore their different applications in creative processes. Collaborating designers Anne Xiradakis and Jessie Derogy tested some of these tools and developed recommendations for their improvement for wider application.

2.2 Goal

Starting from the overarching aim of testing digital tools within porcelain studio practice to gather feedback and recommendations from designers and design students, the workshop focused on three specific objectives:

- Visualising gestural dimension of porcelain-based know-how: By depicting porcelain-making techniques with a focus on gestures rather than on the representation of materials or tools, the emphasis was placed on understanding and improving the physical techniques involved in porcelain-making, ensuring that participants could visualise and accurately reproduce key gestures.
- Enhancing postural transmission for teaching: The workshop explored methods to effectively convey posture and movement techniques, crucial for teaching and mastering porcelain production processes.
- Innovating porcelain design: Participants were encouraged to experiment and develop new approaches to porcelain design, using digital technologies as a means for fostering creativity and extending the boundaries of traditional practices.

2.3 Methodology

A crucial aspect of the methodological approach lies in being aware of the needs and interests of designers in their practice which requires actively listening to their challenges and opportunities, especially as their practice develops at the intersection of digital and traditional techniques. The aim is to co-imagine and co-create strategies and devices that enable them to make use of digital technologies to improve accuracy, efficiency and innovation, while remaining deeply connected to the material and cultural roots of the tradition of their crafts. This collaborative perspective gives a central place to the ideas, experiences and insights of designers, to develop tools that are meaningful and functional concerning their creative, practical and technical needs.

2.4 Timeline

Phases of the workshop process:

1. Workshop preparation (May -June 2024)
    a. Conducted conversations with designers to understand their needs and interests, establishing a foundation for the workshop's focus.
2. Co-construction and development (July – November 2024)
    a. Collaborated with partners (FORTH) to develop an initial set of digital tools tailored to the designers' requirements.
    b. Worked closely with designers to co-construct the workshop framework and pedagogical approach.
3. Workshop implementation (5-8 November 2024)
    a. Four-day workshop within the frame of the Ceramic Studio of ENSAD Limoges, experimenting with the designed tools and methodologies.
4. Evaluation (December 2024-January 2025)
    a. Assessed the outcomes of the workshop, analysing participant feedback and the effectiveness of the implemented tools.
5. Future Development (From February – December 2025)

a. Planning of potential extensions and improvements to expand the initiative further based on insights gained during evaluation and conversations with the designers.

2.5 Results and Recommendations on digital tools

An evaluation was carried out after the practical phase of the workshop using a questionnaire which was distributed to the participating students. Of the nine students, only three have answered this questionnaire. The completed questionnaires correspond to the same working group that developed the pedagogical proposal focusing on the skeleton-based gestural representation of the practitioner. From the information collected through these questionnaires, the following results were obtained:

While the structured progression of the workshop provided clarity and focus, the extended time spent on analysis occasionally hindered the flow, with participants expressing a preference for more direct experimentation with materials. The use of digital tools, such as the 3D plaster wheel simulator, introduced innovative possibilities for visualising and refining forms but revealed limitations in intuitiveness and immersion. Suggestions for improvement included enhancing the digital interface and incorporating tools like connected gloves to deepen the sensory experience. Despite these challenges, the workshop proved highly instructive. It allowed participants to develop new technical and analytical skills, particularly in gesture analysis and material manipulation, while fostering creativity through unconventional tools. The exploration of clay and plaster provided a rich platform for discovery, leaving participants eager to integrate these insights into future projects.

As a complement to this evaluation, a series of discussions were held with each of the three working groups to take stock of the approach and organisation of the workshop, and the potentials and limitations of the proposed digital tools. In the context of these exchanges, some participants expressed the interest that the development of digital tools via a video documentation archiving platform could have in the context of their training at school. The students considered that this type of video platform could be an interesting didactic device, as it allows remote consultation, which could be a relevant complement to the presence of the teachers and technicians of the workshop.

2.6 Conclusions

RCI's Limoges Porcelain Design Workshop at ENSAD offered the opportunity to explore and refine the dialogue between traditional porcelain techniques and digital tools, focusing on gestures, to foster creativity and enhance the students' learning experience. The workshop successfully engaged participants in gesture analysis and material manipulation. The evaluation phase showed that some aspects of the design of the pedagogical device can be improved, e.g. by better adjusting the balance between analytical phases and practical experimentation to streamline the process and improve the overall fluency. In addition, optimising digital tools, such as improving interfaces and incorporating more immersive tools, would increase the effectiveness and sensory experience of the workshop. The workshop's emphasis on linking traditional practices with contemporary design highlighted its potential to evolve into a more experiential and personalised learning environment. The introduction of video documentation and archiving platforms for distance learning could further contribute to lifelong learning and provide more lasting pedagogical value. The workshop provided an in-depth exploration of gestures, materials and digital tools, offering participants an enriching learning opportunity and demonstrating the potential of digital tools to push the boundaries of porcelain-oriented design, blending heritage and innovation for future creative practices.

3 RCI 4 Marble carving & RCI 6 Silversmithing

3.1 Plan for Marble Carving and Silversmithing

3.1.1 Goal

Informal training through the e-Learning platform

3.1.2 Hypothesis

Do the interactive videos offer more information than the traditional ones shown in the museum exhibition?

3.1.3 Participants

1 school class divided into two groups; one test group, and one control group. Preferably from Junior High School (12+ age).

3.1.4 Digital material

Videos focusing on techniques that are presented in the museum in an interactive format through the e-learning platform.

3.1.5 Timeline

One experiment per RCI before January 2025. Two more experiments per RCI from March 2025 until January 2026.

3.1.6 Methodology

1. Preparation and Planning (October - November)
2. Experiment (November - December)
    a. Initial knowledge quiz to all students
    b. Standard museum tour for schools
    c. Separate class in two groups
    d. Give tablets with interactive video to test group + Satisfaction questionnaire, Quiz?
    e. Knowledge acquisition quiz to all students
    f. Group discussion
3. Analysis (December)
4. Report (December - January)

Complementary information:

3.1.6.1 Quizzes

- Place techniques in order
- Match tools to techniques

Initial knowledge: Text

Knowledge acquisition: Image

3.1.6.2 Satisfaction questionnaires

- User Experience Questionnaire: standard, we can choose related aspects → quantitative
- Open-ended questions → qualitative

3.2 Report on Educational Experiments

3.2.1 Introduction

This report covers the educational activities that PIOP conducted as part of Work Package 6, Pilot 1 – Education & Training. It consists of four sections containing information about the methodological plan developed with CERFAV's collaboration (pilot leader), the results of each RCI case, and a general reflection. Visual information accompanies the text through photographs taken during the experiments and figures showcasing quantitative results.

PIOP is a cultural institution and thus we decided to focus the educational experiment on informal learning through educational museum activities. Concerning digital aids developed by CRAEFT that could be employed for the experiment, we created interactive videos for the e-learning platform. We used videos or parts of videos that are shown in the museum exhibitions to create interactive videos with the free online software Lumi. The interactive videos included questions about the technique displayed in the video. Our main experiment hypothesis is to see if the interactive videos offer more information than those traditionally shown in the exhibitions.

It was agreed with CERFAV to target pupils from Junior High School. Technically, the interactive videos are available online on CRAEFT's e-learning platform. For the experiment, we used six tablets that were available by PIOP. Timely, so far, one experiment per RCI has been conducted, while two more per RCI will be planned from March to December 2025. A second version of this report is planned for January 2026.

3.2.2 Methodology

According to CERFAV's educational methodological plan, a group of participants is separated in two to form a control and a test group. The test group receives the digital aid developed by CRAEFT, and the control group performs the educational program with the traditional means.

We developed quizzes to measure if supplementary knowledge was obtained through the digital aids or not. The quizzes aim to learn, first, about the initial knowledge of the participants on the represented techniques, and second, about their knowledge acquisition after the overall experiment. The content of the quizzes was inspired by educational material that PIOP's Museums Department

prepared as part of their educational activities for children and families. The developed quizzes for the experiment follow the same logic and contain two parts. Part A indicates the processes of a technique and asks the participant to place them in order. Part B consists of a table indicating processes in one column and tools in the other. The participant is asked to match the tools with the appropriate processes. The difference between the quizzes is that the Initial Knowledge quiz is in a text format and the Knowledge Acquisition quiz uses visual information, that is, snapshots of the videos or pictures from the museum's archive. The score of the quizzes was defined as a total of 10 points, with each part rating five.

A satisfaction questionnaire was also used to evaluate the interactive video. We used the standardised survey and analysis tool of the User Experience Questionnaire (UEQ)[1] And completed it with two open-ended questions at the end, asking "What did you like most" and "What did you like less". We have previously used this approach in the Horizon project Mingei.[2].

The experiment is divided into three phases. Phase one concerns the initial knowledge of the participants and the traditional educational plan of the museum. First, all the participants complete the Initial Knowledge quiz. After, a museum professional conducts a standard guided tour for schools. In phase two, the participants are separated into two groups. The control group is engaged by the museum professional. The test group receives the tablets and goes through the interactive video. When they finish, they complete the satisfaction questionnaire. In the last and third phases, the participants come together again, and all complete the Knowledge Acquisition quiz. A group discussion takes place at the end to receive feedback on the overall experience.

3.2.3 Silversmithing Museum, Ioannina

3.2.3.1 Experiment and Observations

The experiment took place on Friday 22 November 2024. The participants were 10 pupils (three girls and seven boys) accompanied by two professors. We welcomed them at the museum's outdoor café and offered them some cookies and coffee for the professors. We briefly introduced the project and began by sharing the first quiz of the experiment to measure their initial knowledge. Some had trouble understanding the first part of the quiz where it is asked to write the numbers of the processes in the correct order because the numbers were already in order. Others also had questions about the meaning of some words in the quiz's Part B. The professors and I helped them clarify things.

After the quiz, a museum professional guided the group in the museum. Some more active pupils were constantly drawn by screens and QR codes. The videos drew everyone's attention. It was observed that, during the guided tour, they would watch the video from the part played when they arrived at the spot and not wait to watch it from the beginning. For instance, when the group was in front of the filigree technique, which was part of the quizzes, they did not spend much time because the video was finished. On the contrary, at the first exhibited technique, sand casting, the video was at its beginning. The group watched it and then spent more time looking at the tools.

[1] https://www.ueq-online.org/, accessed 29 November 2024.
[2] For more information, see *Deliverable 6.5 – Report on Mingei pilots*, released in 2022.

Figure 23. The participants in the area showcased the sand-casting technique.

Before arriving at the area of the experiment, I had a preoccupation with who would volunteer to be part of the test group because there was a group of five boys, some of whom were active. I worried that they would volunteer together and work might not be done. I consulted one of the professors and he agreed that it might be better to separate them, if possible. He proposed to ask the girls to participate and then randomly decide on three boys to have a gender balance. He took over the procedure and defined the test group.

The groups were separated into two areas of the museum. The control group was preoccupied with interactive games in the computer area. The test group watched the interactive videos on the tablets. Some pupils compared their scores during the experiment. After the video, they filled out the satisfaction survey. Almost all of them had trouble with the vocabulary and we had to explain some words. This also occurred in Chios when we conducted research with pupils of the same age for the Mingei project in 2019. Nevertheless, the survey cannot be changed because it is standardised.

Figure 24. The control (left) and test (right) groups (silversmithing).

When the experiment finished, we invited the control group to join us and shared the Knowledge Acquisition quiz. When everyone finished, we discussed their experience. I asked the test group to describe to the control group what they did. Most were shy or described it minimally, i.e. “We watched a video and filled out a questionnaire”. After the professors' encouragement, one spoke a bit more. Generally, they said they liked it and would recommend it to others. Furthermore, they were not tired by the quizzes and questionnaires.

3.2.3.2 Quizzes results

The number of each group’s participants was uneven. The control group consisted of four people and the test group of six, which can be expected to show higher results. Analysing the quizzes, overall, the pupils acquired more knowledge through this experience (Figure 25).

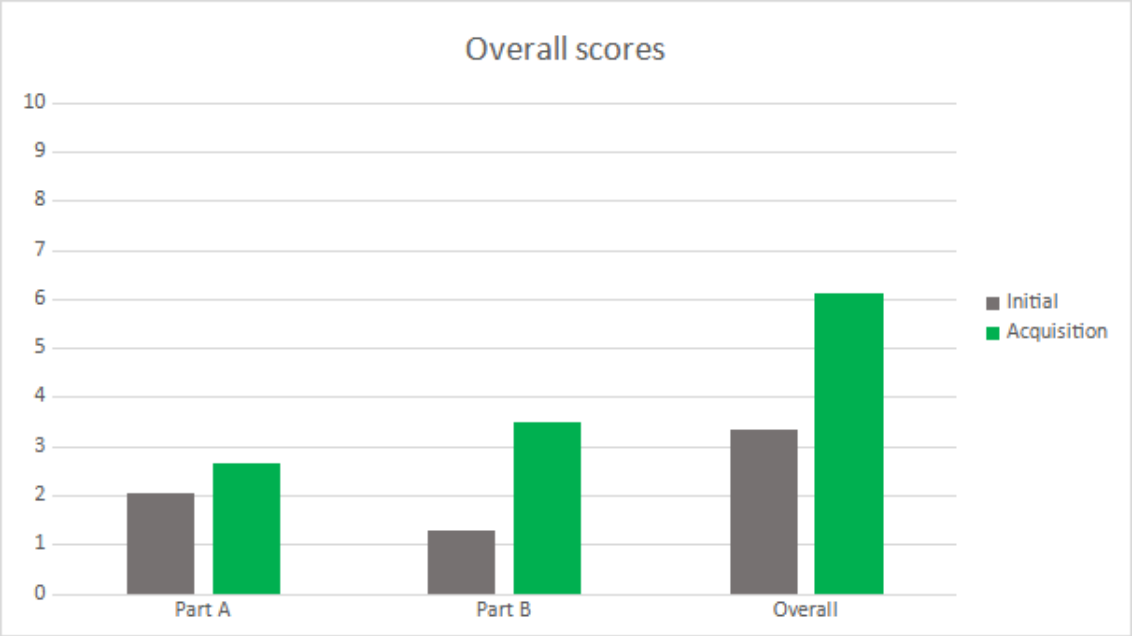


Figure 25. Overall scores of the experiment (silversmithing)

Looking closer at the results of the Knowledge Acquisition quiz and comparing the performance of the control and test groups (Figure 26), it can be seen that the control group had better scores than the test group.

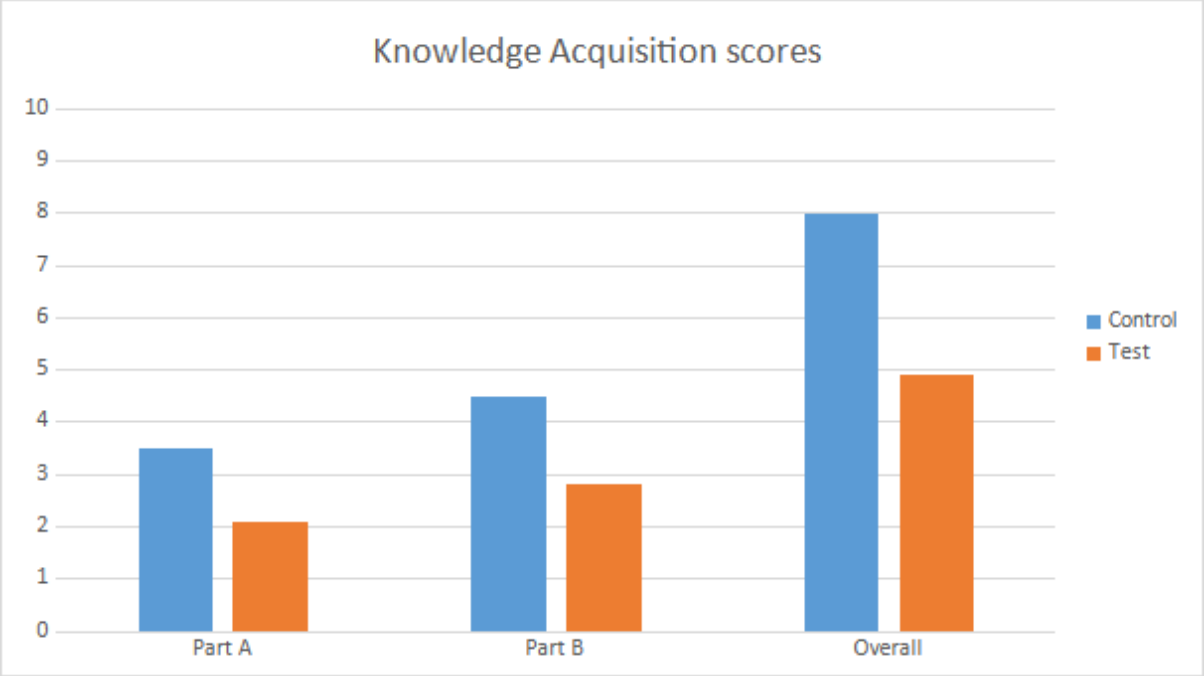


Figure 26. Knowledge Acquisition scores of the experiment (silversmithing).

Figure 27 and Figure 28 Make further comparisons between the Initial and Acquisition scores of the control and test groups, accordingly.

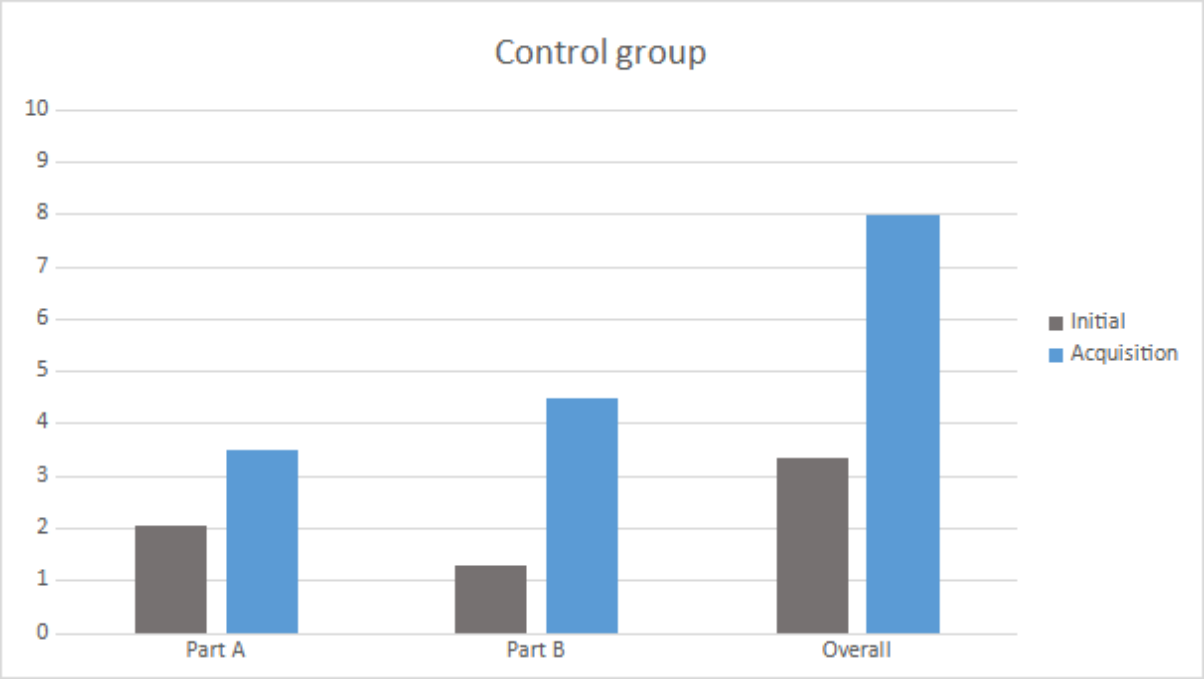


Figure 27. Initial and Knowledge Acquisition scores of the control group (silversmithing).

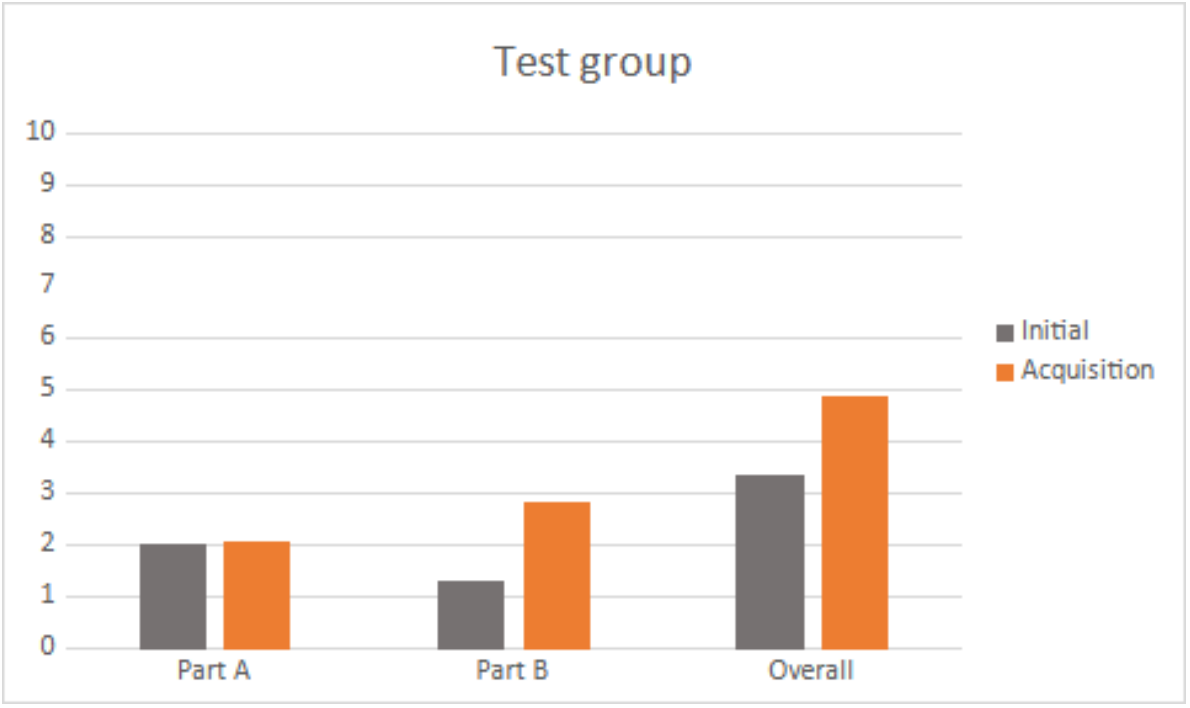


Figure 28. Initial and Knowledge Acquisition scores of the test group (silversmithing).

In conclusion, it can be said that, for now, it is difficult to interpret the data because (a) the selection of participants for the test group can be considered biased since there was an informed way of thinking and selecting the pupils, and (b) the number of participants, and thus of data, is very low.

3.2.3.3 Satisfaction Questionnaire Results

It should be noted that there was a participant in the test group who gave suspicious answers, that is, she or he answered randomly or copied. This was included in the results because the number of participants was low. It is noted here for future reference.

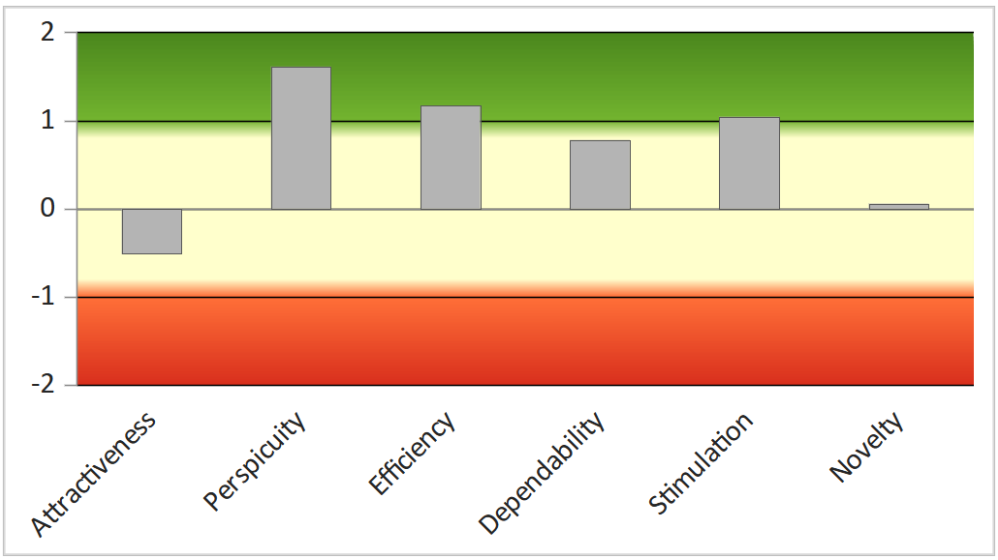


Figure 29. UEQ results (silversmithing).

Figure 29 Shows an overall assessment of the questions regarding attractiveness, perspicuity, efficiency, dependability, stimulation, and novelty. Attractiveness, novelty, and dependability represent a neutral position. Perspicuity, efficiency, and stimulation represent a positive position. In other words, the participants found that the interactive video was easy to understand and practical to conduct, and offered them more information.

Figure 30 Groups the above-mentioned scales into pragmatic (Perspicuity, Efficiency, Dependability) and hedonic (Stimulation, Novelty) quality. Pragmatic quality refers to task-related aspects and hedonic to non-task-related aspects.

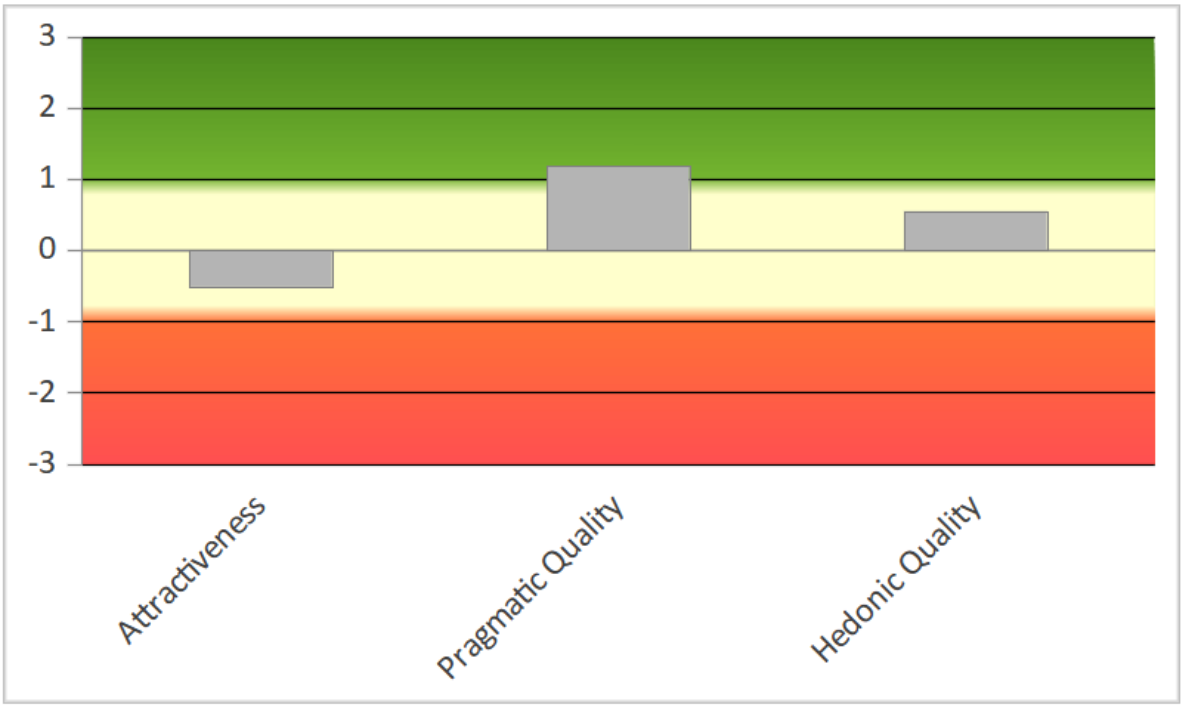


Figure 30. UEQ results grouping (silversmithing).

In the qualitative questions, the participants seem to have greatly enjoyed how the silver rod is created. Nobody reported any negative issues with the video. In conclusion, it can be said that the educational interactive video was easy, practical, and informative but the way the information was offered did not present something that the participants had not seen or experienced before. As mentioned in the previous section, at the moment, this can only be a quick interpretation because of the low amount of data.

3.2.4 Museum of Marble Crafts, Tinos

3.2.4.1 Experiment and Observations

The experiment took place on Wednesday 18 December 2024. The participants were 18 pupils (eight girls and 10 boys) accompanied by two professors. We welcomed them at the multi-purpose hall of the museum to briefly introduce the project. Afterwards, we shared the first quiz of the experiment to measure their initial knowledge. Some had trouble understanding the first part of the quiz where it is asked to write the numbers of the processes in the correct order because the numbers were already in order. We helped them clarify things.

After the quiz, a museum professional guided the group in the museum. It was observed that they spent more time in the first stop related to the quarry techniques. Generally, the pupils did not pay attention to the videos of the museum exhibition because the museum professionals drew their attention through an animated tour. In the end, we asked for volunteers for the second part of the experiment with the tablets. A test group of seven pupils (two girls and five boys) was formed. PIOP's CRAEFT team and the test group returned to the multi-purpose hall. The rest of the pupils stayed at the museum premises with the museum professionals.

During the experiment, it was observed that the participants were talking a lot to each other while watching the video and answering the questions. After the video, they filled out the satisfaction survey. As in the case of Ioannina, some had trouble with the vocabulary and we had to explain some words. Due to hunger and the rush of the students to leave, we did not perform a group discussion.

Figure 31. Participants of the test group (marble carving).

3.2.4.2 Quizzes results

The number of each group's participants was uneven. The control group was comprised of 11 people, and the test group of seven. It can be expected that the control group provides higher results because of the participants' number.

Analysing the quizzes, overall, the pupils seem to have acquired more knowledge regarding the tools used in each technique, which was the topic of the quiz's Part B. Part A shows a difference of more than one point between the initial and knowledge acquisition quizzes. Nevertheless, both are below average. Figure 32 Illustrates the overall scores in detail.

Looking closer at the results of the Knowledge Acquisition quiz and comparing the performance of the control and test groups Figure 33, it can be seen that, overall, both groups had similar scores.

Figure 34 and Figure 35 Make further comparisons between the Initial and Acquisition scores of the control and test groups, accordingly.

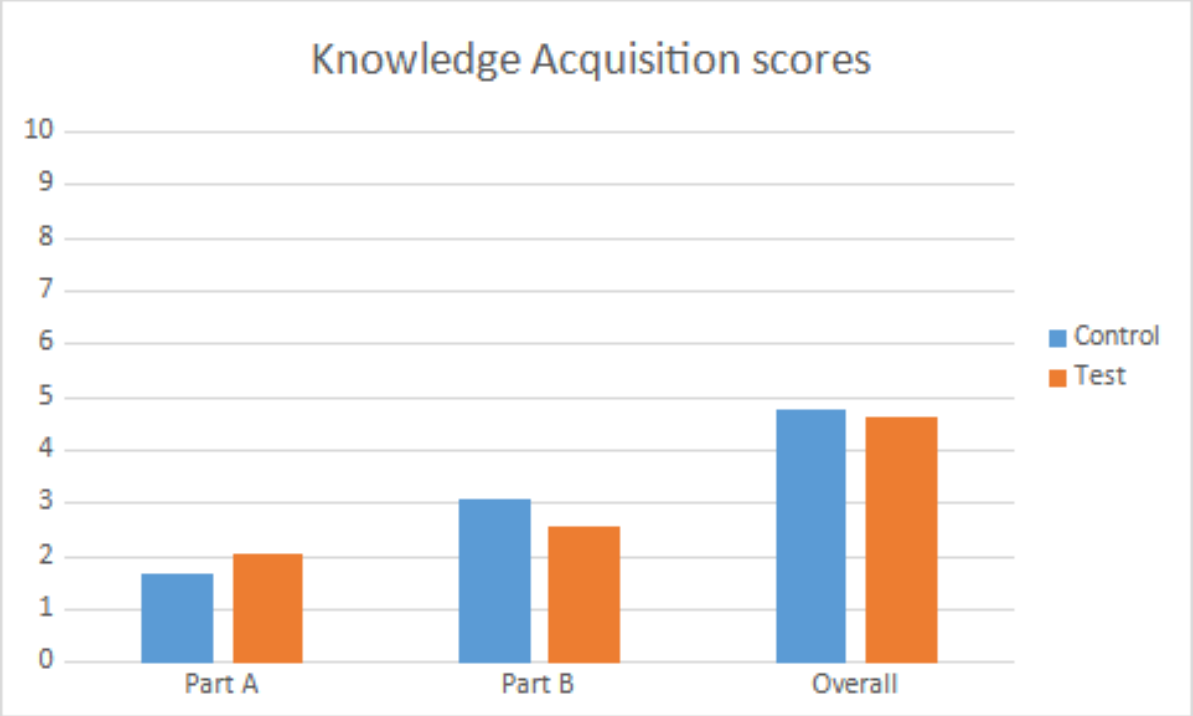


Figure 32. Knowledge Acquisition scores of the experiment (marble carving).

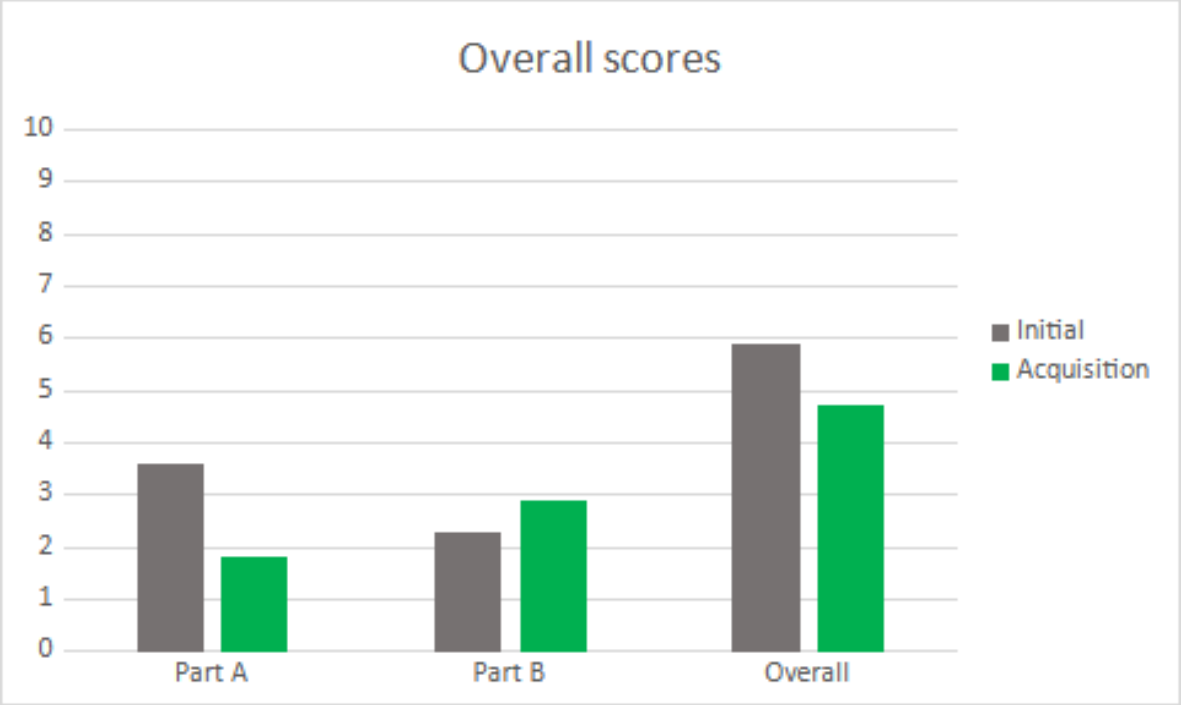


Figure 33. Initial and Knowledge Acquisition scores of the control group (marble carving).

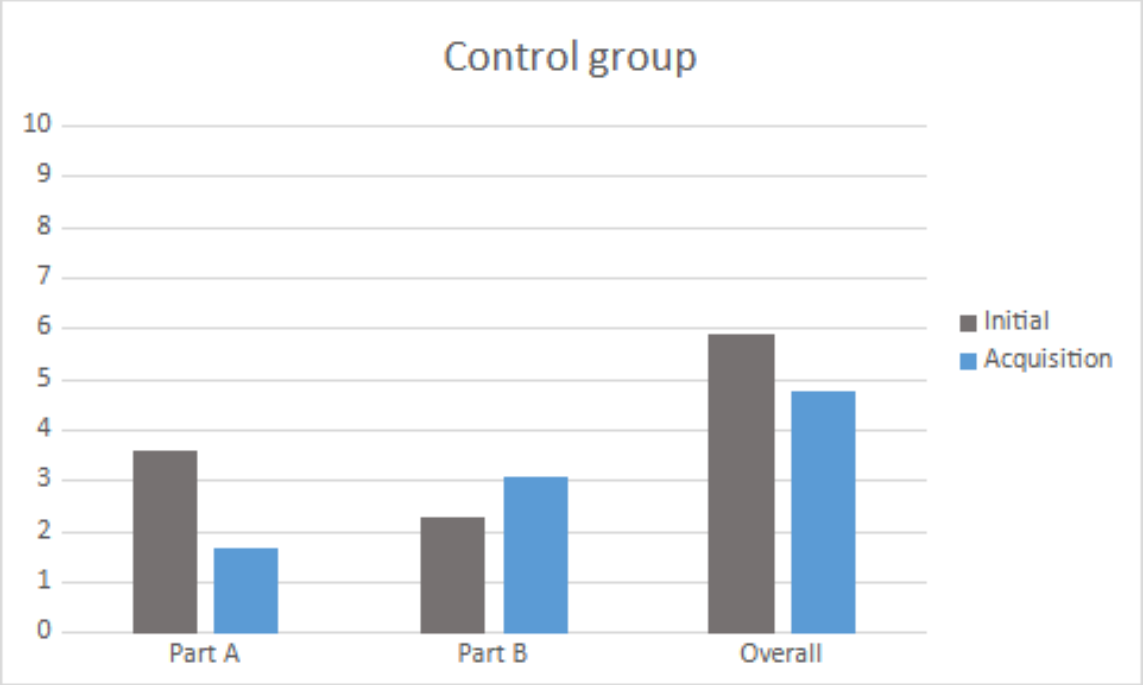


Figure 34. Initial and Knowledge Acquisition scores of the test group (marble carving).

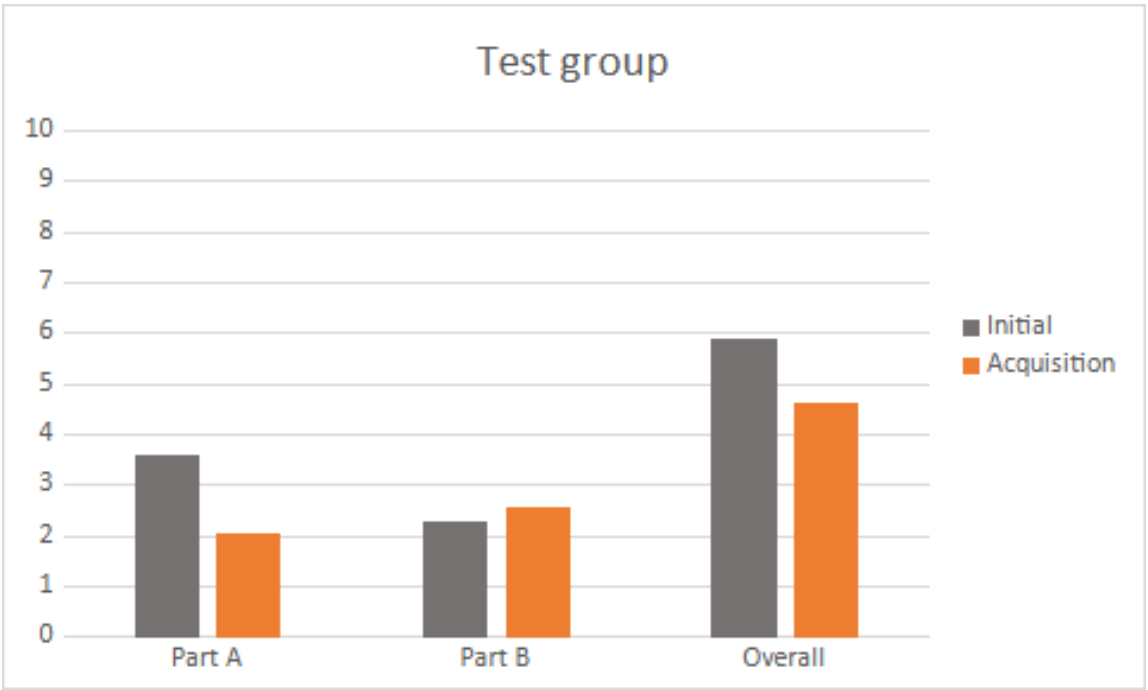


Figure 35. Shows an overall assessment of the questions regarding attractiveness, perspicuity, efficiency, dependability, stimulation, and novelty. Attractiveness, novelty, and stimulation represent a neutral position.

In conclusion, it can be noted for future investigation the increase of understanding which tools are used in each process step, and the general higher ranking of initial knowledge. For now, it is difficult to interpret the data more sufficiently because the number of participants, and thus of data, is low.

3.2.4.3 Satisfaction Questionnaire Results

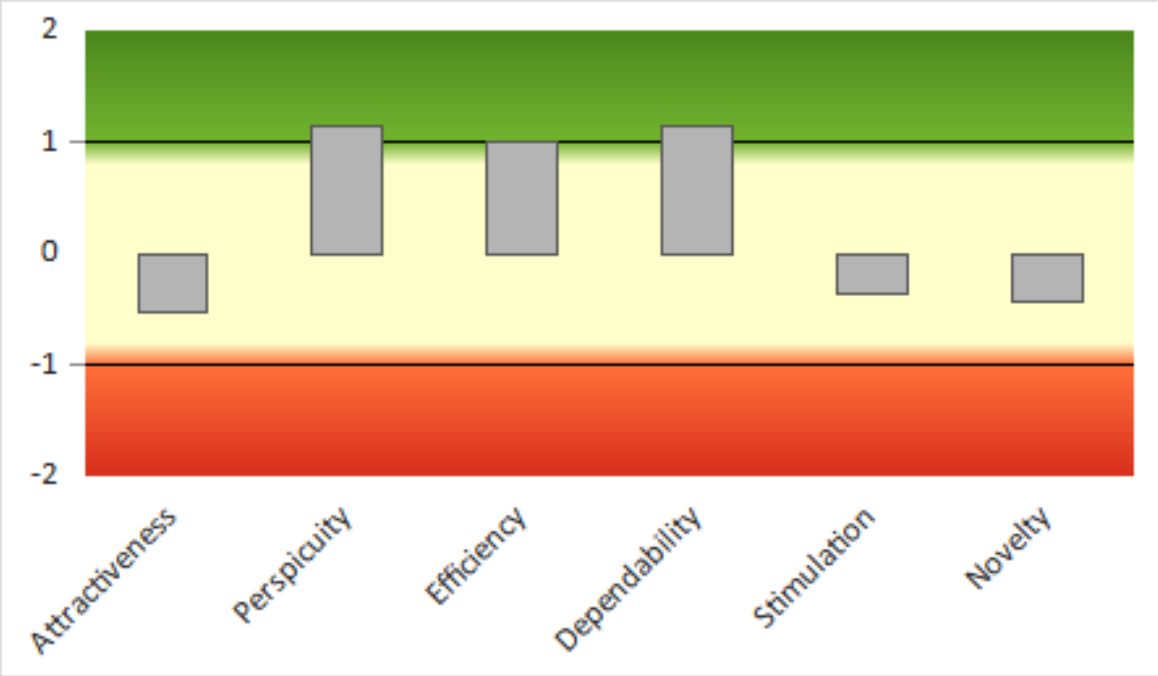


Figure 36. UEQ results (marble carving).

Figure 36 Groups the above-mentioned scales into pragmatic (Perspicuity, Efficiency, Dependability) and hedonic (Stimulation, Novelty) quality. Pragmatic quality refers to task-related aspects and hedonic to non-task-related aspects.

In the qualitative questions, the participants mentioned that they enjoyed the video because it was something they did not use often. They remarked on the craftsman and how he used the tools. Some of them found the sound pleasing but others were annoyed by it. A participant noted that the video was confusing while another wrote it had a short duration.

In conclusion, it can be said that the educational interactive video was easy to use and practical but the way the information was offered did not present something that the participants had not seen or experienced before. As mentioned in the previous section, at this moment, this can only be a quick interpretation because of the low amount of data.

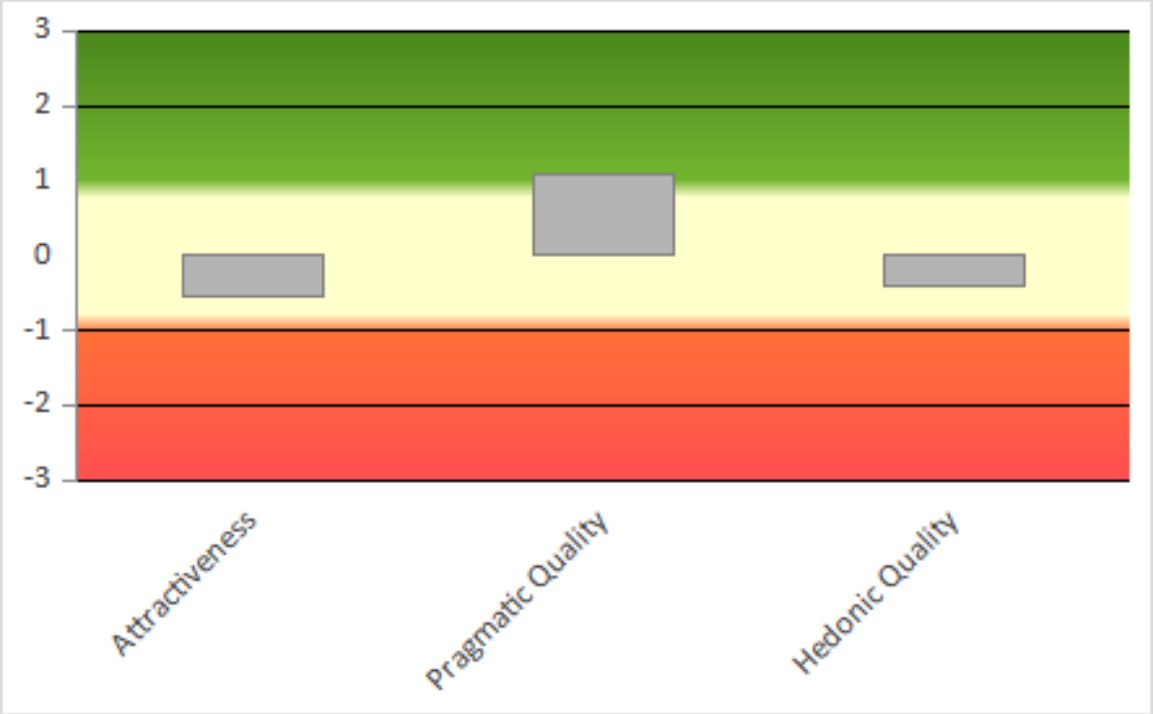


Figure 37. UEQ results grouping (marble carving).

3.2.5 General reflection

Reflecting on the overall methodological plan, in Ioannina everything went according to the plan and was not tiring for any of the participants (organisers, museum professionals, professors, and pupils). In Tinos, the participants got tired, and we had to skip the last group discussion. It can be suggested that offering a treat before the experiment would keep the participants more active. Regarding the first results of the experiments, no general conclusions can be made because of the low amount of data. Nevertheless, several concerns arose that will be further addressed with CERFAV before the next experiments. Below is a list of them:

1. Participants' age and quiz content: Are the pupils too young to understand or focus on specific techniques, or are the content of the quizzes too specialised to answer?
2. Quiz design: Reformulate the Parts.
3. Quizzes formats: Do the differences between initial and knowledge acquisition quizzes occur because of the difference in format, i.e. text and visuals? Can it be that visuals used in marble carving are more confusing because the processes look alike?
4. Group's number of participants: Would it be better to try having an even number of participants in the control and test groups to avoid results discrepancies due to this fact?
5. Guided tours by museum professionals: It was observed that each has its style and decides to include or exclude visual aspects of the exhibition during the guided tours. This might be due to three facts. First, the architecture of the museum areas is different. While in Ioannina the exhibition follows a specific trail, in Tinos, the area is wider. For example, the areas dedicated to techniques are large spaces, including tools, materials, and a video on the back wall (see Figure 38. The area is restricted to visitors while there are chairs far in front of the video to sit and watch.

Figure 38. Marble craftsmanship museum area.

During the Tinos experiment, the museum professional gave a more animated tour explaining how the tools work. He grasped the pupils' attention but did not use the videos. In Ioannina, the videos were displayed near the visitor and were used as an aid during the experiment's guided tour. It should be remembered that the guided tour is the one normally performed by museum professionals for schools and was not altered for the needs of the experiment. This reflection aims to point out the role visual aids play in the museum exhibition, and in our experiment's case, how and if they play a role in acquiring more information about techniques.

Notes:

1. https://www.ueq-online.org/, accessed 29 November 2024.
2. For more information, see Deliverable 6.5 – Report on Mingei pilots, released in 2022.

4 RCI 5 Woodcarving

Plan for woodcarving

4.1 Goal

Launch an e-learning platform as supportive material for in-person training.

4.2 Hypothesis

What interactive videos and digital training resources facilitate knowledge acquisition and future practice after in-person training

4.3 Participants

professionals from companies, and VET trainers on woodworking with low skills and knowledge of woodcarving.

4.4 Digital material

Videos and explanations focusing on initial techniques of woodcarving in an interactive format through the e-learning platform.

4.5 Timeline

	Jan	Feb	March	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Education												
1.Preparation and Planning												
2.Experiment												
- Face-to-face classes for both groups												
- Platform for group B												
- Test to both groups												
3.Analysis												
4.Report												
5.Improvments and changes												

Figure 39. Woodcarving timeline experiment.

4.6 Methodology

1. Preparation and Planning (November – February) – 2024 / 2025
2. Experiment (March-May) - 2025
    a. Initial knowledge quiz to all participants
    b. In-person practical classes in one/two days to introduce them to woodcarving practices
    c. Separate participants in two groups
        i. Group A. E-learning platform. This group will have access to the e-learning platform with all available resources for one month.
        ii. Group B. This group will only participate in the in-person training.
    d. After one month of in-person practical classes:
        i. Knowledge acquisition quiz for all students
        ii. Questionnaire to group A to evaluate the e-learning platform as a supportive training tool.
3. Analysis (June) - 2025
4. Report (June – July) – 2025

4.6.1 Questionnaires & Quizzes

- Initial knowledge: Text (for all on e-learning platform or traditional way with paper?)
- Knowledge acquisition: Image, text, and quiz: place techniques in order
- Questionnaire to group A: user experience and satisfaction questionnaire quantitative and qualitative
- Knowledge acquisition quiz for all students (for all on an e-learning platform or traditional way with paper)

4.6.2 Index of training materials in the e-learning platform

1. 1. Contextual information
    a. Introduction to woodcarving
    b. Woodcarving in Yecla
2. Woodcarving. Workshop, tools and materials
    a. The workshop. Tools and equipment
        i. Electrical tools
        ii. Manual tools
        iii. Bench tools
    b. Woods used in woodcarving
3. Workshop considerations
    a. Tools sharpening
    b. Safety considerations
4. Woodcarving. Process and handling tools
    a. Design and drawing
    b. Roughing
    c. Finishing
5. Exercises

a. Exercise 1.
b. Exercise 2.
c. Exercise 3.
d. Exercise 4.

5 RCI 7 E-learning Platform for Aubusson Tapestry

5.1 Context

Aubusson tapestry training relies on in-person, workshop-based apprenticeship, where aspiring weavers learn directly from master artisans. While this approach ensures the authenticity and precision of the craft, it also limits who can access these specialised skills—only a few students at a time can benefit from expert guidance.

By developing an e-learning platform specifically tailored to Aubusson tapestry, we respond to these challenges. Structuring the training content allows enthusiastic learners, whether hobbyists or seasoned designers, to explore and master the craft. At the same time, interactive modules, detailed visuals, and bilingual glossaries capture the intricate, gesture-based know-how that characterises Aubusson weaving. This approach complements traditional apprenticeship by providing a flexible, scalable learning environment where learners of different skill levels, schedules, and backgrounds can engage with the tapestry tradition.

5.2 Goal

The primary objective is to design, develop, and implement a dynamic e-learning platform that achieves the following:

1. **Preserve Heritage:** Digitally document and archive traditional Aubusson tapestry techniques, terminology, and historical context, safeguarding knowledge for future generations.
2. **Expand Accessibility:** Provide high-quality training modules that can be accessed globally, overcoming regional constraints and enabling remote learning.

5.3 Timeline

- Phase 1: Needs Analysis & Content Collection
  - Conduct interviews with trainers.
  - Gather existing class documentation, including written materials of weaving demonstrations.
- Phase 2: Platform Design & Module Creation
  - Translate and adapt the apprentice's tapestry documentation into e-learning content

5.4 Methodology

- **Collaborative Content Development:** A tapestry apprentice's documentation forms the foundation of the course, supplemented by expert input from master weavers and historical

records. All content is carefully translated, with specialised French terms retained where appropriate and explained via a bilingual glossary.

- **Modular Curriculum Design:** The curriculum is divided into cohesive modules—covering historical context, theoretical concepts, loom set-up, practical techniques, and advanced weaving methods—allowing learners to either progress linearly or select specific topics on demand.
- **Multimedia Integration:** Photographs, diagrams and infographics enrich the learning experience.

5.5 Results

1. **Enhanced Preservation:** By digitising and organising centuries-old weaving knowledge, the Tapestry e-learning guarantees that the Aubusson tapestry tradition remains accessible to future generations, even if local transmission decreases.
2. **Global Reach:** Learners from different regions and backgrounds can now explore Aubusson tapestry, leading to new collaborations, cross-disciplinary projects, and cultural exchanges.

5.6 Description of the e-learning Platform for Aubusson Tapestry Training

We have made significant progress in translating and enhancing training materials for the Aubusson tapestry craft. These efforts ensure that the extensive know-how and cultural heritage tied to Aubusson tapestry-making can be transmitted globally, supporting both preservation and innovation. By transforming the apprentice's in-depth documentation into comprehensive, interactive modules, we aim to deliver a robust e-learning experience for learners of all backgrounds.

5.6.1 A Holistic Approach to Tapestry Training

Theoretical Foundations

Historical and Cultural Context: The documentation provides a detailed historical overview of Aubusson tapestry as an Intangible Cultural Heritage. It situates the evolution of the craft within its broader cultural and economic contexts, illustrating how tapestry-making has adapted to changing artistic styles and market demands.

Technical Concepts: Core theoretical modules introduce learners to low-warp tapestry, highlighting why Aubusson developed this specific weaving style and how it differs from other traditions (e.g., haute-laisse). By understanding the structural specificities of low-warp looms, learners gain a framework for the subsequent practical lessons.

Practical Techniques

Preparation Steps: The apprentice's documentation lays out every stage preceding the actual weaving process, including:

- Ourdissage (Warp Preparation): Setting precise tensions and counts.
- Heddles Setup: Ensuring the correct passage of warp threads to facilitate efficient weaving.

- Carton (Design Template) Setup: Positioning the design against the warp for accurate translation into the tapestry.

Weaving Techniques: Detailed explanations cover a variety of stitches and methods:

- Perfilage: Creating outlines for motifs.
- Liure: Binding the weft for uniform tapestry surfaces.
- Circle, Curve, and Oblique Weaving: Techniques characteristic of Aubusson workshops that allow complex shapes, gradients, and contours to be realised in woven form.

5.6.2 Translation Strategy and Glossary Development

Overcoming Linguistic Nuances

Many of the French technical terms used in Aubusson tapestry-making do not have direct English equivalents, reflecting the specialised nature of this centuries-old craft. To preserve the authenticity and precision of these terms, certain words—such as “liure” (a binding technique) and “ourdissage” (the preparation of warp threads)—are intentionally kept in French. This strategy helps maintain the nuances and cultural context associated with these techniques, which might otherwise be lost in an approximate translation.

To ensure users can fully grasp the meaning of these terms, a bilingual glossary has been integrated into the e-learning platform. Learners can hover over or click on the French words to access concise but informative definitions, along with brief explanations of how these techniques fit into the broader tapestry-making process. By combining retention of key French terminology with immediate, user-friendly guidance, the platform manages to bridge the language gap while honouring the cultural and technical richness of the Aubusson tradition.

Visual Reinforcement

In the initial documentation, many of the images were in black and white, focusing on specific stages of tapestry weaving without fully conveying the subtle complexity of each step. To address this, we transformed these photographs into labelled diagrams that highlight key components of the loom, as well as the precise gestures involved in the weaving process. Where possible, colour illustrations and step-by-step infographics were incorporated to further enhance clarity, giving learners a more immediate and intuitive grasp of the workflow. This combination of labelled diagrams and vibrant visuals caters to different learning styles, ensuring that novices and seasoned practitioners alike can follow each phase of tapestry-making with confidence.

In addition to improving readability, efforts are underway to make these materials fully interactive. Future iterations of the e-learning platform plan to use clickable hotspots within diagrams, enabling learners to zoom in on critical loom parts or to focus on intricate techniques—such as circle weaving or liure—without losing sight of the overall process. By hovering over a particular area or selecting a highlighted detail, users would see close-up images or concise tooltips describing the function, purpose, or specific handling of each element. This approach brings the craft to life, allowing learners to explore the tapestry-making process in a self-directed manner and at a level of detail that suits their individual needs.

5.6.3 E-learning Platform Integration

Modular Course Design

All materials—from theoretical essays to practical step-by-step guides—are structured into thematic modules. This approach allows learners to:

Follow a Linear Progression: The e-learning platform is designed to guide learners through a carefully structured path that begins with foundational theory and culminates in advanced weaving techniques. By moving step-by-step—first examining the historical and cultural context of Aubusson tapestry, then exploring loom construction and setup, and eventually mastering the intricacies of weaving itself—users can build a coherent understanding of the craft. This sequential approach ensures that each topic serves as a building block for the next: once learners understand the framework of low-warp tapestry and the rationale behind its unique setup, they can more confidently move on to the practical steps of preparing the warp and harnessing key weaving methods. Finally, advanced techniques such as circle weaving or liure come into sharper focus, as learners have already internalised the theoretical and technical principles that underpin those specialised skills. By the end of this linear progression, participants not only gain proficiency in specific tapestry-making procedures but also develop a holistic appreciation for the tradition and craftsmanship at the heart of Aubusson's textile heritage.

Select Topics On-Demand: While the platform follows a logical progression for beginners, it also accommodates experienced artisans and designers seeking targeted expertise. Rather than moving sequentially from theory to practice, seasoned professionals can jump directly to specialised modules aligned with their specific goals—whether that means refining techniques like circle weaving or learning about particular dyeing methods. Each module is designed to function as a standalone resource, complete with detailed explanations and visuals. This on-demand approach saves time for advanced users, allowing them to access precisely the insights they need and apply them immediately to ongoing projects. In this way, the platform serves not only as a comprehensive learning tool for newcomers but also as an adaptable reference library that supports continued mastery and innovation among those already well-versed in the tapestry arts.

5.7 Conclusion

By adapting and expanding the tapestry apprentice's documentation into a dynamic e-learning curriculum, we not only preserve and protect the future of Aubusson tapestry-making but also create a powerful educational tool fully aligned with the work package's mandate to modernise and disseminate craft knowledge. This initiative bolsters WP6.1's overarching objective of developing accessible, high-quality training materials that integrate traditional crafts with contemporary digital practices, ensuring both cultural continuity and innovation in the field.

By meticulously translating specialised French terminology, transforming original visuals into interactive diagrams, and structuring content into modular learning pathways, the project meets WP6.1's criteria for effective, learner-centric design. The Tapestry e-learning platform offers a dual advantage: beginners can follow a step-by-step progression to gain foundational skills, while advanced artisans can access on-demand modules that address highly specific creative or technical challenges. This versatility supports a broad spectrum of learners—ranging from students seeking an introduction to tapestry arts, to established designers exploring new techniques for their work.

By showcasing Aubusson tapestry-making in a format adaptable to diverse user needs and skill levels, the project cultivates an international community of practice, enhances professional development opportunities, and seeds future collaborations across art, design, and technology.

6 Conclusion of Pilot 1 and next steps

6.1 Global Summary

The integration of digital tools into the learning of traditional crafts is viewed positively and offers many opportunities to enrich the learning experience. However, it is essential to continue improving and adapting these tools to meet learners' needs and expectations, while maintaining a balance with traditional methods. The creation of learning communities and the promotion of international collaboration are also key elements in ensuring the preservation and modernisation of traditional know-how.

6.1.1 Acceptance and Perception of Digital Tools

- General acceptance: Digital tools such as e-learning platforms, VR simulators and interactive videos are generally well accepted by learners. They are seen as useful complements to traditional learning methods.
- High expectations: There is a high level of expectation regarding the continuous improvement of these tools, particularly in terms of intuitiveness, precision and content.

6.1.2 Integration of digital and traditional tools

- Complementarity: Digital tools should be used in conjunction with traditional methods to enrich the learning experience. This complementarity makes it possible to combine the advantages of both approaches.
- Attachment to the subject matter: Despite the acceptance of digital tools, there is a strong attachment to the relationship between subject matter and traditional techniques. Learners prefer a pragmatic, blended approach.

6.1.3 Improving and Adapting Tools

- Optimisation: Digital tools need to be constantly optimised to meet learners' needs. This includes improving navigation, adding new content, and adapting learning formats.
- Personalisation: It's crucial to customise tools to meet the different skill levels and needs of learners, from beginners to advanced learners.

6.1.4 Community and Collaboration

- Community portals: There is a strong interest in creating community portals that serve as reference points for trades, provide access to technical data, and enable exchanges with experts.
- Multilingual accessibility: Multilingual accessibility is important to foster international collaboration and cultural exchange.

6.1.5 Preservation and modernisation of know-how

- Preservation: The digitisation and organisation of traditional knowledge guarantees its accessibility for future generations, even if local transmission diminishes.
- Modernisation: The integration of digital tools into the learning of traditional crafts enables these skills to be modernised and disseminated while ensuring their cultural continuity.

6.1.6 Educational methods

- Diversity of modalities: E-learning needs to be combined with other teaching modalities, such as video elicitation, situational learning and mixed modalities, to avoid becoming a poor, boring tool.
- Learning scenarios: Learning scenarios should include phases of discovery, preparation, implementation and communication, using a variety of learning modalities.

6.2 Next step

6.2.1 Common points and specificities

Through the experiences of the various RCIs, we have been able to identify strong common points and specific concerns.

6.2.1.1 Common points

- Good overall acceptance of digital tools
- Expectation of a more integrated experience between digital tools and situational learning ‘the extended time spent on analysis occasionally hindered the flow, with participants expressing a preference for more direct experimentation with materials.’ RCI 2 porcelain
- The central role of e-learning platforms, both as learning tools and as reference databases of trade knowledge.

6.2.1.2 Specificities

- A variety of audiences and structures. From school groups in Ioannina and Tinos to ENSAD students in Limoges, to woodcarving and glassblowing apprentices.
- Specific needs, such as the meticulous translation and glossary of tapestry terminology in Aubusson.
- Methods of passing on craft skills that vary greatly from one craft and one geographical location to another.

The final version of pilot 1 education and training will be based on the common points between the different RCIs while taking into account their specificities.

6.2.2 Next step proposal

For the final version of pilot 1 education and training, the aim will be to improve and complete the digital tools, e-learning platform, VR glassblowing simulator, 3D plasters wheel simulator, etc., and to

propose enhanced scenarios for the use of digital tools, enabling better interaction between learning modalities.

Secondly, to propose enhanced scenarios for the use of digital tools, enabling better interaction between learning modalities. A breakdown by learning phases which will correspond to the modalities recommended for better integration of digital tools with situational learning, see Figure 40 Below. The idea is to establish a dialogue between digital practice and workshop practice.

Finally, we aim to develop new tools or transpose existing ones into other fields, such as video elicitation, which enables a reflexive look at and analysis of workshop practice.

learning phases	learning modality			Activities
	e-learning	VR workshop	workshop	
Discovery	tools and machines		optional : workshop tour	Preparation
		workshop tour		
Cross-cutting matters	HSE - GT - Technical drawing - History of glass...			Preparation & Communication
What you should know before practice in workshop	key elements			Preparation & Implementation
			key elements + master	
Process	Glass process & video elicitation methodology			Preparation, Implementation & Communication
			Experiment + master + video	
	experiment report			
Training	process			Preparation & Implementation
		process + basic training (gathering)		
			Experiment & produce	

Figure 40. The layer of educational scenarios.

6.2.3 Conclusion

The aim is to work with learners to develop effective, relevant digital tools that can be integrated into the organisation's learning methods over the long term, to structurally modify and sustainably improve the way know-how is passed on, through a mixed use of digital tools integrated with workshop practice.

Annex 1 Planning

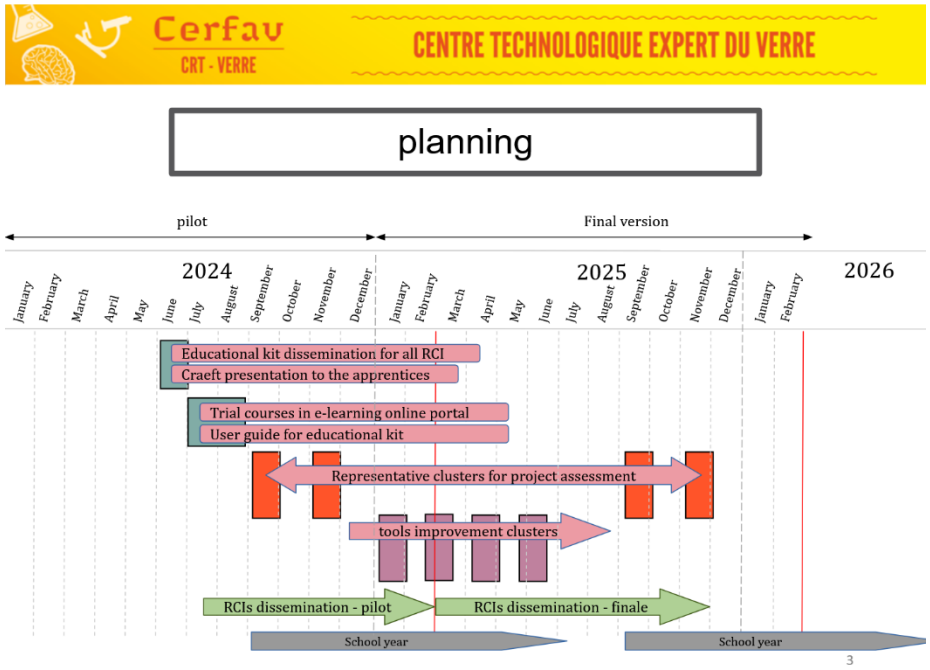


Figure 41. Planning of Craeft digital aids experiments.

Annex 2 Cluster organisation

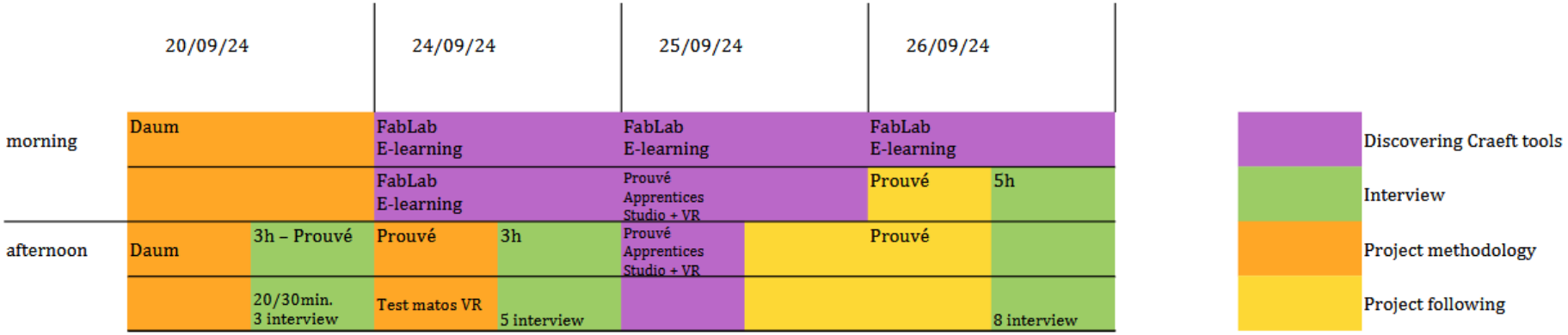


Figure 42. The organisation of the experimental phases of the project - cluster No.7.

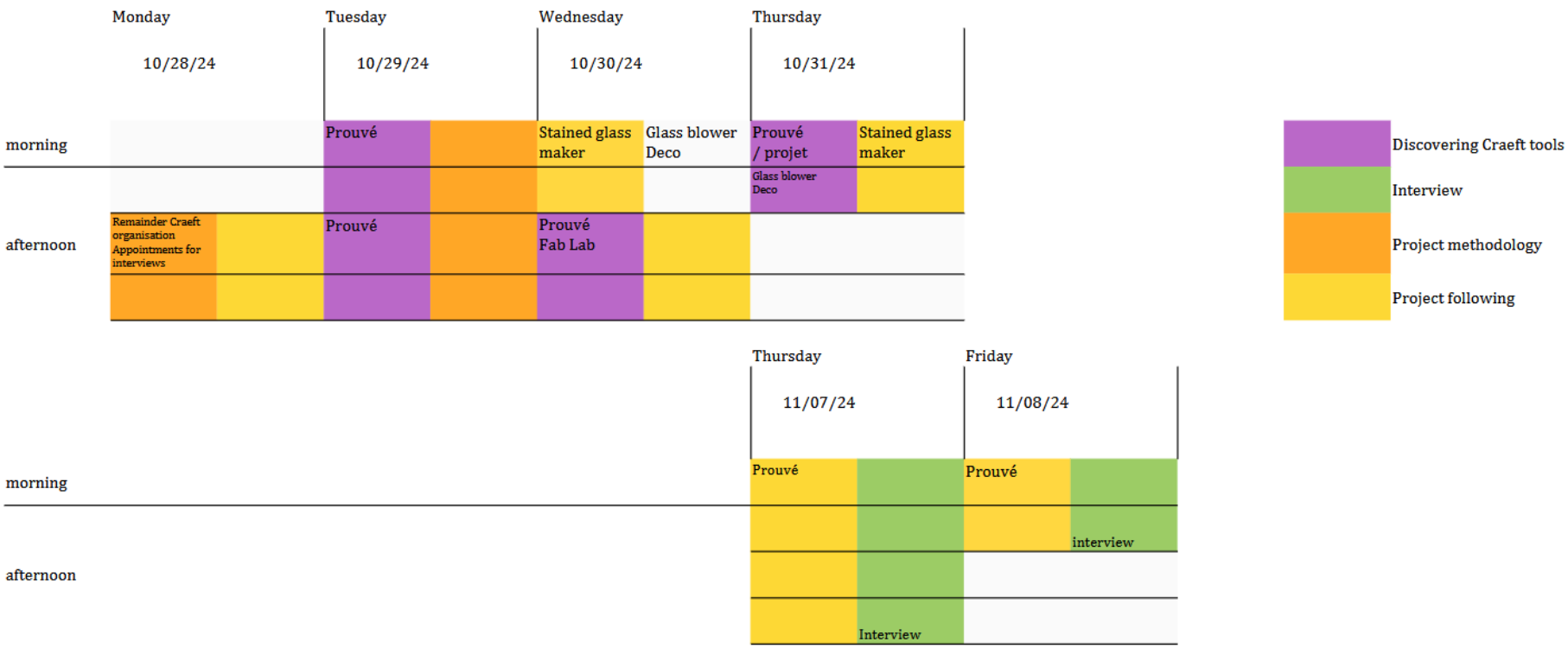


Figure 43. The organisation of the experimental phases of the project - cluster No. 8.

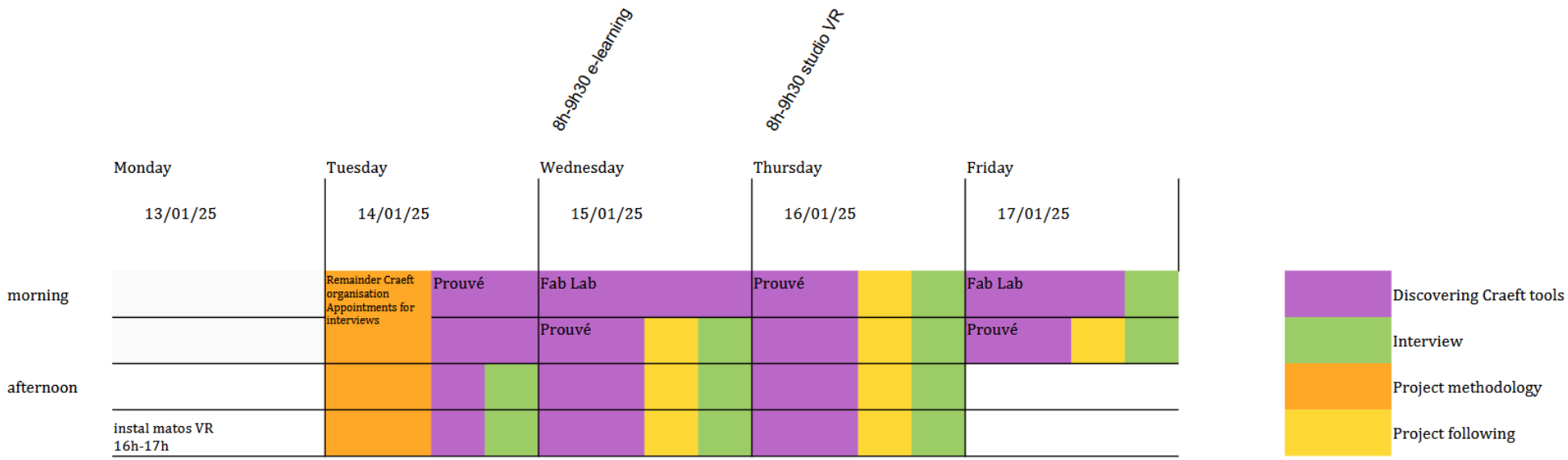


Figure 44. The organisation of the experimental phases of the project - cluster No. 9.

Annex 3 - Project presentation 24 June 2024

See synthesis document

Goals

- Inform apprentices about the Craeft project
- Gather their ideas, suggestions, expectations, fears and solutions about the project

Phases of the session

- Presentation of project Craeft
- Presentation of tools Craeft
- Definition of cohorts
- Atelier creative / tour de table – (attendees, creators, ideas)

Craeft project's presentation

Presentation of the Craeft project to second-year apprentices, via the Craeft website, preview of digital tools and a PowerPoint document.

Figure 45. Craeft project's presentation.

Workshop

Framework of questions

- How do you see Craeft's digital tools?
- What are your expectations?
- What you could do with them
- How would you like to use them?
- What are your fears?
- Why do you want to experiment and use these tools?
- What ideas do you have?

Boards

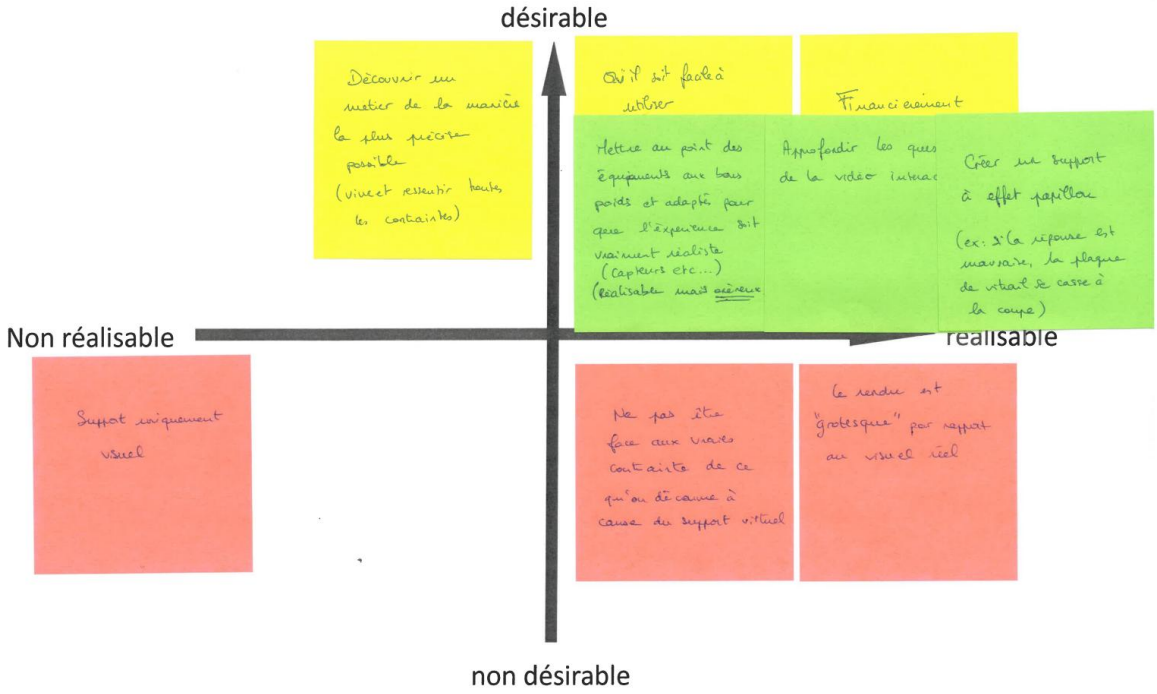


Figure 46. Craeft workshop - sub-group 1.

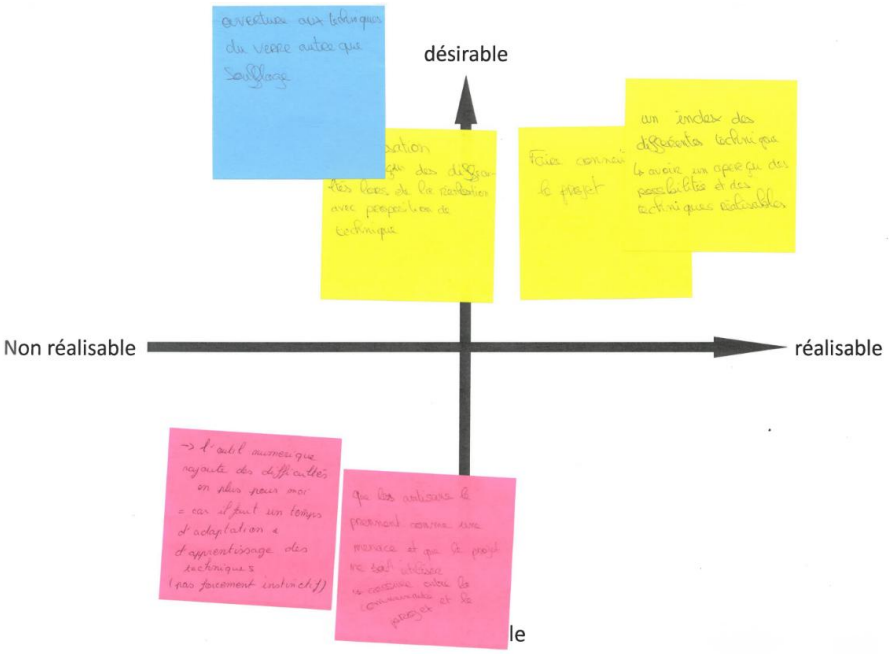


Figure 47. Workshop – sub-group 2.

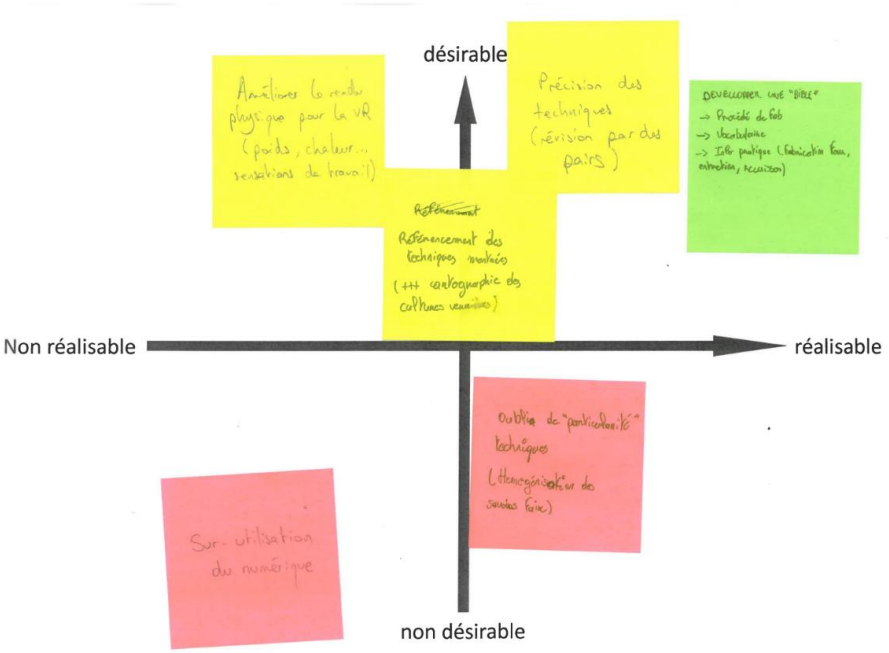


Figure 48. Craeft workshop – sub-group 3.

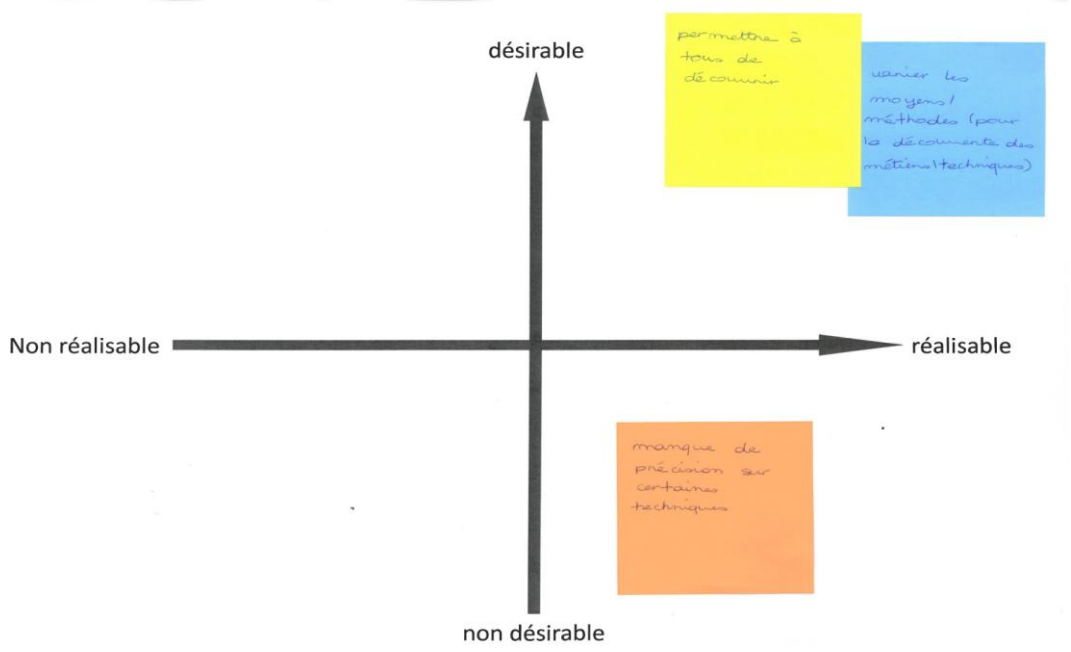


Figure 49. Craeft workshop - sub-group 4.

Boards transcription

Sub-group 1

Expectations:

- To discover a profession as precisely as possible (to experience and feel all the constraints)
- That it is easy to use
- Affordable

Fears:

- Only visual support
- Not being faced with the real constraints of what you are discovering because of the virtual medium
- The rendering is 'grotesque' compared with the real visuals

Proposal:

- Develop equipment with the right weight and adapt to make the experience truly realistic (realistic but expensive sensors, etc.).
- Take a closer look at interactive video issues
- Create a support with a butterfly effect (e.g. if the answer is wrong, the stained-glass panel will break when cut).

Sub-group 2

Expectations:

- Modelling, overview of the difficulties involved in carrying out the project and suggested techniques
- To publicise the project
- An index of the different techniques → an overview of the possibilities and feasible techniques.

Fears:

- The digital tool adds extra difficulties for me = because it takes time to adapt and learn the techniques (not necessarily instinctive).
- That the craftspeople will see it as a threat and that the project will not be used, breaking the link between the community and the project.

Proposal:

- Opening up to glass techniques other than glassblowing

Sub-group 3

Expectations:

- Improve physical rendering for VR (weight, heat, etc.)
- Repository of mounted techniques (+++ mapping of glass crops)
- Accuracy of techniques (peer review)

Fears:

- Overuse of digital technology
- Forgetting technical 'particularities' (Heterogeneity of know-how)

Proposal:

- Develop a 'bible'.
    - Vocabulary
    - Practical information (oven manufacture, maintenance, annealing)

Sub-group 4

Expectations:

- To enable everyone to discover

Fears:

- Lack of precision in certain techniques

Proposal:

- Vary means and methods (for discovering trades/techniques)

Annex 4a - assessment documents TA cohort

Questionnaires on the initial state of skills - Glassblower with pipe.

Questionnaires on the initial state of skills, with apprentices taking part in the T and TA cohorts, to identify or put into perspective any possible bias in the evaluation of the project on the effects of the Craeft tools on the learning path.

Questionnaire:

What is your training pathway?

What is your career path?

Have you ever blown glass with a cane before your apprenticeship? (for example, an apprenticeship in stained glass after a CAP in glass and crystal art).

Do you already have experience in other areas of glass? If yes, in which technique(s)?

Do you already have experience with digital tools? If so, which gaming, for study or work?

What skills from the reference framework do you think you already possess, even partially?

- [x] Mastering skills
- [ ] p partial mastery of skills

C1 Be Informed

- ☐ C1.1 Read the instructions and decode the documents provided (technical file and procedure).
- ☐ C1.2 Identify work materials,
- ☐ C1.3 Identify materials, tools and fluids,
- ☐ C1.4 Identify control tools,
- ☐ C1.5 Take note of health, safety and environmental rules.

C2 Prepare

- ☐ C2.1 Establish the sequence of operations to be carried out according to aesthetic and technical constraints,
- ☐ C2.2 Prepare the raw materials,
- ☐ C2.3 Select and check machines and tools and adjust tools,
- ☐ C2.4 Organise and adapt your workspace.

C3 Implement

- ☐ C3.1 Carry out harvesting with ferret and cane,
- ☐ C3.2 Shape the glass taken for blowing,
- ☐ C3.3 Carry out the blow moulding to produce the required part,
- ☐ C3.4 Carry out the pressing to produce the required part,
- ☐ C3.5 Remove stains and place in the annealing arch,
- ☐ C3.6 Complete the finishing touches (tracing, stripping, slotting, chamfering, sawing, rebranding, flattening, de-tooling, polishing),
- ☐ C3.7 Carry out the decoration (compaction, roughing, cutting, sanding),
- ☐ C3.8 Stop production.

C4 Ensuring maintenance

- ☐ C4.1 Carry out preventive maintenance (standard: NF 13306 of June 2001),
- ☐ C4.2 Detect any malfunctions,
- ☐ C4.3 Maintain the workstation in working order.

C5 Check

- ☐ C5.1 Adapt gestures and posture to the operation to be carried out
- ☐ and respecting ergonomic rules,
- ☐ C5.2 Check the conformity of products during manufacture,
- ☐ C5.3 Carry out the self-test.

C6 Communicate

- ☐ C6.1 Passing on instructions,
- ☐ C6.2 Participate in problem-solving by suggesting improvements or solutions. Or solutions.
- ☐ C6.3 Report orally, graphically or in writing, choosing and using appropriate tools, media, techniques, principles and codes.

C7 Comply with health, safety and environmental rules

- ☐ C7.1 Comply with health and safety rules,
- ☐ C7.2 Respect environmental rules.

Self-positioning on the appropriation of Craeft tools

E-learning platform:

Connecting to the platform

- ☐ easily and independently
- ☐ with help
- ☐ "I'm lost!"

Comments:

Account customisation

- ☐ easily and independently
- ☐ with help
- ☐ "I'm lost!"

Comments:

Navigating the

- ☐ easily and independently
- ☐ with help
- ☐ "I'm lost!"

Comments:

Download a document

- ☐ easily and independently
- ☐ with help
- ☐ "I'm lost!"

Comments:

Send a document for assessment

- ☐ easily and independently
- ☐ with help
- ☐ "I'm lost!"

Comments:

Understanding the logic of evaluation

- ☐ easily and independently
- ☐ with help
- ☐ "I'm lost!

Comments:

Usefulness for my project / How will I be able to use it?

- ☐ This will help me
- ☐ It's not going to help me
- ☐ I don't know yet

Comments:

Comments and suggestions:

Apprentice Studio (VR):

Navigating the interface

- ☐ easily and independently

- ☐ with help
- ☐ "I'm lost!

Comments:

Using headphones and controllers

- ☐ easily and independently
- ☐ with help
- ☐ "I'm lost!

Comments:

Ownership of the environment

- ☐ easily and independently
- ☐ with help
- ☐ "I'm lost!

Comments:

Handling virtual tools

- ☐ easily and independently
- ☐ with help
- ☐ "I'm lost!

Comments:

Usefulness for my project / How will I be able to use it?

- ☐ This will help me
- ☐ It's not going to help me
- ☐ I don't know yet

Comments:

Comments and suggestions:

Satisfaction survey questionnaire on e-learning platforms

Course content:

1. Clarity and organisation of course content

2. Has the course given you an understanding of glassblowing, cross-disciplinary subjects, background, description of machines and tools, presentation of the workshop, etc.?

3. Are the explanations about the machines, tools and workshop clear, detailed and useful?

Course structure and materials:

1. Course structure and organisation of sessions (chapters)

2. Did the course materials (text, images, videos) help you to understand the subject?

E-learning platform:

1. Is the platform user-friendly when it comes to accessing course materials, and assessments and taking part in discussions?

2. Are the navigation and instructions provided by the platform clear and useful?

Back to overview:

1. What specific aspects of the course did you find particularly beneficial or stimulating?

2. Do you have any suggestions for improving this training in terms of content or teaching?

Any other comments?

Satisfaction survey questionnaire on VR Studio

Interface:

1. Is the VR workshop simulation user-friendly when it comes to accessing the functions and tasks to be carried out?

2. Ease of use of the functions via the controllers (teleportation, entering tools, displaying information, etc.)

3. Ease of use of the interface in general (display of information, movements, actions, 'manage to do what I want')

Knowledge structure:

1. Do you prefer free access to the various functions or a more guided path?

2. Did the information aids (text, images, videos) help you to discover and understand the understanding of the blow-moulding workshop?

Knowledge:

1. Do I find the application useful for learning and remembering the workshop environment, tools and machines?

2. Do I find the application useful for learning and remembering the manufacturing process?

3. Do I find the application useful for learning and remembering gestures?

General feedback:

1. What specific aspects of the simulation did you find particularly beneficial or stimulating?

2. Do you have any suggestions for improving the simulation in terms of content or interface?

Any other comments?

Project follow-up form - TA

project booklet and follow-up sheet

The aim of the project logbook and the follow-up sheets filled in during individual interviews is to assess the impact of the digital tools in the Craeft project that we are offering you to try out.

The aim of this evaluation of the Craeft project during its development is to find out how your project has evolved thanks to the Craeft tools.

We suggest that you write down whatever you like in the notebook! Also, take five minutes at the end of each day to note down your work process throughout the project, during the day when a choice is made, when an unforeseen event occurs, and when the result of an experiment is announced.

The project notebook will be used to evaluate the workflow as your project progresses. For example, the time spent creating a mould, the idea and the workflow at each stage of your project (idea →model →plan →mould →execution →finished product).

Definition: in the following paragraph the term project technique indicates the technique chosen by the person to design and model their project, XR for the TA cohort, modelling, wax etc. for the T cohort.

Questions:

Q1 - Which dominant project technique was used for the design, modelling and project preparation, e.g. drawing, clay, wax, mould, XR, etc.?

Q2 - Did my project require the creation and manufacture of a template, a specific mould, a model, etc.?

Q3 - Time/workflow, facilitation:

- organisation and fluidity of the creative process according to the technique and project chosen for modelling.
- speed of execution slowed or accelerated by the project technique.

Q4 - Opportunities and limitations of project design and modelling tools

- specific problems linked to the project technique
- opportunities and limitations of the project technique
- experience in confronting the tools offered by the project technique in the creative process

Q5 - Opportunities and limitations of the production process

- opportunities and limitations of glass technology (depending on each ROI)
- confrontation with the material in the creation of the project

Q6 - Solutions found using XR tools and other project techniques

Q7 - Result/faithfulness to the initial project

- Are my choices guided by the project design method (XR and others, to be noted as the project progresses)?
- how the project technique influenced my choices → Adaptation
- fidelity/loss of meaning/loss of project focus vs technology limitations

Q8 - What skills have been learned or developed as part of the project?

Q9 - Positive points/areas for improvement/suggestions

Annexe 4b - assessment documents Cohort T

Questionnaires on the initial state of skills - stained glass

Questionnaires on the initial state of skills, with apprentices taking part in the T and TA cohorts, to identify or put into perspective any possible bias in the evaluation of the project on the effects of the Craeft tools on the learning path.

Questionnaire:

What is your training background?

What is your career path?

Have you ever worked with stained glass, decoration or blowtorches before your apprenticeship?

(for example, an apprenticeship in stained glass after a CAP in glass and crystal art).

Do you already have experience in other areas of glass? If yes, in which technique(s)?

Do you already have experience with digital tools? If so, which gaming, for study or work?

What skills from the reference framework do you think you already possess, even partially?

p

Mastering skills

- ☐ partial mastery of skills

C1 Be Informed

- ☐ C1.1 Decode work documents and study proposals.
- ☐ C1.2 Recognise the materials used.
- ☐ C1.3 Identify materials, tools and fluids.
- ☐ Deciphering health and safety rules and ergonomic guidelines.

C2 Prepare

- ☐ C2.1 Analyse the product.
- ☐ C2.2 Prepare the necessary tools and materials.
- ☐ C2.3 Prepare the raw materials.
- ☐ C2.4 Check that the workstations are operational.

C3 Implement

- ☐ C3.1 Produce graphic elements.
- ☐ C3.2 Opening glasses.
- ☐ C3.3 Assemble and fit.
- ☐ C3.4 Apply waterproofing.
- ☐ C3.5 Apply stopping procedures at each stage of the production process.

C4 Ensuring maintenance

- ☐ C4.1 Carry out level I maintenance (Standard NF-X-60010) on equipment and tools.
- ☐ C4.2 Locate the source of faults.

C5 Check and contribute to quality

- ☐ C5.1 Make good use of the equipment, materials and fluids provided.
- ☐ C5.2 Check the conformity of work in progress.
- ☐ C5.3 Check the defined structural, geometric and dimensional characteristics.
- ☐ C5.4 Report any anomalies found during production, relating to: work materials, tools, and procedures.
- ☐ C5.5 Keep accurate records of work done and time spent.

Questionnaires on the initial state of skills - Deco

Questionnaires on the initial state of skills, with apprentices taking part in the T and TA cohorts, to identify or put into perspective any possible bias in the evaluation of the project on the effects of the Craeft tools on the learning path.

Questionnaire:

What is your training background?

What is your career path?

Have you ever worked with stained glass, decoration or blowtorches before your apprenticeship? (for example, an apprenticeship in stained glass after a CAP in glass and crystal art).

Do you already have experience in other areas of glass? If yes, in which technique(s)?

Do you already have experience with digital tools? If so, which gaming, for study or work?

What skills from the reference framework do you think you already possess, even partially?

- [x] Mastering skills
- [ ] partial mastery of skills

C1 Be Informed

- [ ] C1.1 Decode working documents and study drawings and/or models.
- [ ] C1.2 Recognise the materials used.
- [ ] C1.3 Identify materials, tools, fluids and consumables.
- [ ] C1.4 Read and/or identify measuring and checking instruments.
- [ ] C1.5 Decode health and safety rules and ergonomic instructions.

C2 Prepare

- [ ] C2.1 Analyse the set and its artistic features.
- [ ] C2.2 Prepare tools, equipment and accessories.
- [ ] C2.3 Prepare raw parts.
- [ ] C2.4 Prepare the workstation.

C3 Implement

- ☐ C3.1 Compaction and tracing.
- ☐ C3.2 Produce: guides, templates, skeletons, colour films, etc.
- ☐ C3.3 Perform cold and hot forming
- ☐ C3.4 Decorate by removing material.
- ☐ C3.5 Decorate by adding material.
- ☐ C3.6 Assemble and glue.
- ☐ C3.7 Shut down the workstation.

C4 Ensuring maintenance

- ☐ C4.1 Carry out level I maintenance (Standard NF-X-60010) on equipment and tools.
- ☐ C4.2 Locate the source of faults.

C5 Control / Quality

- ☐ C5.1 Use materials wisely.
- ☐ C5.2 Check the conformity of work in progress at the end of the job.
- ☐ C5.4 Report any faults found.
- ☐ C5.5 Keep accurate records of work done and time spent.

Project follow-up form - T

Follow-up sheet

The aim of the monitoring form and the individual interviews is to evaluate the Craeft project, comparing two groups, one a control group and the other using digital tools.

The aim of this evaluation during the development of your project is to find out how your project has evolved thanks to the tools you have chosen.

This project tracking sheet will be used to assess the workflow as your project progresses. For example, the time spent creating a mould, the idea being to note the workflow at each stage of your project (idea →model →plan →mould →execution →finished product).

Definition: in the following paragraph the term project technique indicates the technique chosen by the person to design and model their project, XR for the TA cohort, modelling, wax etc. for the T cohort.

Questions:

Q1- What is the main technique used for the design, modelling, and preparation of the project e.g. drawing, clay, wax, mould, XR etc.?

Q2- Did my project require the creation and manufacture of a template, a specific mould, a model, etc.?

Q3- Time/workflow, facilitation:

- Organisation and fluidity of the creative process according to the technique and project chosen for modelling.
- speed of execution slowed or accelerated by the project technique.

Q4- Opportunities and limitations of project design and modelling tools

- specific problems linked to the project technique
- opportunities and limitations of the project technique
- experience in confronting the tools offered by the project technique in the creative process

Q5- Opportunities and limitations of the production process

- opportunities and limitations of glass technology (depending on each ROI)
- confrontation with the material in the creation of the project

Q6- Solutions found using XR tools and other project techniques

Q7- Result/faithfulness to the initial project

- Are my choices guided by the project design method (XR and others, to be noted as the project progresses)?
- how the project technique influenced my choices → Adaptation
- fidelity/loss of meaning/loss of project focus vs technology limits

Q8- What skills have been learned or developed as part of the project?

Q9- Positive points/areas for improvement/suggestions

Annex 5 - Thematic analysis coding structure

Referencing System for Thematic Analysis
Coding structure

E-learning platform [EL]

Pedagogical and didactic effectiveness [PDE]

- PDE-1: Quality of learning materials
- PDE-2: Educational Progress
- PDE-3: Assessment of learning

Ergonomics and accessibility [ERA]

- ERA-1: Navigation and interface
- ERA-2: Organisation of content
- ERA-3: Technical accessibility

Exhaustiveness of content [EXC]

- EXC-1: Core content
- EXC-2: Specific technical aspects
- EXC-3: Educational supplements

Linking theory and practice [LTP]

- LTP-1: Transfer of learning
- LTP-2: Professional Contextualisation
- LTP-3: Practical Applications

Studio VR [VR]

Pedagogical Engineering [PEN]

- PEN-1: Learning structure
- PEN-2: Pedagogical objectives
- PEN-3: Assessment system

Technical Fidelity [FIT]

- FIT-1: Physical simulation
- FIT-2: Reproduction of movements
- FIT-3: Technical accuracy

VR Ergonomics [EVR]

1. EVR-1: User interface
2. EVR-2: 3D navigation
3. EVR-3: Functionality accessibility

Practical Aspects and Security [PAS]

- PAS-1: Security and best practices
- PAS-2: Hardware management
- PAS-3: Organisation of space

Personal project follow-ups [PFU]

Main themes emerging from personal project follow-ups of cluster N°8:

- [DTL] - Learning how to use digital tools.
- [MXU] - A pragmatic, mixed approach depending on requirements.
- [RTM] - A choice based on the pleasure of making, the relationship with the material.
- [AXS] - Access for all?

Added themes for analysis of personal project follow-ups of cluster N°9

- [OLD] – Opportunities and limitations of digital tools, interaction between the choice of tool and the project.
- [SCD] – Subcontracting the use of digital tools.
- [CDT] – Complexity of digital tools

Use of the system

In the main document, each thematic analysis will be associated with its references. In the appendices, each raw data item will be labelled with the corresponding code.

Annex 6a cluster N°7 - results of the e-learning platform evaluation documents.

Feedback - summary table

E-learning					
Positive points	**code**	**Points for improvement**	**code**	**Comments**	**code**
Very good about the course	[PDE-2]	Technical drawing: complete the module with more text and drawings.	[EXC-1]		
Good for revision of cross-curricular subjects	[PDE-2]	Integrate corrections into quizzes TG quiz on oxides/colours HSE	[PDE-3] [EXC-2]		
		TG a single glass history question → integrate a glass history module.			
		TG: → quiz on types of ovens, free text entry, provide several types of answers, several spellings, for example, pots or à pots or à pot, or pot, or even a pot.	[ERA-1]		
		Video quiz, find out if there are one or more correct answers	[PDE-3]		
		Video quiz on the carafe, question "Why blow into the cane" → add to check if it's blocked, eliminate condensation.	[EXC-2]		
				The video quiz question is a bit simple and a bit of a pushover.	[PDE-3]

E-learning					
Positive points	**code**	**Points for improvement**	**code**	**Comments**	**code**
		Before entering the workshop" module: "Watching the videos, you'd think it was easy" → have a warning, show the difficulty, e.g. have videos of apprentices "struggling". → Warning not to get carried away	[LTP-2]		
		In the "decanter process," module → brings together the 3D sequences, creating continuity → 3D sequences + video of the entire process	[PDE-1]		
		Link the videos and the workshop.	[LTP-1]		
				In the description module for blowing tools, redundancies such as seals and seals for canes.	[EXC-2]
		→ Is it possible to have a global registration for the "glassblowing" course and not course by course? Slightly long video loading time.	[ERA-1]		
		No breadcrumb trail, no way to go back in the tree structure when you're in a course	[ERA-1]		

Satisfaction survey - summary table

E-learning					
Positive points	**code**	**Points for improvement**	**code**	**Comments**	**code**
Course content: 1- Clarity and organisation of course content					
Correct, the site is clear and organised.	[ERA-1]			A bit messy at first glance.	[ERA-1]
Well organised	[ERA-1]				
Very good		In some courses there are things missing [technical drawing], there are gaps, and a video is not enough to understand everything.	[EXC-1] [PDE-1]		
Very well organised and easy to understand.	[ERA-1]				
Course content: 2 - Has the course given you an understanding of glassblowing, cross-disciplinary subjects, background, description of machines and tools, presentation of the workshop, etc.?					
I was already familiar with it, but I found the basic knowledge well transcribed and relevant to a discovery.	[PDE-2]			relevant for a discovery	[PDE-2]
Yes, it was very well shown, with explanations and videos, so we really understood how it works.	[PDE-1]			Mainly revision of general technology.	[PDE-2]
Very understandable.					
Course content: 3 - Are the explanations of machines, tools and the workshop clear, detailed and useful?					
The explanations are clear, sufficiently detailed, explicit and concise.	[PDE-1]				

E-learning					
Positive points	**code**	**Points for improvement**	**code**	**Comments**	**code**
Yes	[PDE-1]				
It's pretty clear in terms of understanding whether it's a machine or a tool.	[PDE-1]				
Yes, quite clear.	[PDE-1]				
Course structure and materials: 1 - Course structure and organisation of sessions (chapters)					
Correct (nothing to complain about)	[PDE-2]	more photos or diagrams alongside the technical drawing videos	[PDE-1]		
Very well structured.	[PDE-2]	There should be more chapters on the different courses if it concerns the CAP.	[EXC-1]		
Well organised.	[PDE-2]				
Course structure and materials: 2 - Did the course materials (text, images, videos) help in understanding the subject?					
The supports help enormously!	[PDE-1]	yes, but not developed enough.	[EXC-1]	Yes, it's an interesting way of completing the texts.	[PDE-1]
Yes, very clear/quite understandable.	[PDE-1]				
Yes, but not developed enough.	[EXC-1]				
That helps a lot.	[PDE-1]				
Yes, it's an interesting way of completing the texts.	[PDE-1]				
E-learning platform: 1 - Is the platform user-friendly for accessing course materials, and assessments and taking part in discussions?					

E-learning					
Positive points	**code**	**Points for improvement**	**code**	**Comments**	**code**
I haven't tried it out but from what I've seen, it looks easy to use.	[ERA-1]	not for everything. For example, some of the chapters on blow moulding from A to Z are in English, so are not necessarily accessible.	[ERA-3]		
Yes	[ERA-1]				
E-learning platform: 2 - Are the navigation and instructions provided by the platform clear and useful?					
Correct.	[ERA-1]	It's quite complicated to find your way around the platform, I find it's a bit scattered.	[ERA-1]		
The instructions are useful.	[ERA-1]	Maybe not enough for some things? Example: the "subscribe" button to access the chapters. Otherwise, the rest is fairly clear.	[ERA-1]		
General feedback: 1 - What specific aspects of the course did you find particularly beneficial or stimulating?					
The questionnaires and explanatory videos are the site's greatest asset.	[PDE-1]				
Interactive videos, initial tests.	[PDE-1]				
The quizzes are great for practising, even several times.	[PDE-3]				

E-learning					
Positive points	**code**	**Points for improvement**	**code**	**Comments**	**code**
Interactive videos and questions and answers.	[PDE-1]				
Text + videos/images A test where the answers are quoted, so some assessments are simpler but memorising them is easier.	[PDE-1]				
General feedback: 2 - Do you have any suggestions for improving this course in terms of content or teaching?					
		Instead of having a drop-down menu for each subject, put the chapters before the lessons.	[ERA-2]		
		It would be interesting to add the other specialisations and art history to the courses because it's also part ... of the creation of glass over each century. To see it in stained glass or deco would be good for improvement.	[EXC-1]		
		History of Art expert			
General feedback: Any other comments?					
				Evan: Overall, a bit empty in places.	[EXC-1]

Individual interviews - summary table

E-learning					
Positive points	code	Points for improvement	code	Comments	code
Cool videos for revision.	[PDE-1]	Areas for improvement, blanks [gaps] the modules are scattered, not enough links between the elements, and [information] is a bit scattered.	[ERA-2] [ERA-2] [ERA-2]	For the English part, difficult translations.	[EXC-1] [ERA-3]
E-learning won't be of any use to me for the project, but more for revising for the CAP.	[PDE-2]			Blowing on the e-learning platform - I'm not going to use it [L is a stained-glass option].	[LTP-1]
Can be used for the CAP.	[PDE-2]				
An e-learning platform is a minimum requirement for TG.	[ERA-1]				
Question from TG about the colours available in glass	[EXC-2]	Oxide Colours [see full-colour chart].	[EXC-2]		
TG revision, remember the HSE concepts.	[PDE-2]				
Interesting for HSE to question the dangers present in the workshops.	[LTP-2]				
The English version is top-notch and very well-constructed.	[EXC-1]				

Annex 6b cluster N°7 - results of the evaluation documents for the VR glassblowing simulator

Feedback - summary table

Virtual studio					
Positive points	code	Points for improvement	code	Comments	code
1st glimpse "not bad	[PEN-1]	Set objectives (small tasks), such as making a glass drop.	[PEN-1]		
		Be able to turn the cane on the bench.	[FIT-2]		
		Being able to pick up tools	[FIT-2]		
		Adding tools, being able to shape the glass.	[FIT-1] [EXC-2]		
		→ complete + possible gestures	[FIT-2] [EXC-2]		
		→ Have tutorials - for example making a guided cup with the steps (process)	[PEN-2]		
		→ [Tutorial? Pre-recorded scenes ?]	[PEN-2]		
		Learning, doing it all [seeing a process from A to Z, practising, for example on a cup].	[LTP-1] [PEN-1]		
		For the evolution of the viscosity of the glass as a function of temperature, if this cannot be modelled continuously, allow for stages, for example proposing to reheat the glass if it is too cold to continue working.			[FIT-1]

		For the rod heater, you already have the red tips of the rods to identify the right colour/temperature, without even having a choice of several possibilities.			[FIT-1]
		Have a bucket to put the canes in at the end of work	[PAS-2]		
		Be able to relaunch the application via a menu	[EVR-1]		
		Setting limits to the exploration of the limits of simulation.	[EVR-1]		
		Life points [depending on mistakes made].			[PEN-3]

Individual interviews - summary table

Virtual studio					
Positive points	code	Points for improvement	code	Comments	code
		Interesting to discover new tricks and an interesting simulator.	[PEN-1]		

Annex 7 - Cluster No. 8 - Valuations, raw data

On-the-spot feedback TA cohort

E-learning platform

Have you used the e-learning platform? No

Community Portal

Social networks used: Snapchat, Instagram, or not used at all

Why go to this site rather than your usual networks?

- an interesting source of information
- find another craftsman to work with
- when faced with a technical problem, ask your peers
- be sure that the artisans know what they're doing, a professional forum that's more reassuring than Instagram

→Label the technical level of people: trainees, self-taught, experts, etc.

→ member-level Administrator, editor, reader

→Have one translation per language, not everyone speaks English.

Other reactions:

- go and see it but don't take part
- interesting for anyone, retraining, those interested in crafts
- Cool professional in front of you
- access to business referrers

"We don't see ourselves as professionals".

Another person, such as a pro on exploring job, to advise other members.

Studio apprentices:

+ do all the steps from A to Z

VR studio:

- Good improvements
- avatar with predefined scenes OK if gestures are precise
- Tooling information well received

Didn't want to try out studio apprenticeships or the new VR version because it was too close to the previous one.

Reminder of questions on the project follow-up sheet:

Q1- What is the main technique used for the design, modelling, and preparation of the project e.g. drawing, clay, wax, mould, XR etc.?

Q2- Did my project require the creation and manufacture of a template, a specific mould, a model, etc.?

Q3- Time/workflow, facilitation: Organisation and fluidity of the creative process according to the technique, and project chosen for modelling. Speed of execution slowed or accelerated by the project technique.

Q4- Opportunities and limitations of project design and modelling tools specific problems linked to the project technique opportunities and limitations of the project technique experience of confronting the tools offered by the project technique in the creative process.

Q5- Opportunities and limitations of the production process opportunities and limitations of glass technology (depending on each ROI) confrontation with the material in the creation of the project

Q6- Solutions found using XR tools and other project techniques

Q7- Result/faithfulness to the initial project. Are my choices guided by the project design method (XR and others, to be noted as the project progresses)? how the project technique influenced my choices → adaptation fidelity/loss of meaning/loss of project focus vs technology limits

Q8- What skills did you learn or develop as part of the project?

Q9- Positive points/points for improvement/suggestions - (if I had to redo my project, what would I keep, what would I change)

TA cohort interviews

Digital tools are highlighted in yellow.

ELM- blowing - TA cohort:

Context: Cold-cutting tests, "not bad", but the form lacks a little something. ELM is planning further tests at the next meeting.

Note: preparation of the MAF in parallel with the project, priority MAF.

Q1- Drawing. 3D models a lot of effort for not much, start to learn a tool to do [DTL].

Modelling is not complicated; production is more difficult [MXU].

Q2- It might be interesting to have a template to check the hot part. Either laser cutting or cardboard. Preference for laser cutting, which is cleaner and more resistant. [editor's note - need to produce a digital drawing] [MXU].

Q3- No influence of digital technology because drawing is used in the project [MXU].

7 tries takes a long time, but yesterday I was able to do one in an hour. It's hard to tell when I see the piece whether it looks right.

How can I help you? A tool that could help you? A vision aid to help with templates, perhaps.

Q4-Q5- Glass paste, solid piece, blow-moulding allows colour to be applied in several layers plus removal by sandblasting.

Limitation - experience in carrying out tasks or applying techniques.

Q6- There's no need to look for solutions, the project is simple.

Q7- A little smaller than it should be at the moment, the shape won't be exactly what I thought it would be.

Dimensional limit with the reheating oven, expert limit.

The shape of the helmet, flattened on the sides, was not formalised precisely.

Q8- New way of working, different from Baccarat [apprenticeship company].

Knowledge of colour ranges. Production, working in pairs, reheating, freehand work, etc.

Q9- Right from the start, having a template and developing my skills, cold work may be complicated.

LV- stained glass - TA cohort:

Context: Creation of a visual illusion with flat sets in-depth, Italian-style theatre.

Q1- Drawings and models, tracing paper and cardboard. 3D modelling test takes too much time to finish modelling correctly [DTL] [editor's note - an animal figurine], plus the time needed to create in pâte de verre, perhaps 2D creation in Tiffany-stained glass, not with a blowtorch. Creation optional [editor's note - if there is enough time in the project].

Knowledge of the tool plus 3D vision, a first full year to get to know the 3D tool. 3D VR is an experiment. [DTL]

Q2- Template yes for the stained glass. A model of a greenhouse with birds, images of greenhouses on the internet, model in black to make the grisaille (stained glass painting technique).

[Maybe] theatre modelled in 3D with Fusion and the help of the FabLab trainer, because it had to be dismantled with a laser-cut base. [MXU]

The tracing of the stained glass is already done, [to be done next] the templates. Glass leaves and flowers are already made with a blowtorch.

Q3- [the choice of technique to develop the project] That's going to help me, drawing helps me a lot and drawing adapted to the stained-glass project.

Q4-Q5- I don't feel restricted, I'm comfortable in what I do. I'm not looking for difficulty either. Reassuring, that I know what I'm doing, and the choice of project technique that I've mastered, even if I know/master other glass techniques [editor's note - glassblowing].

Q6- No answer for the moment, perhaps later, when the stained-glass windows are installed, how do you hold the first sheet of glass/stained glass in the theatre?

Q7- Compared to the basic idea, [I've made] some changes, like the fox, which I'm not doing at the moment, I've narrowed the project down [during the project follow-up] with the trainers, getting the plant out, the idea in the pipeline, faithful for the moment.

Q8- Exploring the blowtorch technique.

Q9- I won't be changing much; my project seems simple to carry out.

AL- stained glass - TA cohort:

A reminder of the project: create a stained-glass greenhouse, structure and plants.

[missing page 1 of interview].

Q5- There's no problem with the greenhouse, but I'm frustrated that I can't test the flowers with a blowtorch. You can prepare them at home but not assemble them.

Use of digital tools to obtain a model for the assembly of the greenhouse, seen with the FabLab trainer for production [editor's note - parametric 3D modelling] [MXU].

Q7- Originally a mixed technique of stained glass in lead and Tiffany, now all in Tiffany. The idea of a dome over the greenhouse has been abandoned in favour of a square structure in Tiffany, as the greenhouse is already finished. Suggesting plants with a material other than glass, fabric...

It's frustrating to find that the idea can't be realised, but I'm sticking pretty much to my original idea.

OR- decoration - TA cohort:

Project, making a glass hat.

Q1- Just the flowers in VR 3D modelling + 3D printing at the FabLab. [MXU]

Q2- Give the measurements to the FabLab trainer using a dimensioned sketch to make the mould for the top of the hat. [laser cut]

Q3- Tests carried out on the top of the hat with the glass-blowing trainer → need for a mould. Three different tests and go straight to finishing, go to cutting → 1st piece is broken. Problem with cutting the part, too flat to work with enamel afterwards.

The flower is simple, and faster [in 3D modelling] than with wax. Simple wax too, for more complicated modelling VR allows you to go faster. And allows you to go directly to glass paste, and direct mould on PLA. [MXU]

Q4-Q5- Initially, thermoforming was too complicated for the teachers → easier to blow → more complicated to assemble → silicone, wood + glass glueing.

[the part] is held on a metal rod, afraid it will break. [because of the weight]. Questions about the strength of the frame, and twisted round iron → call in a blacksmith.

Q6- FabLab mould, see in January?

Q7- I've changed a lot of things, I wanted to change from breakages to finishing - I need the trainer's help, plan B to do it in Tiffany. Fidelity? Don't know yet, see at the end of the project.

Q8- 3D modelling [VR Adobe modeller] nice, easy to handle, difficult to get what you want, to get the details. [DTL]

LP- blowing - TA cohort:

Project: to make a Moebius strip representing a road. LP takes part in MAF, project abandoned?

Q1- Wax test, quite happy with the shape.

Q2- Not bad in VR, no time to fully get to grips with the software. [DTL]

Choice of wax, manual work More pleasant, addictive, but more restrictive, heat in hot water then work again in hot water.

VR is more practical, and faster, but not the feel of the material. Faster than wax once the software is in hand (hypothesis not tested). [RTM]

Q3- VR better option for working time, wax is better for detail [MXU].

Q4- Not bad in VR with few limits, versus the constraints of the material.

Aren't the constraints there afterwards? No, for example, I start 3D printing while I'm doing something else. [MXU]

Q7- I've changed my mind once, from a symbol of infinity to a path with a tree and flowers of life in the centre. On the whole, I'm sticking to the basic idea.

T cohort Interviews:

Digital tools are highlighted in yellow.

LP- blowing - cohort T:

Project to make a glass hand with a butterfly on it.

Q1- Sketch drawing

JC- decoration - cohort T:

Context: Three-part part, two fusing wings and a blow-moulding cutter in the centre + blow-moulding leaves.

Q1- Different drawings, scale 1, how to position it in space, technical drawing. Model, [tests with] glass blocks in finishing.

Q2- No template

Q3- I never know if I'm missing something, so my drawings are enough for me. I have an idea of what I want it to look like and try it out in the workshop:

- a single test [editor's note - for the wings, in thermoforming], shape and colour to be reviewed, a straight test [I want a more natural organic shape].
- blow moulding [for the milling cutter] reduced-scale test

Q4-Q5- The problems are more in blow moulding the part is a bit big, and needs help. Not render like a milling cutter [depending] on colour choice, texture is OK.

As far as fusing is concerned, it's going well overall. No real blow moulding test yet, as there's a problem with the shape of the achenes.

Q6- Assembly of wings and tiller but the solution to come.

Q7- I would have liked wings that weren't fused, but for the moment it's working. [fused wings] I'm a bit put off by the flat aspect but it's not as flat as that, I'm fine with it, I imagined them to be blown, and they'll be suspended → weight problem.

Q8- Not at the moment.

Q9- So far so good.

JD- stained glass - cohort T

Context: thermoformed tableware, set for kebab restaurants, contrasting with made-to-measure glass and fast food.

Q1- Sketches to start with, I'm inspired by what already exists, then I try things out. I look for ideas on the internet, in books and in decorating shops. [I make] drawings with a bit of colour.

Q2- Moulds for thermoforming, stencils for colouring.

How do you make the mould? Use existing moulds.

I've modelled a plate in 3D, plus 3D printing for the mould. Help with modelling from LF. [DTL]

Q3- It's going pretty well; we'll have to see about 3D printing the mould. [MXU]

Q4-Q5 Quite a few constraints. Thermoforming is exactly what I'm looking for in terms of rendering. Problem of fragility, practical for restorers. [Except for one shape, I have to use the moulds available to make the shapes I want. The fragility of glass, [example of crockery seen with a restaurateur] type of crockery comes from Turkey, porcelain + plastic combined, appearance and solidity.

Q6- Cf. 3D mould for a more precise shape versus a plaster model that is not precise enough [MXU].

Q7- For the moment it's working well. I made the right choice, it's going in the right direction, rather better.

Q8- At the moment thermoforming and fusing, knowledge of finishing, I'm learning because I don't have any practical experience in my workshop.

Q9- Start earlier, go and see restaurant owners.

CM- stained glass - cohort T

Context: Using time wisely, exercises and consolidating skills in stained glass. Deepening my knowledge and references, training panels have already been completed. Work on the learning method.

Q1- Writing, diagrams, research notebook, taking notes. Ask questions, visit stained glass artists, read articles, and books, watch videos - internet - books - people.

Q2- Plan, I have my drawings, models for the painting, existing and personal models, and models of the stained-glass windows.

Q3- For the moment that's enough for me, it might be interesting to make a computer model to print to scale 1 (Pro Create software for stained-glass artists). For the moment, drawings to scale 1 directly [from sketches].

Q4-Q5- The fact that it's so vast [the field of stained-glass techniques]. Refocusing on painting, I can't do everything. Exploring techniques one by one is good.

Q6- [the question is still] whether or not I'd do a rendering at the end. What's the point if I present, if I do everything in the same format or not?

Q7- True to my initial idea

Q8- I'm currently learning painting [stained glass], [I want to] make sure I have a good grounding.

Q9- I wouldn't change anything at the moment.

Disclaimer: The following interviews were conducted at a greater distance from the questionnaire.

LF- stained glass - cohort T:

Criticism: no more platform where documents are put, the political trend to remove teachers, takes away a lot, useful human to review [knowledge], in terms of unemployment... [AXS].

Everything on screen, tiredness, lots of screen time, for the eyes, the brain, relationships, not sure it's really better. [MXU]. Inequality between those who have a tablet and those who have a computer, equal opportunities. [Paper document, no document, already a lot of tools, why add more, ecology?

Project: 2D remove modelling. Relationship to living things, "species of Pachamama mountains" several mountains, inserting plants between sheets of glass, [graphic effect, carbonising plants between two sheets of fused glass].

For the development of the project stay on colourless, white print colourless.

[Patterns] Peruvian fabrics, upper part sandblasted with interlocking animals' transparent glass or plated.

Drawing on vinyl → manual cutting → vectorised document → vinyl cutting.

Paper-mâché lead [bio-construction principle], perishable material.

Frame, double door tile, 20x34 cm format

Work from home, test drawings, sandblasting at Cerfav, my computer is not powerful enough for 3D modelling [AXS] → so work here is more complex in terms of time organisation.

MM- stained glass - cohort T

Stained glass project on the theme of Icarus.

Q1- Main technique: stained glass, grisaille. Silver yellow, lead, and wax to make the figure's wings.

Q5- Difficulties with technical skills rather than subject matter.

Lead path, how to include the character, painting tests in silver yellow OK. The apprentice master can help.

Q3- I'm stumbling over my character, drawing work, 60 cm diameter drawing, size of the character and wings, working time, and course proposed as a project.

Q2- The project calls for templates and models for painting.

Q7- The initial idea has evolved quite a bit about the representation versus the technique, which remains stained glass, faithful to the idea of Icarus and the sun.

Differences with the [initial] drawing, influence from others, and discussion with Carla [a colleague who trained], gave me the idea of wax wings, in natural wax colour.

Q6- File on computer, and paper, I was starting to run out of ideas, so I chose a leather notebook, an idea notebook in form, Icarus' notebook, a parallel between Icarus' project and my own project.

No use of digital tools except for page layout. [MXU]

BL- stained glass - cohort T:

Project: make a glass bird puppet.

Q1- Modelling, lots of drawings. More for the background, drawing to scale 1, plus coloured pencils. No use of digital tools is envisaged, I prefer to do everything by hand on paper. [RTM]

Q2- Bird still to be made, cardboard model. Glass-cutting stage [in this group, using a gauge], painting and assembly in the next group.

Q3- For the moment I'm doing what I've mastered. More complicated for the bird, fusing test [with risks] of breakage, maybe don't keep the technique, think about another technique.

Q4-Q5- Limit of the project, the material, consider the life of the piece, weight, glass breaks, [risk with] handling.

Q7- Faithful to the original idea, no major changes, adjustment of techniques.

NA- stained glass - cohort T:

Project: Using the technique of traditional stained glass, but to set stones, two panels, one with cut stones, the other with rough stones, the imprint of Man on the rough stone.

Maintenance notes:

Q1- AutoCAD for own modelling, mastery of the software through previous experience as a cabinetmaker. [DTL]. Sketches, tests, models, paper. 2D plus for structured parts has a medium other than paper - File via screen copy [MXU].

Q2- Template for creating stone cuttings, and paper.

Q3- Creation of steps, layers, template cutting.

Q4- Cutting the stones, I had to rethink the way I cut them, the stained-glass technique works, but I had to adapt the thickness of the stones by chamfering them to fit the I-shaped lead. Integrate the randomness of the stones, and play with the gaps [between stone and lead] imposed by the material. Constraint of how to cut stone, tile saw. Constraint of stone thickness according to lead → bevels.

Q5- The material remains fragile → breaks. The randomness of the material during cutting is not obvious, [for example] slate crumbles.

Q6- Find a tool adapted to the subject.

Q7- From the traced path to the random path, the empty example in the stone, [finally] takes part in the project. I was fooled by the thickness of the stones. I had to come to terms with what was imposed on me. I had to confront myself to see it. Research to stay true to the idea.

Notes from NA:

Q1- I used manual techniques, models, sketches, tests, research → and positioning of the stones. Modelling on AutoCAD, plans and dimensions. [MXU]

Q2- Creation of templates for the stone pieces alongside the stained glass.

Q3- A phased organisation:

- creating sketches
- scaling - AutoCAD
- layer
- cutting templates
- stone cutting
- panel mounting

Q4- /

Q5- My project does not involve the use of XR techniques. I use manual techniques to a large extent and only rarely use computer methods. [MXU]

Q6- As part of my project, I'm learning how to cut stone using a tile saw + water.

Q7- I work with light → the colour of the stones, the randomness of the stones due to their shape. What I like about this project is playing with the size of the stones in the same way as the design of the stained glass.

AT- stained glass - cohort T:

Project: digital and manual. Creating digital material on the computer with bugs, choice, and then re-transcription into stained glass. "Transcribing digital material into reality".

Opening of heavy random part image files. [MXU]

Q1- Manual techniques, drawing, collage, sketching. Digital techniques, scans, digital copies [screen copies] plus experience with bugs [when opening files] [MXU].

Q2- Yes, stained glass template. No mould [stained glass] integrated into a computer shell. Thermoformed object or glass paste for glass computer accessories, idea abandoned.

The grid of the stained glass reflects the digital architecture.

Q3- Very quick sketches reworked on the computer, digital collage. It takes longer but develops my motivation. [MXU]. For the moment it's going well.

Q4- Fears of not trying everything, fears about future implementation. [to transcribe the] grey scale screen into the greyscale on the glass in grisaille.

Q7- Test welds to make them as geometric as possible. Question the result.

Q8- Geometric welds

Q9- A bit of a start, motivating digital/physical transition.

LP- decoration - cohort T:

Project: stained glass plus pieces in pâte de verre, engraved pieces [multi-layered glass], with a thermoformed mirror in the centre. Theme: the cycle of life, nature, the universe.

Q1- Drawings, wax models, engravings, preliminary drawings.

Q2- Yes, template, stained glass gauge, glass paste mould, photo references on the internet. Handmade.

Q3- Modelling my waxes, the question of 3D modelling, not at ease with software, I go faster because I'm used to waxing, more pleasant [DTL][MXU][RTM].

Texture rendering, fingerprints in the glass, digital tool losing contact with the material [MXU][RTM].

The glass pastes will be ready by the end of the group, no time to learn the digital tool [DTL].

Q4- Drawings and waxes are easier to modify than on a computer, simpler to make clean things faster, no series, it suits me like that [MXU].

Q5-/

Q6- Waxes, a few tests, some things worked, others didn't, solutions found thanks to the trainer and other learners.

Q7- I've made some changes to the initial idea, but not many. I made the branches out of pewter instead of glass paste, but the idea is the same.

I was thinking of engraving with sandblasting, but in the end, I'm more inclined towards engraving with a Dremel.

True to the original idea.

Q8- Theoretical skills, and techniques developed for wax and glass paste.

Q9-/

CM- stained glass - cohort T:

Project: Crimping glass in a 3D structure, project name "nuances".

Q1- [Metal, one of the mechanical trainers helps with] bending metal rods plus silicone for crimping.

Drawings, models with metal.

Q2- Template creation [for glass parts] from the finished metal form, cardboard or paper.

Q3- I'm a bit stuck because I'm dependent on the mechanical trainer and I'm doing paperwork in the meantime. I'd have liked to have tried it on my own, I'd have liked to have been able to project myself and make the templates.

[Questioning], be able to calculate the length of the stem and therefore

the lead I need.

Difficulties in making a model, unknowns in the project, and having the structure so that everything fits together.

Q4- I don't have the material available.

Q5- ability to experiment.

Q6- Making a mock-up to get a feel for the project gives me a 3D vision, rather than a drawing.

Q7- I wouldn't have thought of silicone, the rod was supposed to be invisible, but the metal structure is going to show.

Slightly suspended, renunciation, but the important thing is the stained glass in volume.

Q8- Not at the moment, not in metalwork, learning to make compromises, learning to layout.

Q9- Rather different variations, mobile or around a lamp, bringing it to life in a different way... the "nuances" project.

LM- stained glass - cohort T:

Project: recording in a public space, pressing a button to match the audio to the stained-glass window.

Q1- Stained glass - process, I start from a recorded memory, [if I do it after the fact] the memory is no longer fresh. The idea of the moment, drawing while listening to a recording, colouring → model of the stained-glass window, no superimposition, no alteration of the memory. → Abstract, link between colours, audio, drawing.

Q2- Calibres for cutting glass. The notion of accident in the work works on the coherence of colour through memory.

Q3- Other projects, changing ideas several times, for the moment everything's going well.

Reasons for the change: a project in pâte glass or painting (stained glass), no time, whereas now I can project onto several panels.

Q4-Q5- I don't see how you can do that other than with a line, or with a drawing.

Q6-/

Q7- For the moment no, but I'm mounting my first stained glass window → adding a lead wing? [editor's note - assembly imperfection].

Q8- Consolidating stained glass skills, improving colour memory.

Q9-/

EG- decoration - cohort T:

Project: stained glass and sandblasting, cave theme.

Q1- Observation, visits to sites and works, sound recordings, feelings, note-taking, books, and drawings.

Modelling the stained-glass window on Blender from a scan of a hand-drawn image, using AI to create animations [MXU].

I've started testing textures, concrete tests, and sandblasted glass and wax.

Q2- Glass cutting template, 3D textures, candles on a milk bar. [simulation of the creation of stalactites and stalagmites].

Q3- The work process is running smoothly, it's going well. Question about the [final] completion of the project.

Q4- At the base with water and real limestone, concretion time [too long!]

Lead and locksmithing, more testing questions. - Price can become a limit. - Limit of knowledge, time to search, tests.

Q6-/

Q7- Not at all. At the beginning I wanted to do a performance with wax leads, yes to remain faithful to the original intention.

Q8- example: Blender [DTL]- on glass - on caves etc.

Impression on plaster in the kiln [thermoforming], research in the studio, thermoforming and sandblasting.

Q9- Weight, optimised glass thickness.

Annex 8a cluster N°9 - results of the e-learning platform assessment documents.

Feedback - summary table

E-learning					
Positive points	code	Points for improvement	code	Comments	code
				Quizzes: why a quiz for each part and not one for the whole module?	[PDE-3]
		Layout: Video of the oval layout too fast → difficult to understand	[EXC-2]		
Rather well done	[EXC-1]				
		Quizzes: the questions are always the same. It would be good if they were given at random so that we didn't always have the same questions.	[PDE-3]		
Good for TG revision	[PDE-1]				

Satisfaction survey - summary table

E-learning					
Positive points	code	Points for improvement	code	Comments	code
Course content: 1- Clarity and organisation of course content					
		The organisation is not super clear if you don't know the site.	[ERA-1]		
		The register button to access the courses is a bit special.	[ERA-1]		

E-learning					
Positive points	code	Points for improvement	code	Comments	code
It's very easy to find your way around the different courses.	[ERA-2]				
It's great	[EXC-1]				
OK	[ERA-2]				
Course content: 2 - Has the course given you an understanding of glassblowing, cross-disciplinary subjects, background, description of machines and tools, presentation of the workshop, etc.?					
Learn about technical drawing.	[PDE-2]				
Yes, especially in technical drawing with videos.	[PDE-1]				
				I already knew most of it.	/
Yes, correct understanding	[PDE-1]				
Course content: 3 - Are the explanations of machines, tools and the workshop clear, detailed and useful?					
Assessment	[PDE-1]				
		They could be more detailed, particularly on how they work.	[EXC-3]		
All the explanations are easy to understand and useful for progress.	[PDE-1]				
		missing names [of tools]	[EXC-3]		
Course structure and materials: 1 - Course structure and organisation of sessions (chapters)					
Good but...	[ERA-2]	.... but not well organised. For example, before launching a quiz,	[ERA-2]		

E-learning					
Positive points	code	Points for improvement	code	Comments	code
		the course/page ratio and the quiz button are not obvious compared with the total page.			
Very good	[ERA-2]				
The sessions are well-organised	[ERA-2] [PDE-2]				
OK	[ERA-2]				
Course structure and materials: 2 - Did the course materials (text, images, videos) help in understanding the subject?					
Yes	[PDE-1]				
Yes	[PDE-1]				
Yes, it helped to understand	[PDE-1]				
OK	[PDE-1]				
E-learning platform: 1 - Is the platform user-friendly for accessing course materials, and assessments and taking part in discussions?					
It's friendly enough.	[ERA-1]				
		It's a bit hard to get your bearings and know where to go at first.	[ERA-2]		
Yes, I think it's good and the courses are practical and interesting.	[PDE-1]				
Yes	[ERA-1]				
E-learning platform: 2 - Are the navigation and instructions provided by the platform clear and useful?					
Yes, useful …	[ERA-1]	…. but not 100% Clear	[ERA-1]		

E-learning					
Positive points	code	Points for improvement	code	Comments	code
The instructions are clear and easy to follow.	[ERA-1]				
Yes	[ERA-1]				
General feedback: 1 - What specific aspects of the course did you find particularly beneficial or stimulating?					
Quiz + auto-correction	[PDE-3]				
The video of the workshop with Jean-Pierre doing a carafe and the questions.	[PDE-1]				
I've found the general technology courses beneficial, as they're good for revision.	[PDE-1]				
Videos and tests	[PDE-1] [LTP-1]				
General feedback: 2 - Do you have any suggestions for improving this course in terms of content or teaching?					
				Non	/
		Add a general knowledge or art history section.	[EXC-3]		
General feedback: Any other comments?					
/		/		/	

Annex 8b cluster N°9 - results of the assessment documents for the VR glassblowing simulator

Feedback - summary table

Virtual studio					
Positive points	code	Points for improvement	code	Comments	code
		The videos are not clear.	[EVR-1]		
				A desire to grasp and use tools with real interaction	[EVR-3]
		Turn the pipe with the left-hand controller, after the foliage, to reproduce the work situation.	[FIT-2]		
		The big pipe standing there is strange. Why not make a more organised showcase?	[FIT-3]		
It's already taking shape.	[PEN-2]				
The glass doesn't just stay in the centre, funnily enough,	[FIT-1]				
		Have a board with the tools on the wall, rather than the floating panel.	[EVR-1]		
It's a good way to get an idea, before ... [workshop experience].	[PEN-2]				
		The desire to do it yourself, no further than picking, is a bit of a shame.	[FIT-3]		

Virtual studio					
Positive points	code	Points for improvement	code	Comments	code
Two scenarios, discovery, learning, OK	[PEN-1]				
		Give directions and instructions.	[EVR-1]		
		Use magnetism to position the hands on the cane for picking.	[EVR-1]		
Transcription of videos made during the experiment					
		The big pipe. On the visual, I would have bet on wood.	[FIT-1]	In terms of texture, there are different types of pipes.	[FIT-1]
		The video is too undoomed, you can't see it. Because in itself, the quality is fine and good.	[EVR-1]		
		It would be nice to pick with the other canes (which are presented in the 'to discover' tools). It wouldn't potentially change much, but with the smallest you could take less glass, with the medium a bit more, and with the big one a bit more.	[FIT-1]		
				Visual observation: a test of the proposed tools interacting with the glass → physics not coherent.	[FIT-1]
				The irons on the bench as "decor"	[EVR-1]

Virtual studio					
Positive points	code	Points for improvement	code	Comments	code
				look completely wrecked	
		Perhaps the lid should be removed to improve the texture of the water.	[EVR-1]		
Well, that's not bad.	[FIT-3]				
				Can you pick very large balls?	[FIT-1]

Satisfaction survey - summary table

Virtual studio					
Positive points	code	Points for improvement	code	Comments	code
Interface: 1- Is the VR glassblowing workshop simulation user-friendly for accessing the functions and tasks to be carried out?					
Yes, it's fun to use	[EVR-1]				
		Quite a few bugs, especially when using the pipe.	[FIT-2]		
Yes, it's pretty good.	[EVR-1]				
Yes, it's OK	[EVR-1]				
Interface: 2 - Ease of use of functions via controllers (teleportation, tool input, information display, etc.)					
Yes, quite simple					
		Slightly complicated tool grabbing.	[FIT-3]		
		This is complicated because the movements are not easy to manage.	[FIT-2]		
OK					

Virtual studio					
Positive points	code	Points for improvement	code	Comments	code
Interface: 3 - Ease of use of the interface in general (displaying information, moving around, taking action, 'managing to do what I want')					
		Yes, except for the right joystick, which turns the cane and teleports (or bug during testing, I don't know).	[FIT-2]		
It's OK	[EVR-1]				
		Training movement to tame	[FIT-2]		
… otherwise, OK	[EVR-1]	Information should be displayed by grabbing a tool rather than pointing at it, I think...	[EVR-2] [EVR-3]		
Knowledge structure: 1 - Do you prefer free access to the various functions or a more guided route?					
		Both	[PEN-1]		
		A guided route with possible stages.	[PEN-1]		
		A more guided scenario with difficulty levels.	[PEN-2]		
		Free access for those who already know the route and more guided access for beginners.	[PEN-2]		
Knowledge structure: 2 - Did the information media (text, images, videos) help you to discover and understand the blowing workshop?					
		Lack of display quality	[EVR-1]		
		The video too zoomed out.	[EVR-1]		

Virtual studio					
Positive points	code	Points for improvement	code	Comments	code
The Videos are understandable but…	[EVR-1]	... but too random [stability of screen appearance].	[EVR-1]		
Yes, …	[EVR-1]	... a little [blurred, crossed out] zoomed-out videos.	[EVR-1]		
Knowledge: 1 - Do I find the application useful for learning and remembering the workshop environment, tools and machines?					
				Mainly for discovering	[PEN-2] [FIT-3]
For the tools yes,	[PEN-2]	... but the machines and layout are specific to each workshop.	[FIT-3]		
Yes, it can teach you the tools...	[PEN-2]	... but the practical side still needs to evolve.	[FIT-2]		
Yes	[PEN-2]				
Knowledge: 2 - Do I find the application useful for learning and remembering the manufacturing process?					
Yes, I think.	[PEN-2]				
Except for gathering...	[FIT-3]	… not really.	[FIT-3]		
Yes, it can help.	[PEN-2]				
		We need to use the tools.	[FIT-3]		
Knowledge: 3 - Do I find the application useful for learning and memorising gestures?					
		BOF! [not really]	[FIT-2]		
To view them, yes...	[PEN-2]	... but not memorise them	[FIT]		
		Yes and no, because it's better to do it in real life because you can feel it.	[PEN-1]		

Virtual studio					
Positive points	code	Points for improvement	code	Comments	code
		Not very much.	[PEN-2]		
General feedback: 1 - What specific aspects of the simulation did you find particularly beneficial or stimulating?					
		See and be able to remember the process stages, if you can interact with a hammer and so on.	[FIT-1] [PEN-1]		
Being able to blow glass	[PEN-2]				
Being able to walk around the workshop and discover the tools.	[PEN-2]				
Gathering	[PEN-2]				
General feedback: 2 - Do you have any suggestions for improving this simulation in terms of content or interface?					
		Overall optimisation of the simulation.	[FIT-2] [FIT-3]		
		Have a board on the wall with the different tools and their uses.	[EVR-1]		
		Have a table where all the tools are marked and be able to click on the name of the tool to see an explanatory video.	[EVR-1]		
					/
General feedback: Any other comments?					
		Don't put the videos on the tools but on a separate board.	[EVR-1]		

CRAEFT

care, judgment, dexterity

Annex A – Educational kit

In the general purpose of preservation and revival crafts, the aim is to codesign and adopt digital aids in knowledge transmission and training across ways of formal and informal learning.

The educational kit formalises draft digital aids for each RCI curricula program, as well as pedagogical methodology and usage scenario for Craeft digital tools.

The educational kit starts with a reminder of context and demand analysis to define the questions it will answer.

- How can Craeft digital tools be implemented in the glassblowing with a pipe CPC curriculum as a pilot?
- How can we assess the impact of digital aids on learning?
- How can a transposable educational model be established for each RCI?

Then, a strategy to combine existing learning methods with digital tools and to select appropriate activities to maximise learning impact has developed through the proposal of usage scenarios and an overall methodological approach.

Our concern is to think about the articulation of knowledge and know-how, to create opportunities to go back and forth between digital tools and workshop work to create a synergy of learning tools synchronously or asynchronously.

Based on heuristics educational methods and Cognitive Load Theory as a validated scientific approach, this document details:

- the context and methods for experimentation of glassblowing pilot 1
- assessment methodology of Craeft digital tools impact on the learning process
- how to transpose the experimentation on the other RCIs.
- templates of the key training sessions for experimenting.

This project has received funding from the European Commission, under the Horizon Europe research and innovation programme, Grant Agreement No 101094349.
http://www.craeft.eu/

1 Introduction

1.1 The demand

Grant Agreement, DESCRIPTION OF THE ACTION (PART A)

Work package WP6 – Craft preservation (p12)

Use the Community Platform and the Apprentice Studio, appropriate to the knowledge transfer model of each RCI (formal, industrial, informal, workshops). The objective is to evaluate their efficacy during the first pilot semester and use the results to improve them. Apply findings to improve them, for the second pilot semester. Evaluate outcomes with two cohorts of trainees (one using CRAEFT aids and the other not), for each RCI, and comparatively analyse the progress in developing crafting capacities.

Deliverable D6.1 – P1 - Education & Training (p23)

This deliverable will report the contributions of Craeft to craft education and training. The first version (M24) will contain the drafting of the use of digital aids targeted per the training programme of each RCI, as well as the pedagogical methodology and usage scenarios for the Craeft Studio and Apprentice Studio software. It will furthermore provide the content collection for the contextualisation of the RCIs. CERFAV will compile the education and training outcomes for the program from the individual RCIs. [...]. The second version (M36) will contain the final version of the curricula and the results of the evaluation of the effectiveness of the education and training aids per RCI. Each version of this deliverable includes: (a) Instructional methodology and software suite usage scenario, (b) a Report, and (c) Publication of the education documents that will be published on the OpenAIRE communication infrastructure.

1.1.1 Summarise aims

Appropriate the Craeft numeric tools to the glassblowing activity as a pilot and deploy them for each RCI.

Defined the modalities and criteria to assess the effectiveness of the education and training aids per RCI and to collect the results.

1.1.2 Strategy

- “Define a strategy to combine the alternative modes of learning and training in the existing curriculum structure
- Select the most appropriate activity to maximise learning impact
- Using heuristic methods and experience in the organisation of curricula by Cerfav
- Maximise the efficiency of each activity through scientifically validated approaches
- Evaluate learning outcomes and refine
- Integration of a pedagogical engineer at Cerfav for the next two years.”

1.2 Context

In the work frame of the European Craeft project, the aim is the integration of digital tools developed as part of the project in Cerfav glassblowing curricula as a pilot and in further steps disseminate this experimentation all through the other RCIs.

The numerical tools are embedded in the Craeft Authoring Platform (CAP). This platform will give access to a Craft eLearning Portal (CLT), a Design Studio, two training applications Craeft Studio and an Apprentices Studio.

This experimentation will be implemented with Cerfav apprentices of the first and/or second year preparing the Certificate of Professional Competence CPC in glass and crystal art.

1.2.1 Conditions

- two cohorts
  - a control cohort without the use of Craeft tools
  - a test cohort using Craeft digital aids and tools
- two times
  - Implementation and assessment of the experimentation, 2nd semester of 2024
  - Improvement, tuning, assessment and report for the final version, 2025 years

1.2.2 Principles

- Situational learning: "In every profession and every activity, there is knowledge that is "resistant to classical schooling", built up progressively through experience, and which nothing can replace. Situational learning is decisive here and reinforces the training-employment continuum.
- Using the principles of cognitive load theory and testing its operational limits (see annex 1).
- Not to hinder apprentices in their curricula.

1.2.3 Aims

- To create an appetite for the tools offered by Craeft.
- To create an attractive, interactive interface.
- To encourage independent learning.

1.3 Analysis of demand

- Why?
  - Craeft will catalyse craft education and training with intuitive digital aids.
- How?
  - Drafting an educational kit for Glass blowing, integrated pedagogical methodology and usage scenario for the Craeft Authoring Platform, as a pilot for all the RCIs (Representative Craft Instances)

- Who?
  - Craeft team
  - Cerfav trainers, (pilot)
  - Cerfav apprentices, (pilot)
  - The people in charge of training for the other RCIs, (implementation)
  - RCI learners, (implementation)
- Where?
  - Cerfav
- When?
  - From March 2024 to February 2026
- How many?
  - Two cohorts
    - 2 learners + 1 trainer, traditional cohort (T)
    - 2 learners + 1 trainer, traditional augmented (TA)
  - Two phases, one drafting of the use of digital aids targeted per the training programme of each RCI, experimentation and assessment, M24. The final version of curricula and results of project assessment of the effectiveness of the education and training aids per RCI, M36.

The issues

- How to implement Craeft studio tools in the CPC curricula glass and lead crystal glass art training courses?
- How can we assess the impact of the use of digital technologies, e-learning and extended reality on learning?
- How can a transposable educational model be established for each RCI?

2 Proposal scenario for setting up the Craeft education and training experiment

2.1 Craeft tools

- eLearning platform – CLT
- an XR design/modelling platform- Design Studio
- a virtual workshop training platform – Craeft Studio / Apprentices Studio

2.2 Hypothesis

The issue is to implement in an existing program of learners the Craeft experiment times. (see Annex 3 - example of Cerfav CPC glassblowing curricula)

One proposal was to do it during their project time rather than their vocational training time, for several reasons:

- do not hinder:
  - not reduce the time devoted to learning the skills of the trade, gathering glass, mould blowing, etc.
  - on the contrary, allow them to have more time to do it.
- use a heuristic, active, project-based educational method.

2.3 What can Craeft tools do for them?

- design their project using a virtual reality tool - Design Studio
- practice making parts - Apprentices Studio
- test their knowledge - CLT
  - about the workshop
    - environment
    - machinery and equipment
    - tools
    - process
  - knowledge of glass
    - composition
    - operating temperature
    - The rules of hygiene, safety, ergonomics and respect for the environment
- Opening up and learning about other techniques
  - other glass techniques, or hot glass, such as filigree
  - other arts and crafts
- project follow-up, having a virtual project notebook

Note: a questionnaire or creative workshop on the expectations of Craeft tools could be carried out with learners and trainers to reinforce the proposal.

2.4 Scenarios

I'm an apprentice exempted from general subjects at Cerfav and part of the TA cohort.

2.4.1 Get informed and think about my project

Using Craeft eLearning platform (CLT):

- I can test my knowledge.
- I can review the concepts I haven't mastered,

at the start of each module, I will be given advice.

- I can discover/deepen my knowledge of the basics of the glassblowing technique (steps involved in blowing a cup) - trade gestures.
- I can find out about the workshop environment, technology, HSE, etc.
- I can find out about other glass techniques, stained glass, blowpipes, etc.
- I can learn about other glassblowing techniques, filigree, etc.
- I can learn about other arts and crafts.
- I can take notes on the progress of my project.

2.4.2 Modelling my ideas

Using Design Studio:

- I design and develop the shape of my object.
- I can take account of manufacturing constraints.
- I can work out my manufacturing process. (C2.1 reference guide)
- I prepare the documents and elements necessary for manufacture, e.g. plan, mould, etc.
- I can prepare the elements defining the quality criteria for my creation.
- I can check method points or the tools I'll need on CLT.

2.4.3 I practice before producing my piece in the workshop

Using Apprentices Studio:

- I can practice basic movements.
- [train on a sequence of actions].
- I take into account health, safety, the environment, maintenance and quality. For example, I can't access the virtual workshop if I don't pass the quiz beforehand, or there could be 'surprises' during the simulation. → link with CLT.
- I can draw up a checklist of points to check before, during and after manufacturing.
- I can check method points or the tools I'll need on CLT.

2.5 Dependent modalities on the scenarios and the digital tools used

Modalities	Scenarios / digital tools			Workshop
	E-learning platform	Design Studio	Apprentices Studio Craeft Studio	
Connections	Online	Off-line	Off-line	Off-line[1]
Location	Everywhere	FabLab or workshop	FabLab or workshop	Workshop
Time	Every time	Project session	Project session	Workshop session
Synchronicity	asynchronous	synchronous / asynchronous[2]	synchronous / asynchronous[2]	synchronous

Figure 50. Digital tools modalities table.

Notes:

1. Off-line at first, we can imagine an augmented reality application or access to the e-learning platform available on mobile phones in the workshop, for certain concepts to be learned or certain tasks to be carried out.
2. Depending on the session, there may be synchronous times when the whole group works together on the discovery session. Asynchronous times are when people work on different tools depending on the needs of their project, during project time but not necessarily at the same time on the same tool.

3 Overall methodological approach

3.1 General principles

3.1.1 Foundation:

Document Miro by David Pilot Glassblowing:

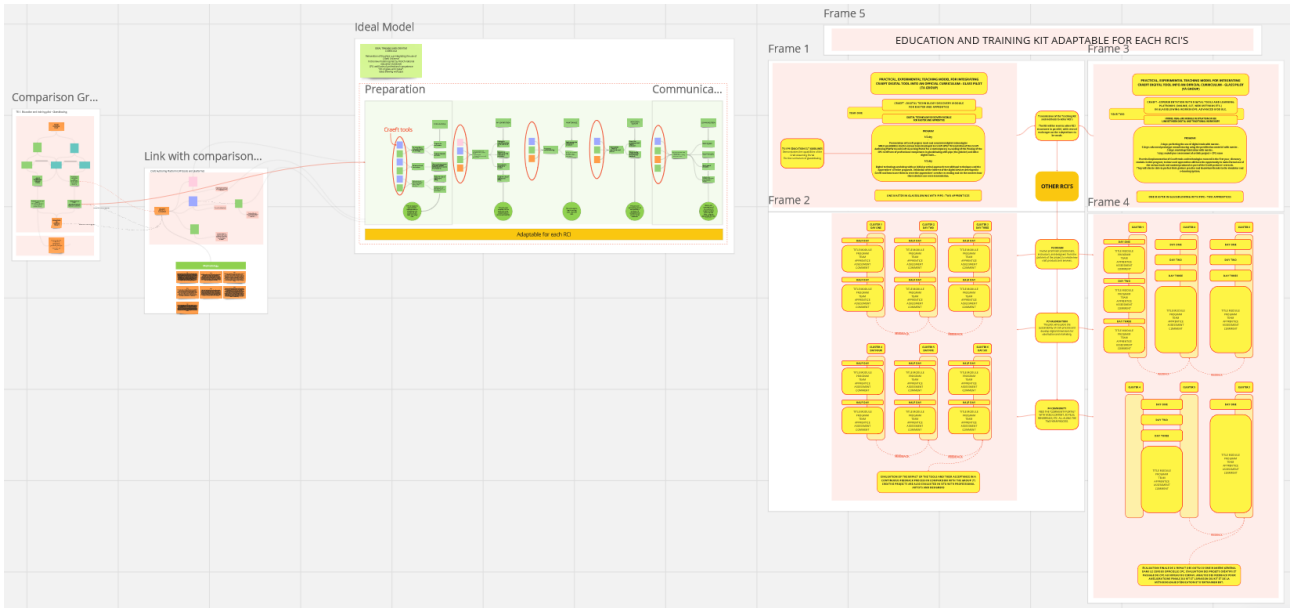


Figure 51. Pilot glassblowing synopsis.

See Annex 2 and link to a detailed view

3.1.2 Method based on:

- Project-based educational and cognitive load theory.
- 2 cohorts in 2 phases
- 5 activities linked to the curricula glass and lead crystal glass arts:
    - Prepare
    - Implement
    - Inspection/Quality
    - Maintenance
    - Communication
- 3 learning and project creation phases:
    - I get informed and think about my project
    - I model
    - I practice
- Activities and phases overlap

	Prepare	Implement	Inspect quality	Maintain	Communicate	
I get informed and think about my project"	O		O	O	O	Craeft eLearning platform
"I model"	O		O		O	Design Studio
"I practice"	O	O	O	O	O	Apprentices Studio

Figure 52. Activities and phases overlap the diagram.

Legend:

O: the learning phase allows you to work on acquiring the skills linked to the activity.

O: the learning phase is indirectly linked to the acquisition of skills related to the activity.

- The three phases of the scenario can be available through all RCIs with their specific modalities of transmission and learning.

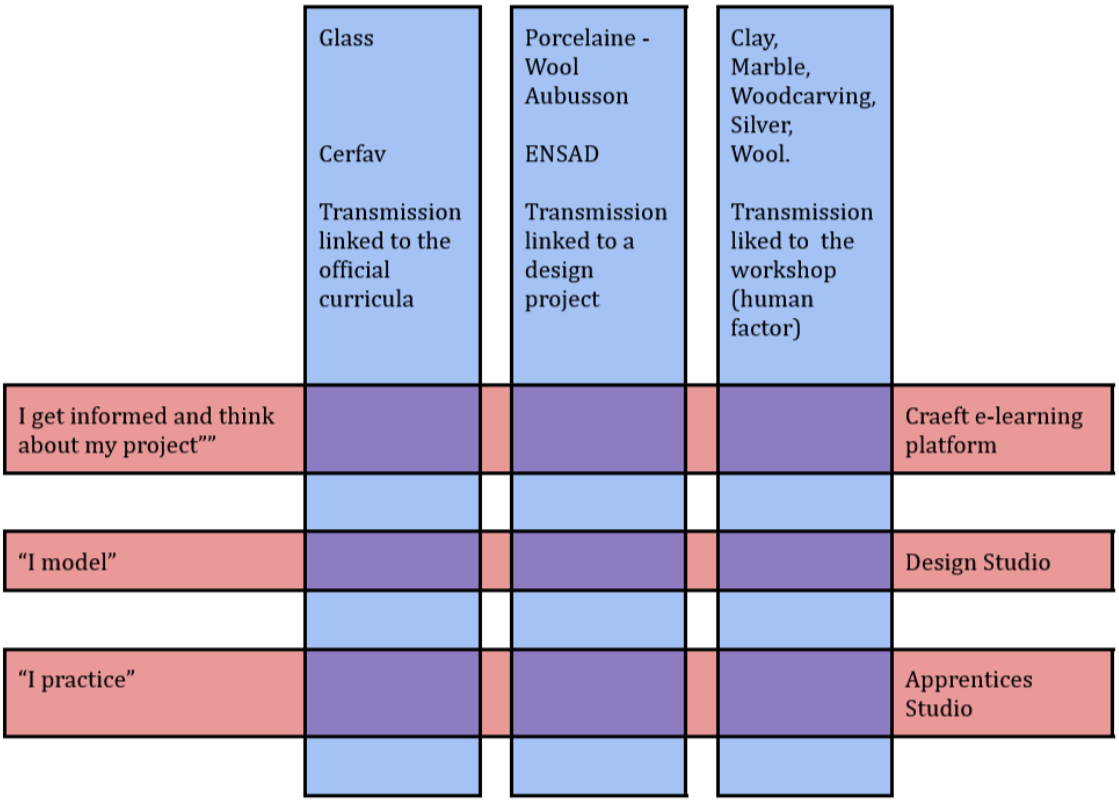


Figure 53. Cross-sectional approach of scenarios for RCIs.

- Educational scenarios have the same structure from one RCI to another.
- The sessions are "empty shells" to be completed with the knowledge and know-how of each RCI.

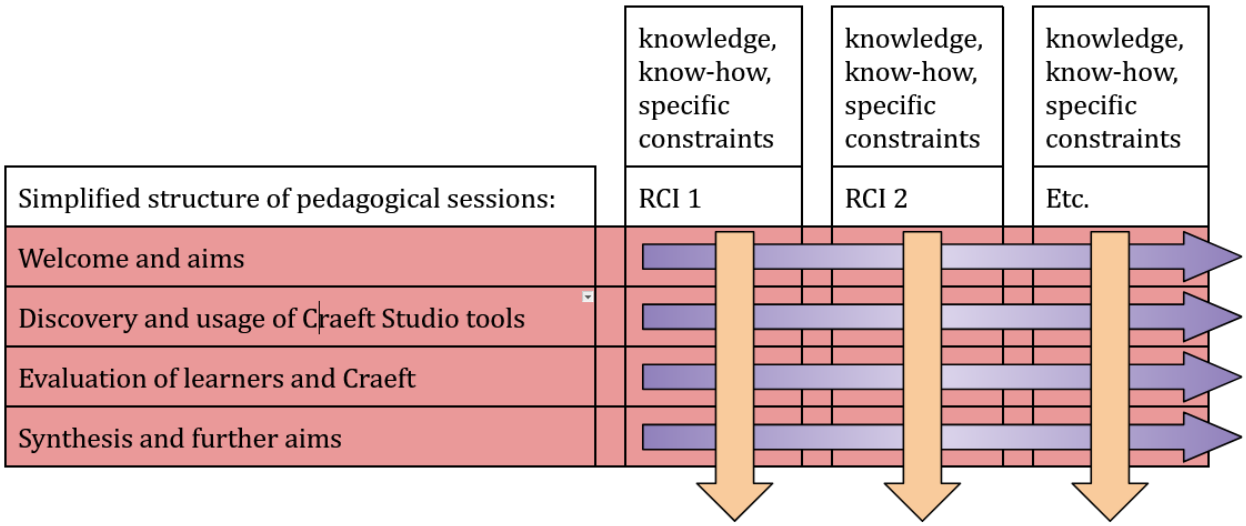


Figure 54. Simplified structure of learning session.

- The common points between the different RCIs are the elements (semantic fields) involved, materials, processes and actions. The specificities of each RCI are expressed through the work environment (the workshop), tools and machines, gestures and techniques.

Added to this is cross-disciplinary knowledge, such as health and safety rules, etc.

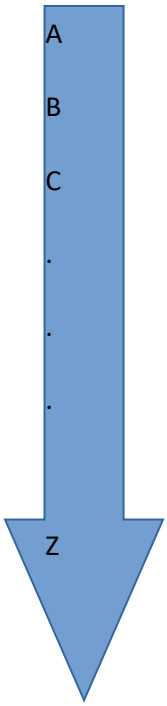
- Assessment criteria of learners and Craeft project are transferable directly from one RCI to another, (see assessment chapter).

3.2 Educational principles

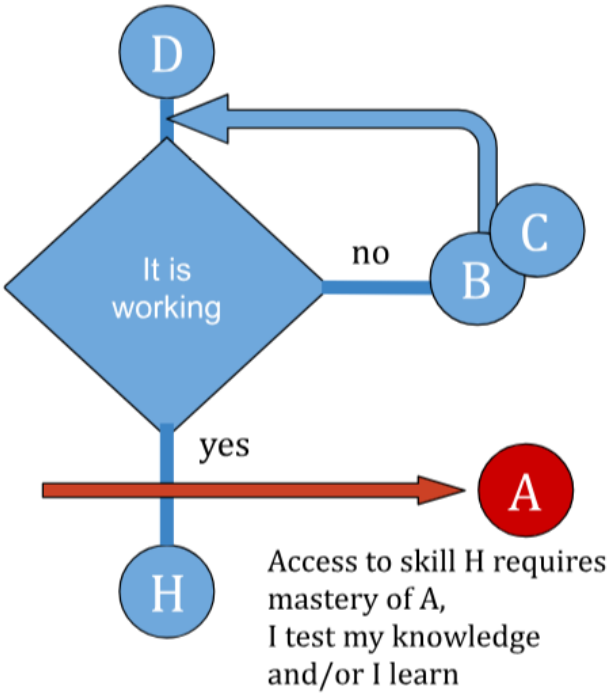
Which educational approach?

Comparative chart of approaches:

Deductive approach	**Inductive approach**
From general to particular	From particular to general
Linked educational methods: - Affirmative (teaching) - Interrogative (training)	Linked educational methods: - Active - Active experiential - Project-based
The learner: “I like learning”	The learner: “I like doing”

<table>
<tr><th>Deductive approach</th><th>Inductive approach</th></tr>
<tr><td>Knowledge, know-how and skills are accessed via the teacher, in a top-down and sequential manner, one notion after the other.
 
</td><td>"I have a project; I'm going to learn the knowledge I need to succeed".

Access to skills is direct from the learner to the knowledge, the trainer is a facilitator, and access to knowledge is discontinuous.

"I test and start with skill D".
 
</td></tr>
<tr><td>Benefits:

● provides a framework that can be reassuring, particularly for less independent learners.
● no gaps in "knowledge" in the learning progression</td><td>Benefits:

● learners are responsible for their own learning progress (it is monitored by the trainers)
● motivation</td></tr>
<tr><td>Disadvantages:

● lack of motivation for less 'academic' learners</td><td>Disadvantages:

● requires more autonomy from the learner.</td></tr>
</table>

Figure 55. Comparison of inductive and deductive approach.

The approach we are proposing as part of the Craeft experiment is an inductive one, more in line with the project's recommendations. Proposing pedagogical, heuristic and hauntological tools, and an active teaching method.

3.3 Implementation of educational principles

People following the apprenticeship are likely to already have some knowledge via their apprenticeship master or the courses given at the CERFAV, so creating a challenge with a quiz beforehand is a way of creating an appetite for the tool and motivation.

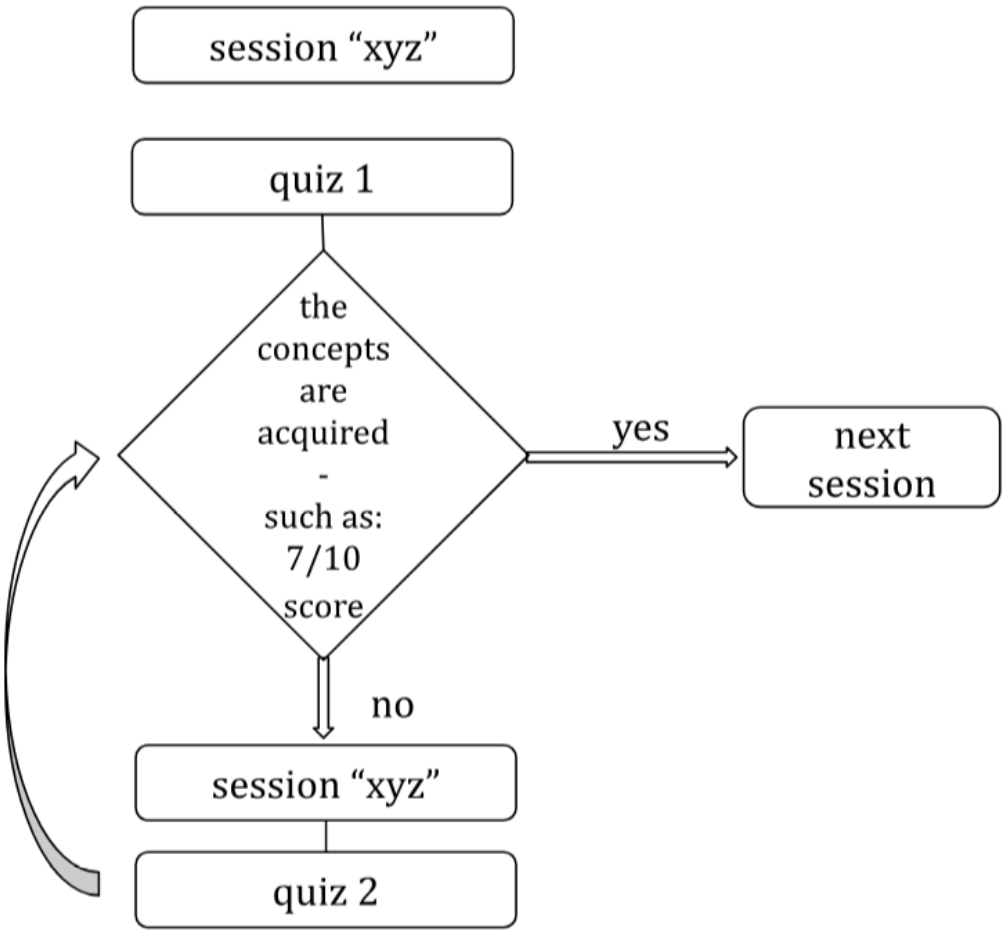


Figure 56. Quiz first principle.

Links between the CLT and Apprentices Studio: concepts covered in theory in the CLT are reviewed practically in the Apprentice Studio.

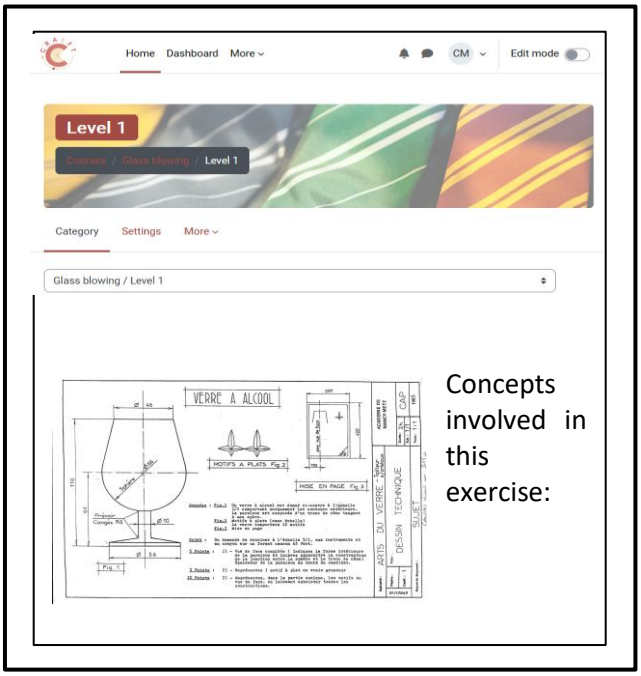


Figure 57. Knowledge learned as part of the CLT.

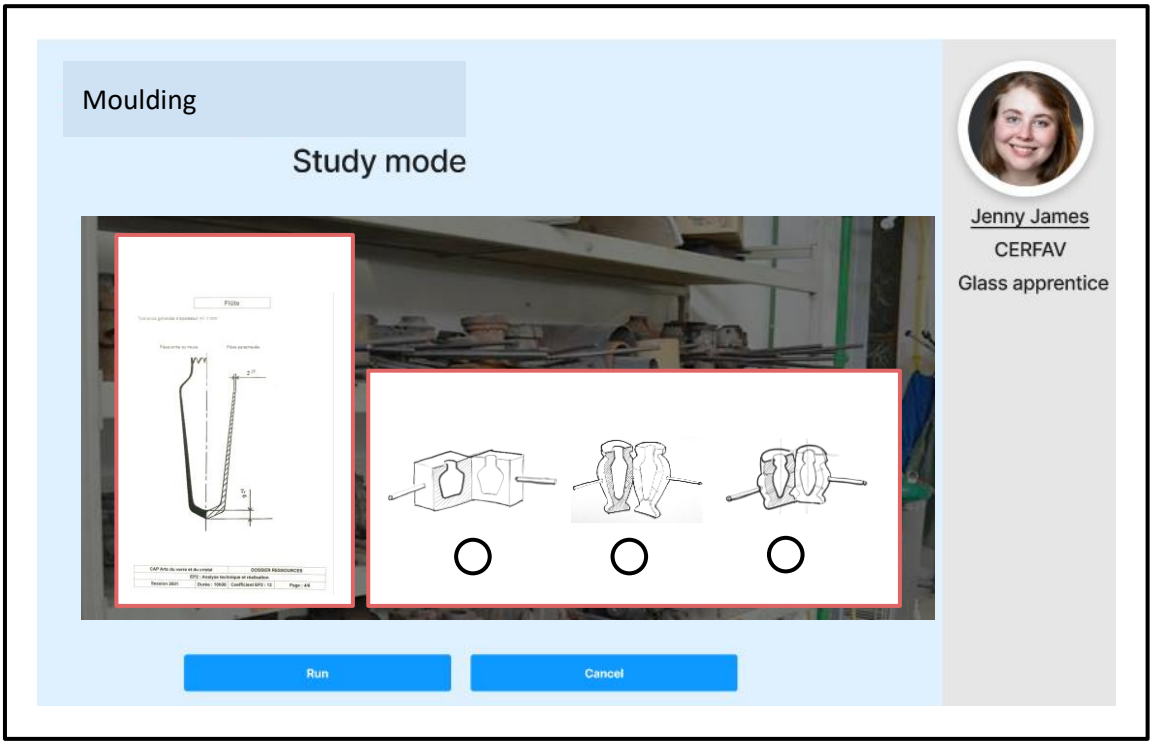


Figure 58. Contextualisation in Apprentices Studio.

During the learning process, the three phases of "I get informed", "I model" and "I practice" can loop back on themselves.

- “I get informed; think about my project
- “I model”
- “I practice”

Structuring information into sub-sections and creating categories makes it easier to understand and remember (cognitive load theory).

For example, to showcase hot glass tools and machines:

Action	**Tools**
Gathering glass	
	punty
	blowpipe
Modelling	
	block
	mould
	wet newspaper
	jacks
Detach	
	tweezers
	jacks
	detaching iron
Bringing glass	
	punty
	diamond shears

Figure 59. Knowledge structuring example.

Various forms and ways to present concepts: textual, visual, and audio-visual such as:

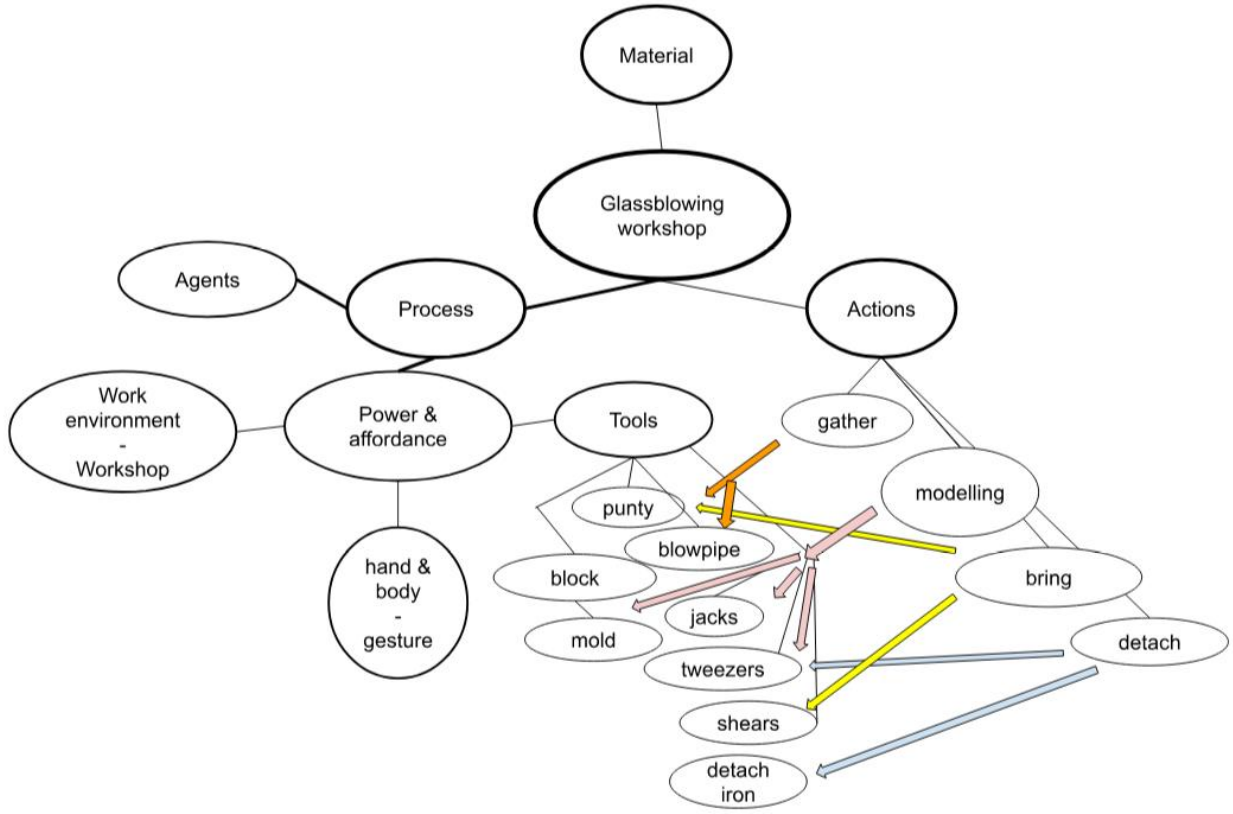


Figure 60. Mind map.

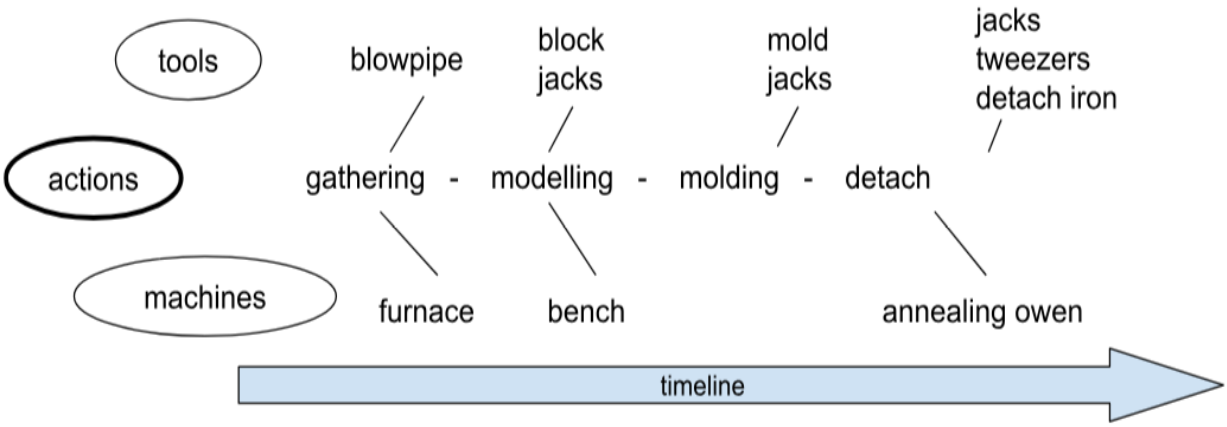


Figure 61. Timeline.

4 Assessments

4.1 What is assessed?

4.1.1 Assessment of Learner

- The results of assessments during the curricula (formative assessments - quantitative, scores/notes):
  - paper
  - Cerfav eLearning platform
  - Craeft eLearning platform
  - case study.
- The consistency of skills acquired in cross-disciplinary subjects such as technology, HSE and technical drawing with practical implementation in the workshop (qualitative, observation by trainers, self-assessment).
- CPC exam results (summative evaluation)
- The result of the personal project (summative assessment)
- Educational progress (time/speed of skills acquisition, maturity of skills mastery at the end of the course, statistical evaluation).

4.1.2 Assessment of the Craeft Project

- The tools
- Effects (impact of Craeft tools on teaching progress)

4.2 Assessment methods - how is it assessed?

4.2.1 Learners:

- Theoretical assessment
  - quizzes, tests
  - cases study
  - presentations
- Practical assessment
  - simulations
  - practical workshop
  - personal project

4.2.2 Craeft project:

- personal project monitoring (project notebook)
- satisfaction survey
- statistical evaluation, compilation of learners' results

Notes:

- Comparing the results obtained in the assessments between the T and TA cohorts will make it possible to evaluate the effects of the Craeft tools in the acquisition of skills.
- Statistical comparison of the scores obtained in the assessments, and tests taken on the CERFAV / CLT platforms or paper for each person in the T and TA cohorts.
- Qualitative comparison of the assessments made by the trainers on the progress in the workshops and the projects of the apprentices in the T versus TA cohorts.

4.3 Limitations

- the small number of people per cohort may make them unrepresentative.
- Depending on the criteria used to assess the situations or the personal project, there may be an increased possibility of subjectivity. An existing evaluation grid should be used and recorded or created and recorded.

4.4 Learner Assessment Criteria

See the table showing the relationship between activities and skills in this document.

Activity-based assessment is more global and oriented towards situational assessment in a workshop. Skills-based assessment is more oriented towards CLT assessment.

The aim is to cross-reference the results to generate an overall assessment.

4.4.1 Activity-based assessment criteria:

According to the Glass and Crystal Arts referential, expected results for:

- **Preparation:** "The workstation is ready for use in compliance with procedures and health and safety rules."
- **Implementation:** "The work conforms to the production order and the technical file."
- **Maintenance:** "The workstation is kept clean, safe and in good working order."
- **Inspection / Quality:** "The inspection, which complies with the technical file, is carried out by the quality procedure and environmental standards".
- **Communication:** "Reports and instructions are given or written within the allotted time, using the appropriate technical vocabulary".

4.4.2 Skills-based assessment criteria:

Skills table, CPC referential of glass and crystal art, see pages 12 to 16.

C1 - Be Informed

	Assessment criteria	
Know-how	**Setting the scene**	**Expected results**
C1.1 Read the instructions and decode the documents provided (technical file and procedure).	Environmental elements: The workshop, the workstation. Available resources: - Technical file and procedure - Oral or written instructions - Model	The determining elements, related to the work, are identified and can be expressed.
C1.2 Identify the materials used.	Environmental elements: The workshop, the workstation. Available resources: - Material sheet. - Datasheet	The materials are identified and the constraints related to their use are taken into account.
C1.3 Identify materials, tools, and fluids.	Environmental elements: The workshop, the workstation. Available resources: - Technical file. - Oral information.	Materials, tools and fluids are identified.
C1.4 Identify control tools.	Environmental elements: The workshop, the workstation. Available resources: - Technical file. - Oral information.	Control tools are identified. They are in working order and available at the workstation.
C1.5 Be aware of health, safety and environmental regulations.	Environmental elements: The workshop, the workstation. Available resources: - Technical file, - Rules of procedure,	Health, safety and environmental rules are identified and understood.

	Assessment criteria	
Know-how	**Setting the scene**	**Expected results**
	- Safety booklet, - Single document, - Environmental sheet, - Product sheet.	

Figure 62. Assessment criteria for activity "be informed".

C2 – Prepare

	Assessment criteria	
Know-how	**Setting the scene**	**Expected results**
C2.1 Establish the chronology of the operations to be carried out according to the aesthetic and technical constraints.	Environmental elements: The workshop, the workstation. Available resources: - Technical file - Procedure sheet - Model	The choice related to aesthetic And technical constraints are formalised. The chronology of the manufacturing operations is coherent.
C2.2 Prepare the work materials.	Environmental elements: The workshop, the workstation. Available resources: - Technical file - Procedure sheet=	The materials are ready to be used.
C2.3 Select and check machines and tools and adjust tools.	Environmental elements: The workshop, the workstation Available resources: - Technical file - Procedure sheet	The choice of the tool and the machine is adapted to the required realisation. The tool and machine are in working order. In the case of anomalies, the person responsible is informed.

	Assessment criteria	
Know-how	**Setting the scene**	**Expected results**
C2.4 Organise and adapt your workspace.	Environmental elements: The workshop, the workstation. Available resources: - Safety data sheet - Rules of procedure - single document - Labor Code	The workspace is operational.

Figure 63. Assessment criteria for activity "prepare".

C3 – Implement

	Assessment criteria	
Know-how	**Setting the scene**	**Expected results**
C3.1 Carry out picking with ferret and cane	Environmental elements: The workshop, the workstation. Available resources: Procedure sheet.	The quantity of material is necessary and sufficient to produce the part.
C3.2 Shape glass is taken for blowing	Environmental elements: The workshop, the workstation. Available resources: Procedure sheet.	Mesh and marbling techniques are mastered.
C3.3 Carry out the blowing process to produce the required part.	Environmental elements: The workshop, the workstation. Available resources: Procedure sheet.	The part (cup or single goblet) is by the procedure sheet. The blowing is clear.
C3.4 Carry out the pressing to produce the required part.	Environmental elements: The workshop, the workstation. Available resources: Procedure sheet.	The part (feeder mould, simple shape) is by the procedure sheet.

	Assessment criteria	
Know-how	**Setting the scene**	**Expected results**
C3.5 Perform stain removal and annealing.	Environmental elements: The workshop, the workstation. Available resources: Procedure sheet.	The part is detached at the right temperature and carefully placed in the arch.
C3.6 Perform finishing (Tracing, bevelling, slotting, chamfering, sawing, re-brushing, flatting, de-tooling, polishing).	Environmental elements: The workshop, the workstation Available resources: - Datasheet - Machine file - Model	The completion of the part is following the datasheet or the model: - The bevelling, the slotting and the re-branding are mastered on parts of two to five millimetres of thickness of mouth; - The chamfering is mastered on simple and flat curves. The chamfer does not exceed 5 mm for an angle of 45°; - Nurse sawing is mastered; - The platinum surface is perpendicular to the vertical axis of a 25 to 100 cm2 part; - The de-tooling is mastered for a maximum diameter of 50 mm; - Reshaping and deburring are mastered; - The mechanical polishing and shining, except for decoration, are mastered.
C3.7 Perform decoration (compaction, roughing, cutting, sanding)	Environmental elements: The workshop, the workstation Available resources: - Datasheet - Machine file - Model	For a design composed of straight bevels, cords and slanting bevels: - Compassing: The realisation of the marks conforms with the technical drawing; Roughing: The installation conforms with the drawing or the model; - Size: The decoration conforms to the design and model. The surface condition does not

	Assessment criteria	
Know-how	**Setting the scene**	**Expected results**
		show any defects incompatible with the continuation of the process; - Filleting and small brushwork elements are by the design; - Sandblasting: the installation of covers, protections and abrasive blasting are by the drawing.
C3.8 Ensure that production is stopped.	Environmental elements: The workshop, the workstation. Available resources: Instructions, and procedures.	The workstation and tools are returned in working order, clean and safe.

Figure 64. Assessment criteria for activity "implement".

C4 - Ensure maintenance

	Assessment criteria	
Know-how	**Setting the scene**	**Expected results**
C4.1 Ensure preventive maintenance (standard: NF 13306 of June 2001).	Environmental elements: The workshop, the workstation. Available resources: Machine file.	Maintenance is carried out by the machine file.
C4.2 Detect possible malfunctions.	Environmental elements: The workshop, the workstation.	The alert is given and the workstation is made safe.
C4.3 Maintain the station in working order.	Environmental elements: The workshop, the workstation.	The workstation is kept in working order, tidy, clean and secure.

Figure 65. Assessment criteria for activity "maintaining".

C5 – Control

	Assessment criteria	
Know-how	**Setting the scene**	**Expected results**
C5.1 Adapt gestures and posture according to the operation to be carried out and respect the rules of ergonomics.	Environmental elements: The workshop, the workstation. Available resources: - Rules of procedure, - Safety data sheet.	The gesture and the posture are adapted to the operation carried out.
C5.2 Verify the conformity of the achievements during the manufacturing process.	Environmental elements: The workshop, the workstation. Available resources: - Datasheet - Quality sheet - Template - Means of control	Quality requirements are met.
C5.3 Carry out the self-check.	Environmental elements: The workshop, the workstation	The process is integrated. Self-control is carried out throughout the manufacturing process.

Figure 66. Assessment criteria for activity "control".

C6 – Communicate

	Assessment criteria	
Know-how	**Setting the scene**	**Expected results**
C6.1 Pass on instructions.	Environmental elements: The workshop, the workstation Available resources: - Instruction Booklet - Scoreboard - Memos	Instructions are communicated clearly, accurately and on time.

	Assessment criteria	
Know-how	**Setting the scene**	**Expected results**
C6.2 Participate in the resolution of problems by suggesting improvements or solutions.	Environmental elements: The workshop, the workstation	Proposals for resolution or improvement take into account the context, and constraints and are relevant.
C6.3 Report orally, graphically or in writing by choosing and using tools, media, techniques, principles and codes adopted.	Environmental elements: The workshop, the workstation Available resources: - Liaison Sheets - Manufacturing order	The choice of tools, media, techniques, principles, codes and vocabulary is appropriate and contributes to the clarity and precision of the communication.

Figure 67. Assessment criteria for activity "communicate".

C7 - Respect the rules of hygiene, safety and environment

	Assessment criteria	
Know-how	**Setting the scene**	**Expected results**
C7.1 Respect the rules of hygiene and safety.	Environmental elements: The workshop, the workstation. Available resources: - Technical file - Rules of procedure - Safety Booklet - Single document - Product sheet	The rules of hygiene and safety are known and applied.
C7.2 Respect the environmental rules.	Environmental elements: The workshop, workstation Available resources: - Technical file - Rules of procedure - Environmental sheet	The environmental rules are known and applied.

	Assessment criteria	
	- Product sheet	

Figure 68. Assessment criteria for activity "HSE".

4.4.3 Personnel project assessment criteria:

Expected results

1) Completely formatted written dossier including:

- Graphic Research
- Cultural references
- Presentation of the project
- Study of technical processes

2) The model or project itself (the piece or pieces)

The assessment criteria take into account the quality of the production.

3) Oral presentation to a jury to explain and defend the project, its concept and its implementation.

Conditions

Presentation of the work at the exhibition venue, in the presence of a jury made up of professionals and representatives of the teaching team, who may be joined by representatives of institutions and/or exhibition venues.

	None	Insufficient	Satisfactory	Excellent
File	No or very incomplete file	File present but incomplete and/or sloppy	File present and fully compliant with expectations	A very complete dossier, with particular attention paid to content.
Presentation	Disorganised and/or confused presentation. Speaking time is not respected	Unclear presentation. Speaking time respected	Simple yet clear presentation	Clear, thorough and orderly presentation. Respect for speaking time
Piece or model production	Incomplete and sloppy production, showing a lack of	Incomplete or sloppy production, showing a lack of	Complete, meticulous production, in	Remarkable work, production of high technical quality and incorporating

	commitment to the project	commitment to the project	keeping with the stated ambition	particular difficulties

Figure 69. Assessment criteria for a personal project.

4.5 Project assessment - by learners

4.5.1 The project notebook:

The project notebook aims to assess the learners' experiences - a questionnaire administered to the apprentices throughout the project to find how the project has evolved thanks to XR and the Craeft tools.

Recording their working process throughout the project, for example at the end of each session, or when a choice is made.

Note: the project notebook will be completed by the T and TA cohorts to draw up a T vs TA comparison of the time spent on the project, e.g. creation of a mould, is the workflow optimised: idea → model → plan → mould → erected → finished product.

4.5.1.1 Craeft tools assessment (specific to the TA cohort):

- benefits provided
  - What have the CLT/AS/DS tools done for me?
- specific issues relating to XR
- experience

4.5.1.2 Assessing the impact of Craeft tools on the learning process (Cohorts T + TA):

Definition: in the following paragraph the term project technique indicates the technique chosen by the person to design and model their project, XR for the TA cohort, modelling, wax etc. for the T cohort.

- which dominant project technique was chosen for the design, modelling, and project preparation e.g. drawing, clay, wax, mould, XR etc.
- did my project require the creation and manufacture of a template, a specific mould, a model, etc.?
- time/workflow and facilitation:
  - Organisation and fluidity of the creation process according to the project technique chosen for the modelling.
  - speed of execution slowed or accelerated by the project technique.
- opportunities and limitations encountered about the project's design tools / specific issues relating to the project technique.
  - opportunities and limits of the project technique
  - experience in confronting the tools offered by the project technique in the creative process
- opportunities and limitations encountered in the production process
  - opportunities and limitations of glass techniques (depending on each RCI)
  - negotiating with the material in the creation of the project
- solutions found using XR tools and other project techniques

- result/faithfulness to the initial project
  - Are my choices guided by the project design method (XR and others, to be noted as the project progresses)?
  - how project technique has influenced my project choices → adaptation
  - fidelity/loss of meaning/loss of project focus vs technology limits.
- what skills have been learned or developed as part of the project?
- positive points/areas for improvement/suggestions

4.5.2 Satisfaction survey

Craeft tools assessment by learners - their experience of using the various Craeft tools. Below is the evaluation proposed in CLT - Glassblowing - Feedback level 1.

Course contents

1. the clarity and organisation of the course content.
2. Did the course provide a comprehensive understanding of glassblowing (or other RCIs), including contextual information, machine and tool descriptions, workshop presentations, and health and safety considerations?
3. Were the explanations and examples provided for glassblowing machines, tools, and workshop details clear and informative?

Course structure and materials

1. How would you rate the overall structure of the course, including module organisation and order of topics?
2. Did the course materials (text, images, videos) enhance your understanding of the subject matter?

E-learning platform

1. How user-friendly did you find the eLearning platform for accessing course materials, submitting assignments, and participating in discussions?
2. Were the provided navigation and instructions within the eLearning platform clear and helpful?

General feedback

1. Were there any specific aspects of the course that you found particularly beneficial or challenging?
2. Do you have any suggestions for improving this course, both in terms of content and delivery?
3. Do you have any other comments that you would like to share with us?

4.6 Project assessment

4.6.1 Assessing the impact of Craeft tools on the learning process

- Personal project assessment
- Time taken to design and model the T vs TA project

- Progress in technical or cross-disciplinary skills

4.6.2 Summary table of assessments

Assessment media	Documents/ reference paragraphs	Cohort		what is assessed					Assessment methods - how is it assessed?	
		T	TA	learners			project			
				know	know-how	how to be	tools	effects	quantitative	qualitative
reference skills		O		O				O	paper tests / Platform Cerfav	
			O	O				O	paper tests / Platform Cerfav / CLT	
reference skills		O			O			O	scores (learners' assessment)	workshop/ project
			O		O			O	scores T vs TA (project assessment)	workshop/project / Craeft Studio
reference skills		O				O		O	T vs TA compliance (project assessment)	respect for gestures and posture, HSE rules, etc.
			O			O		O		respect for gestures and posture, HSE rules, etc. / Craeft Studio

Assessment media	Documents/ reference paragraphs	Cohort		what is assessed					Assessment methods - how is it assessed?	
		T	TA	learners			project			
				know	know-how	how to be	tools	effects	quantitative	qualitative
educational progression		O		O	O	O		O	speed of progress, analysing of scores in T vs TA (project assessment)	trainers' assessments/test results
educational progression			O	O	O	O		O		trainers' assessments/test results
Project - project notebook			O	O	O	O		O		trainers' assessments / results in T vs TA
Project notebook			O				O			learners' assessment
satisfaction survey			O				O			CLT platform

Figure 70. Summary table of Craeft assessment.

4.6.3 Clusters for project assessment

To avoid creating any bias, the evaluation of the Craeft project will be carried out on clusters 7 and 8, with the same training curriculum but different groups. As Cluster 9 in January 2026 is too late for the end of the project, Cluster 9 has not been retained.

Groups 9 to 12 in 2025 will be dedicated to perfecting Craeft tools.

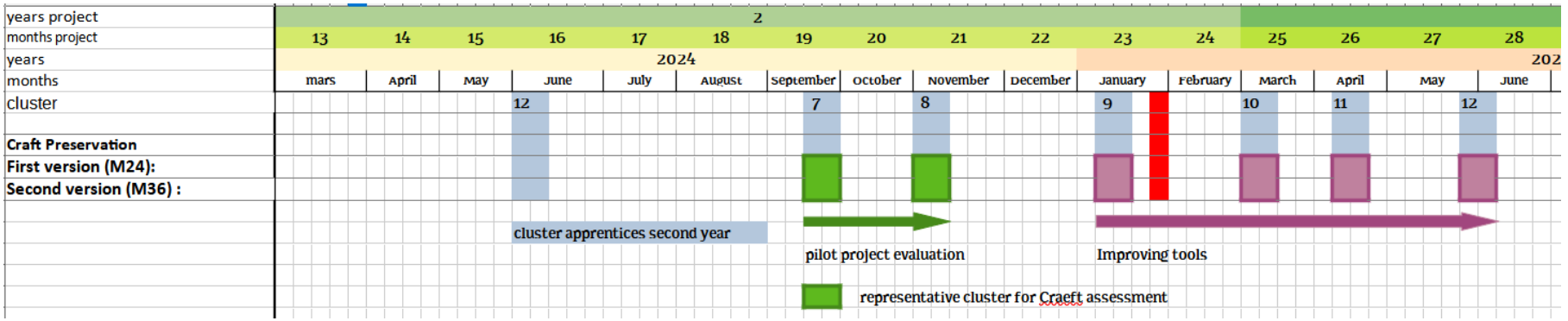


Figure 71. Glassblowing pilot 1 (M24): Organisation of the assessment and improvement phase based on clusters.

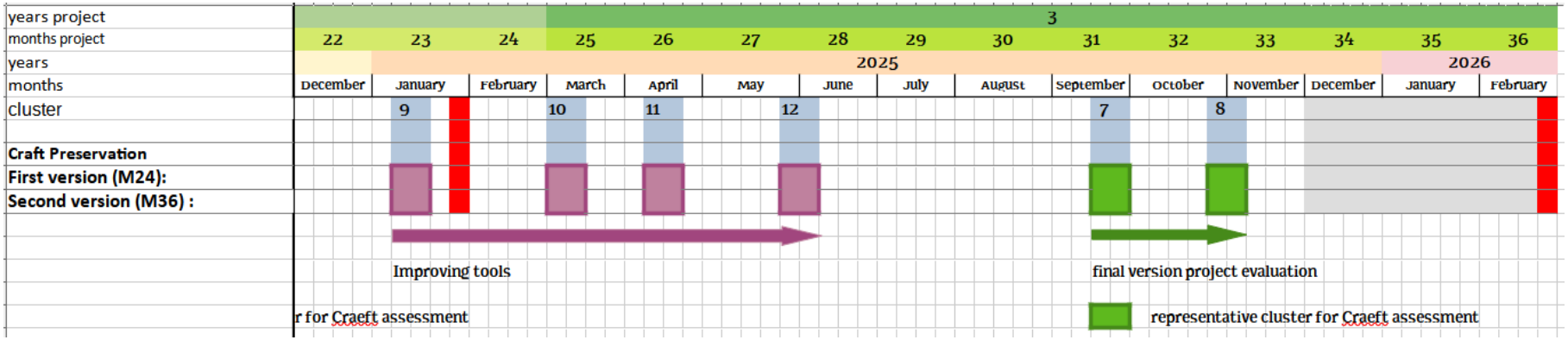


Figure 72. Final version (M36): Organisation of the assessment and improvement phase based on clusters.

5 Craeft educational and training module proposal for glassblowing *with steel pipe*:

5.1 Overall aims

To make learning easier using Craeft's digital tools, to support apprentices right through to the CPC in the best possible conditions.

Experiment with and evaluate the tools offered by the Craeft Authoring Platform.

5.2 Concerned public and prerequisites

- Concerned public:
  - The apprentices of CPC glass and crystal art
  - age: from 16 to 30 years old, this an average age of 22 years old.
- prerequisites of the sequence:
  - the glassblower apprentices are exempted from general subjects.
  - present the Craeft project to apprentices and select those who wish to be part of one of the two cohorts
  - Present and appropriation of Craeft digital aids and "use of Craeft tools" to people in the TA cohort.
- workforce: 4 people
  - 2 apprentices + trainer, cohort T

note: to secure the evaluation of the project, we can envisage having cohorts with a higher number of apprentices in the event of illness, setbacks or other circumstances during the project which make the evaluation difficult if the person has not followed the whole process.

Two people per cohort will be included in the Craeft assessment and report.

5.3 Educational aims

Make learning easier using the digital tools offered by the Craeft Studio portal.

Initially applied to the glassblowing, the module proposed and tested should be transposable to other craft sectors (RCIs) at the same time.

5.4 Contents of the course

The contents of the course are based on the French glass and lead crystal glass art CPC referential, at the end, the learner will be able to carry out a project in glassblowing with numerical aids and also be able to blow a cup.

Furthermore, the curriculum structure is based on the five activities (mains skills) of the glass and crystal art CPC referential and must be able to be transposed on the other RCIs:

- Prepare
- Implement
- Inspection / Quality
- Maintenance
- Communication

To sum up, the Craeft course proposal will use a restrained part of the CPC referential and implement pedagogical tools based on numerical aids.

Its structure will follow the five activities of referential that can be transposed from one craft to another so that it can be adapted to the eight RCIs. The educational kit, a guide for transposition to each RCI, will have to take into account the diversity of activities and workshop structures.

5.5 Assessments

- of the learner
    - Criteria & indicators
        - From CPC art of glass and crystal referential
        - Personal project assessments
- of Craeft project
    - Criteria:
        - successful acquisition of skills linked to the reference framework
        - successful completion of the CAP
        - anchoring of knowledge
        - level of compliance with and understanding of instructions, processes and technical documents
        - satisfaction, personal experience

Note: particular attention must be on the cohort's representativity and the assessment criteria for the result will be validated. Information is detailed in the assessments section of this document.

5.6 Pedagogical methods

Depending on the skills to be acquired and the context in which they are to be implemented, the method used may vary:

- Experiential
- Active / Heuristic
- Towards self-directed training.

Notes: a survey of the existing methods implemented will have to be carried out for cohort T. This report will be included in the methodological description and evaluation of WP6.1. Similarly, a check should be carried out for the TA cohort, methods planned / methods implemented.

5.7 Support materials

Pedagogical follow-up tools:

- assessments
- CLT platform
- Support and interviews for apprentices

Resources

- the tools offered by the Craeft Authoring Platform
- the Craeft project team
- the CERFAV trainer team

Equipment

- Haptic tools from WP4
- CERFAV technical platforms, in particular, the hot workshop and the FabLab
- Premises CERFAV

Duration, dates, pace and organisation, (see simplified planning).

6 Sequence

6.1 Formative aims of the sequence

- Propose a new method of learning glassmaking techniques to be mastered as part of a personal project, using Craeft digital tools.
- Appropriation of the use of Craeft digital aids.
- Acquisition of 5/10 essential basic concepts in HSE, TG and DT, which are essential for use in the workshops.

6.2 Duration, dates, organisation

The Craeft project experiment will be carried out during part of the time devoted to personal projects of learners in the second-year apprentices' timetable.

The cluster periods will condition the experimentation times linked to the Craeft project. (see simplified planning).

- June 2024, last grouping of 1st year apprentices, future 2nd year.
- September, October/November 2024, 2nd year of apprentices

6.3 Assessment criteria of learners

Information detailed in the assessments section of this document, learners' assessment criteria.

6.4 Overall description of assessment situations

Assessment situations may be based on the assessment of knowledge, know-how or interpersonal skills. These skills can be grouped and assessed within an activity. The assessments may be differentiated according to the T or TA cohort.

6.4.1 Knowledge Assessment

Cohort T	Cohort TA
paper / eLearning CERFAV platform	eLearning Craeft platform (CLT)

Figure 73. Assessment of knowledge items based on cohorts.

6.4.2 Know-how Assessment

Cohort T	Cohort TA
Workshop situations	Workshop situations
	Virtual situation in Apprentices Studio

Figure 74. Assessment of know-how items based on cohorts.

6.4.3 Interpersonal Skills Assessment

Cohort T	Cohort TA
paper / eLearning CERFAV platform	eLearning Craeft platform (CLT)
Workshop situations	Workshop situations
	Virtual situation in Apprentices Studio

Figure 75. Assessment of interpersonal skills items based on cohorts.

6.5 Contents of the sequence

6.5.1 Activities

- A1 - Prepare
- A2 - Implement
- A3 - Ensure maintenance
- A4 - Inspect and ensure quality
- A5 - communicate

6.5.2 Educational progression

List of sessions	**Content of session**	**Activities involved**
Presentation of the Craeft project/choice of cohort Cluster n° 6 apprentices 1st year - 4 hours	Present the Craeft project to apprentices at the end of their first year to identify those interested in the project and to define the T and TA cohorts.	
Discovery of Craeft studio platform tools. Cluster n° 7 apprentices 2nd year - 2 days	• Information and knowledge required to use the Craeft Studio platform • Training in the use of Craeft studio	A1
Create and develop your glassblowing project using the tools on the Craeft Studio platform. Cluster n°7, n° 8 apprentices 2nd year - 2 + 2 days	• Use of CLT, design studio and Apprentice Studio applications to support project and skills development. • More focused on the design studio.	A1+, A2-, A3, A4, A5
Create and develop your glassblowing project using the tools on the Craeft Studio platform. Cluster n°8 apprentices 2nd year - 2.5 days	• Use of CLT, Design Studio and Apprentice Studio applications to support project and skills development. • More focused on Apprentice Studio.	A1-, A2+, A3, A4, A5

Hygiene, safety, environment (HSE) - 1 hour Student grouping n° 7	• Risks and hazards in a glassblowing workshop. • Personal protective equipment • Postures • Moving around the workshop	A1, A2, A4
Technology - 4 hours student grouping n° 7, 8, 9	• The composition of glass (material) • Glassblowing tools (tools) • Furnaces (machines)	A1, A2, A3, A4, A5
Technical drawing - from 1 to 2 hours Student grouping n° 7, 9	Know-how to read a technical drawing to carry out the application (CPC technical file)	A1, A2, A4, A5

Figure 76. Educational progression table glassblowing sequence.

6.5.3 Relationship between activities and skills

Professional activities		Skills		Craeft Tools			
				CLT	DS	AS	W
A1	Preparation	C1	Get Informed				
		C2	Prepare				
		C4	Ensuring maintenance				
		C6	Communicate				
		C7	Comply with health, safety and environmental rules.				
A2	Implementation	C3	Implement				
		C5	Inspect				
		C4	Ensuring maintenance				
		C6	Communicate				
		C7	Comply with health, safety and environmental rules.				
A3	Maintenance	C4	Ensuring maintenance				
		C5	Inspect				
		C6	Communicate				
		C7	Comply with health, safety and environmental rules.				
A4	Inspection / Quality	C5	Inspect				
		C6	Communicate				
		C7	Comply with health, safety and environmental rules.				
A5	Communication	C6	Communicate				

Figure 77. Table of glassblowing skills and Craeft tools.

CTL: Craeft eLearning Platform

DS: Design Studio

AS: Apprentices Studio

W: Workshop

7 Session 1a: presentation of the Craeft project

Choice of cohort: Cluster N°6 - June 2024

7.1 Educational aims

Present the Craeft project to apprentices at the end of their first year to identify those interested in the project and to define the T and TA cohorts.

7.2 Operational educational objective

- Observable behaviour: Knowing and understanding the Craeft project
- Implementation conditions: PowerPoint presentation of the Craeft project
- Performance criteria: be able to give back 4 of the 5 key concepts of the project

7.3 Requirements

Without

7.4 Assessment of Apprentices

With a quiz.

7.5 Assessment of project

To justify membership in each of the T or TA cohorts

8 Session 1b: workshop on Craeft tools

Cluster N°6 - June 2024

8.1 Educational aims

Presentation of the learning scenarios to the TA cohort, and discussion of expectations. "What can I do with the Craeft tools? How do I want to use them, make them mine, my proposals".

8.2 Educational objective

- Observable behaviour: formulate ideas, suggestions, expectations, fears and solutions relating to the Craeft project.
- Implementation conditions: creative workshop, ideation, and production of suggestions formalised in a final document.

8.3 Educational method

Active, project-based learning

8.4 Presumed difficulties a priori and learning aids and a remedying

Suspected difficulties	Remedying
• Membership	Highlighting the benefits of the Craeft project
• Motivation	Interactive exchange, attention to questions about the project.
• Ensuring understanding	Reformulating and getting others to reformulate - quiz

Figure 78. Presumed difficulties for session 1b.

8.5 Pedagogical aids (Educational materials)

- PowerPoint presentation
- summary document
- quiz

8.6 Materials

- board and felts
- video projector
- summary documents

8.7 Motivation

- clarity of purpose

- involvement of participants

8.8 Educational scenario for the presentation of the Craeft project and workshop

sequence	timing	title of parts	aims	contents	method and methodology	tools	comments
Morning: 4 hours - start at 8.00 a.m. - presentation of the Craeft project							
	10 min.	Launch & contextualisation.	Welcome, and confidence-building		Face-to-face group facilitation		
	20 min.	Presentation of Craeft project	Provide the necessary information so that apprentices can choose their cohort.	• the project, the context • the proposed tools • the proposed experiment	Affirmative teaching method	PowerPoint presentation (video projector)	
	5 min.	Quick feedback	Creating a cognitive break and involvement	Questioning the initial perception of the Craeft project	Question-based formative method	Questioning	
	30 min.	Discovery of Craeft tools	Discovery of Craeft tools	• CLT • Design Studio • Apprentices Studio	Active method	Demonstrating and testing platforms	

sequence	timing	title of parts	aims	contents	method and methodology	tools	comments
	20 min.	Round the table	Discussions about the project, questions, interests, expectations, etc.	Presentation: • personal • of their project • expectation of Craeft tools	Active method	Note-taking in brainstorming mode, mind map, (felts & board)	
	10 min.	Quiz	Check understanding and representation of the project.	"The five key concepts you remember"	Individual activity	Quiz on paper or online on CLT.	MCQ-type questionnaire or open questions?
	25 min.	Choice of cohorts	Collection of enrolments and non-enrolments, definition of T and TA cohorts.	• Benefits and commitments • Collecting membership		PowerPoint slide - the commitment (on paper)	
Pause 10 min. - Workshop on Craeft tools							
	5 min.	Workshop presentation	Define the aims/ Involving learners in the Craeft project		Question-based formative method	(board and markers)	

sequence	timing	title of parts	aims	contents	method and methodology	tools	comments
	15 min.	What we'll be thinking about	Define the main themes.	• "What can I do with the Craeft tools?" • "How can I use them and make them my own?" • "My suggestions"	Question-based formative method	Suggested ideas + brainstorming, mind map (board, felts)	
	40 min.	Brainstorming in subgroup	Develop the selected themes		Active method	Helping frame for ideation (paper, pencil, felt)	
	30 min.	Return in full group	Select the key ideas that stand out.		Question-based formative method, working group	Display, oral presentation. (scotch tape)	
	15 min.	Putting ideas into perspective	Present the next sessions - the programme for 2024-2025. (situate the learner in these curricula, and maintain motivation)		Face-to-face group facilitation		

sequence	timing	title of parts	aims	contents	method and methodology	tools	comments
	5min. Closure						

9 Session 2: discovery of Craeft platform tools

Cluster N°7 - September (1 or 2 days)

9.1 Educational aims

Discovering with learners the Craeft Authoring Platform, CLT, Design Studio, Apprentices Studio, and Craeft Studio. The aim is for learners to make these tools their own.

9.2 Project aims

Collecting the first feelings and suggestions about the contents and usage of the Craeft platform.

9.3 Operational educational objective

- Observable behaviour: using Craeft tools autonomously
- Implementation conditions: with the digital tools offered by Craeft Authoring Platform
- Performance criteria: use the tools autonomously. (without major assistance from the trainer(s))
-

9.4 Requirements

- to be membership of the TA Cohort
- have attended the Craeft project presentation session

9.5 Assessment of Apprentices

Self-assessment, and co-construction with guidance from the trainer.

Learner assessment criteria:

- "I can navigate the Craeft Authoring Platform tree"
- “I can navigate the CLT tree”
- "I can follow the CLT courses without major intervention from the trainer”
- "I can use the Design Studio modeller"
- "I can export my model for 3d printing/vinyl cutting/wood cutting (blow mould)”
- "I can export a production plan” (technical communication - technical drawing)
- "I can use haptic interfaces with Apprentices Studio”
- "I can navigate Apprentices Studio simulations"

9.6 Assessment of project

Information is detailed in the assessments section of this document.

9.7 Educational method

Active, project-based learning

9.8 Presumed difficulties and learning aids

Suspected difficulties	Remedying
Ensuring understanding	user guide
Appropriating the tools	doing-with / demonstration

Figure 79. Presumed difficulties for session 2.

9.9 Educational materials

- Craeft Platform
- PowerPoint presentation
- User guide

9.10 Materials

- PC
- VR headsets, haptic and non-haptic controllers
- Video projector
- Fab Lab

9.11 Motivation

- Knowledge of upstream tools
- Involvement of participants

9.11 Educational scenario for the discovery of Craeft platform tools

sequence	timing	title of parts	aims	contents	method and methodology	tools	comments
Day 7h - start at 8.00 a.m.							
Discovery of Craeft e-Learning Platform (CLT)							
	10 min.	Launch & contextualisation.	Welcome, and confidence-building		Face-to-face group facilitation		ensure cohesion
	20 min.	Presentation of CLT	provide essential guidelines for the use of CLT	• CLT interface • logic of use • sample of courses	Presentation and demo	Video projector + PC + Craeft Studio	
	1h 20 min.	experimenting with CLT	• Experimenting with and adopting the tool	• CLT courses	Independent use by learners + instructor presence	PC + Craeft Studio	
	10 min.	CLT assessment learner and project	ensure understanding and adoption. Collect data to evaluate the project.	• evaluation survey	self-assessment co-construction with guidance from the trainer	• assessment questionnaires (paper or electronic)	On-the-spot evaluation of the tools during the session and evaluation at the end of the day.
Break - 10 min.							
Discovery of Design Studio (DS)							

sequence	timing	title of parts	aims	contents	method and methodology	tools	comments
	20 min.	DS presentation	provide essential guidelines for the use of DS	• Interface • logic of use • tools	Presentation and demo	Video projector + PC + Craeft Studio + VR devices	
	1h20	Experimenting with DS	Experimenting with and adopting the tool	• DS tools	Independent use by learners + instructor presence	Video projector + PC + Craeft Studio + VR devices	
	10 min.	Evaluation DS	ensure understanding and adoption. Collect data to evaluate the project.	• evaluation survey	self-assessment co-construction with guidance from the trainer	• assessment questionnaires (paper or electronic)	On-the-spot evaluation of the tools during the session and evaluation at the end of the day.
Lunch break - 12.00 noon to 1.00 p.m.							
	5 min.	Launch					
	10 min.	Round of the table	First impressions of CLT, DS et AS	• learners' contribution	Question-based formative method	Mind map - (Felt, board)	informal assessment, taking notes on learners' feedback
Discovery of Apprentices Studio (AS)							

sequence	timing	title of parts	aims	contents	method and methodology	tools	comments
	20 min.	AS presentation	provide essential guidelines for the use of AS	• Interface • logic of use • tools	Presentation and demo	Video projector + PC + Craeft Studio + VR devices	
	1h30	Experimentation AS	Experimentation and appropriation of tools	• AS tools	Autonomous usage by apprentices	Video projection, PC, Craeft Studio + VR devices	
Break - 10 min.							
	20 min.	Assessment of Craeft Studio and global, learners and project.	Ensure understanding and adoption. Collect data to evaluate the project.	• evaluation survey	self-assessment co-construction with guidance from the trainer	• assessment questionnaires (paper or electronic)	
	10 min.	Round of the table	First impression of Craeft tools. Evolution of Craeft Studio image after experimentation.	• learners' contribution	Question-based formative method	Mind map - (Felts Board)	informal assessment, taking notes on learners' feedback
	15 min.	Putting ideas and concepts into perspective & Closure.	Putting the cluster N°7 and 8 programmes into perspective setting objectives.	• Programme of cluster N° 7 & 8 • set objectives	Face-to-face group facilitation Question-based formative method	(Felts board)	report on the objectives and survey formulated by the learners.

sequence	timing	title of parts	aims	contents	method and methodology	tools	comments
End of day - 4.00 p.m.							

Figure 80. Detailed educational scenario for session 2.

10 Sessions 3 and 4: develop your glassblowing project

cluster N° 7 and 8 - September and November (2 to 4 days)

10.1 Educational aims

Using digital tools to develop a craft project (glassblowing),

through three phases: “get informed”, “modelling my ideas”, and “I practice”.

10.2 Operational educational objective

- Observable behaviour: use the Craeft tools to develop the project.
- Implementation conditions: with the digital tools offered by Craeft Studio.
- Performance criteria: independent use of tools, level of interaction, use and integration of tools in project development.

10.3 Requirements

- to be membership of the TA Cohort
- have taken part in the Craeft tools discovery session.

10.4 Assessment of Apprentices

Self-assessment, and co-construction with guidance from the trainer.

Learner assessment criteria:

- Choosing the right CLT, DS and AS tools according to the development phases and project development needs.
- Use the CLT, DS and AS tools independently (with assistance and then the presence of the trainer - take into account the level of mastery).

10.5 Assessment of project

Information is detailed in the assessments section of this document.

Note: to facilitate the assessment of learners and projects, we suggest that learners use a project notebook as an educational and assessment aid.

10.6 Educational method

Active, project-based learning

10.7 Presumed difficulties and learning aids

Suspected difficulties	Remedying
● Ensuring understanding	● User guide
● Appropriating the tools	● Doing-with / demonstration
● Problem-solving	● Listening / thinking-with / doing-with

Figure 81. Presumed difficulties for sessions 3 and 4.

10.8 Educational materials

- Craeft platform
- User guide

10.9 Materials

- Pc
- VR headsets, haptic and non-haptic controllers
- Video projector
- Fab lab

10.10 Motivation (create, maintain, develop)

- Involvement of participants
- Provide support in the event of difficulties in using the tools.

10.11 Educational scenario for developing your glassblowing project

sequence	timing	title of parts	aims	contents	method and methodology	tools	comments
Day 7h - start at 8.00 a.m.							
	5 min.	Launch & contextualisation.	• Welcome and confidence-building • Remember the objectives set in the previous session	Objectives set during the previous session	Face-to-face group facilitation	notes/minutes "discovering the tools on the Craeft platform" session - project notebook	ensure cohesion
	20 min.	Project status	• Discussing and sharing projects • Identifying and addressing issues • Presentation of individual objectives	Learners' contribution	Question-based formative method	round of the table	maintain motivation
	3h30	Work on the project using Craeft tools.	• Experimenting with and adopting tools • Developing personal projects using Craeft tools.	• Mainly centred on DS and AS • Minus on CLT	Project mode- Independent use by learners + instructor presence	Video projector + PC + Craeft Studio + VR devices	
	5 min.	Closure					
Lunch break - 12.00 noon to 1.00 p.m.							

sequence	timing	title of parts	aims	contents	method and methodology	tools	comments
	2h20	Work on the project using Craeft tools.	• Experimenting with and adopting tools • developing a personal project using Craeft tools.	• Mainly centred on DS and AS • Minus on CLT	Project mode - Independent use by learners + instructor presence	Video projector + PC + Craeft Studio + VR devices	
	10 min.	Round of the table	Experience and representation of learners for Craeft tools.	Learners' contribution	question-based formative method	Mind map (Felts Board)	informal assessment, taking notes on learners' feedback
	15 min.	Assessment of Craeft Studio and global, learners and project.	Ensure that the tools are appropriate and understand how they interact with project development. Collect project evaluation data.	Evaluation survey	self-assessment co-construction with guidance from the trainer	assessment questionnaires (paper or electronic)	
	15 min.	Putting ideas and concepts into perspective & Closure.	Putting the cluster N°8 programme into perspective setting objectives.	Programme of the next cluster • Set objectives • Cluster 7 • Conclude	Face-to-face group facilitation -	(Felts board)	report on the objectives and survey formulated by the learners.

sequence	timing	title of parts	aims	contents	method and methodology	tools	comments
			Cluster N°7 or conclusion Cluster N°8	• Cluster 8	Question-based formative method		
End of day - 4.00 p.m.							

Figure 82. Detailed educational scenario for sessions 3 and 4.

11 Cross-cutting sessions

Since learner project time is more about modelling and training, the problem is to "find" time for the Craeft e-learning platform (CLT). The idea is to use the time of the Technology, Health / Safety / Environment and Technical Communication (technical drawing) courses to have a common core for each session with the T and TA cohorts and an hour at the end of the session where the T cohort follows the course traditionally and the TA cohort via the CLT.

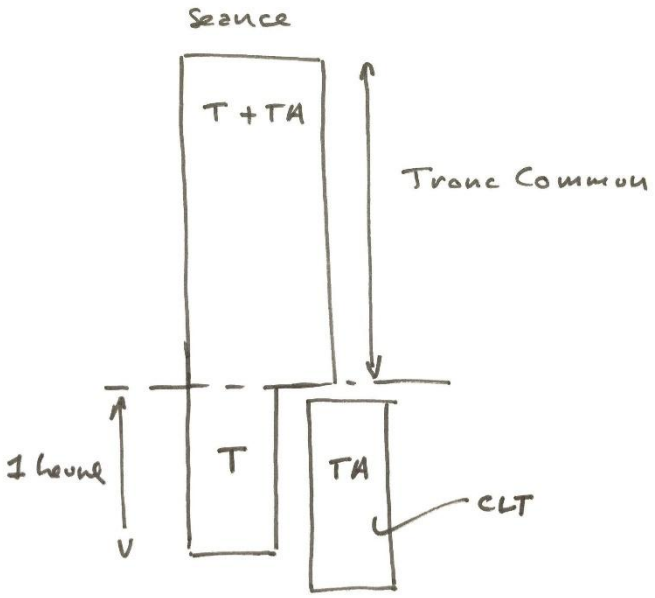


Figure 83. Organisation of sessions on cross-cutting themes.

11.2 Educational aims

Acquire the essential and basic concepts as a prerequisite for working in the workshop. The aim is to ensure that those concepts are known and applied.

11.3 Operational educational objective

- Observable behaviour: know 5 to 10 essential concepts for each subject.
- Implementation conditions: using CLT
- Performance criteria: the concepts can be reproduced without error in different contexts (CLT, AS, workshops).

11.4 Requirements

To be membership of the TA Cohort

11.5 Assessment of Apprentices

Quizzes, video quizzes, case studies, virtual or real-life situations.

11.6 Educational method

Semi-active, active

11.7 Presumed difficulties a priori and learning aids and a remedying

Suspected difficulties	Remedying
• Interest, sense of acquisitions	• Don't relearn a concept you've already learned → preliminary quiz
• Ensure they understand	• User guide • Trainer presence
• Maintain motivation	• Exchanges with peers

Figure 84. Presumed difficulties for sessions 3 and 4.

11.8 Pedagogical aids (Educational materials)

- Craeft eLearning platform
- User guide

11.9 Materials

- PC

11.10 Motivation (create, maintain, develop)

- Ensuring that learning is meaningful - (avoiding the pitfall of being too academic, learning for learning's sake, linking knowledge to reality, a need, an obligation in the field)
- Pay attention to the learning method and educational tools (plan adaptations)

11.1.11 Educational scenario for cross-cutting sessions

Detailed educational scenario: cross-cutting sessions – first session

sequence	timing	title of parts	aims	contents	method and methodology	tools	comments
1 hour							
cross-cutting session 1							
	5 min.	Launch & contextualisation.	confidence-building		Face-to-face group facilitation		
	15 min.	a reminder of CLT usage	Make sure learners are familiar with the tool	• CLT Interface • logic of use	questioning/demonstration	PC + Craeft Studio	Motivation: to ensure that the tool is easily used
	3 min.	Objective	Acquisition of a cross-curricular concept/skill	depending on the subject studied	Self-training on CLT	PC + Craeft Studio	Trainer presence
	15 min.	Learning session/acquisition of concepts					
	7 min.	Learner assessment: quiz, etc. (on CLT)					
	5 min.	Assessment of CLT tools	Collect data to evaluate the project.	evaluation survey		• Assessment questionnaires	

sequence	timing	title of parts	aims	contents	method and methodology	tools	comments
						(paper or electronic)	
	5 min.	Round of the table	Feeling about the use of CLT	learners' contribution	Question-based formative method		Taking notes for the project report
	5 min.	Putting ideas and concepts into perspective & Closure.	Set objectives for the next session.	programme of the next session	Face-to-face group facilitation	felts and board	

Figure 85. Detailed educational scenario for cross-cutting themes - first session.

Detailed educational scenario: cross-cutting sessions - following sessions

sequence	timing	title of parts	aims	contents	method and methodology	tools	comments
1 hour							
cross-cutting session							
	5 min.	Launch & contextualisation.	confidence-building		Face-to-face group facilitation		
	3 min.	Objective			Self-training on CLT	PC + Craeft Studio	Trainer presence

sequence	timing	title of parts	aims	contents	method and methodology	tools	comments
	30 min.	Learning session/acquisition of concepts	Acquisition of a cross-curricular concept/skill	depending on the subject studied			
	5 min.	Learner assessment: quiz, etc. (on CLT)					
	7 min.	Assessment of CLT tools	Collect data to evaluate the project.	evaluation survey		Assessment questionnaires (paper or electronic)	
	5 min.	Round of the table	Feeling about the use of CLT	learners' contribution	Question-based formative method		Taking notes for the project report
	5 min.	Putting ideas and concepts into perspective & Closure.	Set objectives for the next session.	program of the next session	Face-to-face group facilitation	felts and board	

Figure 86. Detailed educational scenario for cross-cutting themes - following sessions.

12 Glossary

Term	Definition	Example
activity	cluster of skills enabling a field of activity related to a trade to be carried out	in sales: • selling and advising customers • managing a sales area
skill	carry out a task with given resources in a given context.	• manage a stock • blowing a cup in a mould
capability	be able to carry out an elementary task forming part of a skill	• gathering glass • prepare a gob • blow into the mould
assessment	test used to validate the acquisition of an ability, skill or activity.	
formative assessment	is used to validate the learning progression, by checking whether or not the ability or skill has been acquired. If the skill has not been acquired, remedial action is taken.	• test at the end of a course • pop quiz
summative assessment	is used to validate the acquisition of skills and the mastery of an activity during or at the end of curricula. In particular, as part of a certification process. No remedial action.	• mid-course exams • final examination • CPC
remediation remedial action	action taken by the trainer and the learner to identify gaps in the acquisition of a skill and to remedy them.	In the skill of blowing a cup review and practice preparing the gob.
criteria	transposing qualitative data associated with an ability or skill into quantitative data, to assess success and give a score.	the right temperature → 21°C a successful cup: • filling the mould - y/n • surface trace - y/n

Term	Definition	Example
		• bottom thickness 5 mm, +/- 1mm
modality	means and conditions for simulations, assessment, etc.	• paper-based test • test on an e-learning platform • role-playing in a workshop
module	corresponds to the acquisition of mastery of an activity	
sequence	corresponds to the acquisition of a skill	
session	corresponds to the acquisition of a capability	
referential	reference document linked to a certification defining the skills to be acquired, the assessment criteria and the examination conditions to guarantee the uniformity of the certification.	
educational approach	inductive or deductive, a choice of principle from which the educational methods will derive.	Inductive approach, particular to general → active experiential method → project-based teaching.
educational method	affirmative, interrogative, active, and active experiential, the method derives from the approach and is implemented using tools defined by the educational trends.	Deductive approach: • affirmative method • interrogative method inductive approach: • active method • active experiential
educational trends	Based on university research, they define educational principles, methods and tools.	• behaviourism 1920 - 1935 Pavlov / Skinner Link with the affirmative method • le constructivism / socio-constructivism 1925 - 1960

Term	Definition	Example
		Piaget / Bandura link with active method
educational aim	defined the general objectives of a sequence	
operational educational objective	defined a precise objective linked to the acquisition of a skill for a session. It contains three axes: • Observable behaviour • Achievement condition • Performance criteria involves assessment.	The learner will be able to: • blow a goblet • in a hot workshop using a mould • 10 cups put on the annealing oven, complying with the quality criteria defined in the technical file for 12 attempts.
educational objective	defined a precise objective linked to the acquisition of a skill for a session. It contains two axes: • Observable behaviour • Achievement condition no assessment	the learner will be able to: • blow a goblet • in a hot workshop using a mould
learning progression	acquisition of skills by a learner about the training programme. The concepts of level of mastery of skills, time and speed of acquisition come into play. The markers of learning progress are formative assessments.	
heutagogy	self-directed learning.	I'm taking a MOOC course on plants.
synchronous	learners take part in a training session at the same time, in the same place or different places.	• Training session in a workshop or classroom. • A distance learning session or a session with some learners in the same place and others at a distance but at the same time.

Term	Definition	Example
asynchronous	Learners can access the session at any time from any location.	• E-learning platform • Access to an audio/video recording of a session that took place synchronously.

Figure 87. Glossary table.

Annex 1 Cognitive Load Theory

Cognitive load is a theory developed by John Sweller and Fred Paas that explains the failures or successes of people primarily in learning activities, but also in problem-solving activities. The cognitive load theory involves the capacity to store information in working memory and the integration of new information. It is useful for teachers and educationalists and provides them with advice that can easily be applied in learning situations.

Working memory: working memory can only handle a limited amount of information, between five and nine depending on the individual.

Mental schema: Although working memory can only process three to nine pieces of data simultaneously, there is apparently no limit to the size of these pieces of data.

Types of cognitive load:

- Intrinsic - linked to the task itself
- Extrinsic - linked to the way the information is presented
- Essential - enables knowledge to be transferred to long-term memory; mental schemas should be encouraged.

The effects:

- Split attention effect - dissociation of attention
- Modality effect - the modality with which information is presented
- Redundancy effect - too much redundancy of information leading to dissociation of attention.
- Worked examples effect - demonstration by an expert helps to solve a problem
- Expertise reversal effect - putting something into practice is preferable to repeating the same demonstration.
- Guidance fading effect - adapting guidance to the level of learning, guiding the learner more at first, and gradually letting them become more and more autonomous.
- Element interactivity effect - present information by breaking it down into simple 'bricks' which are then assembled into a mental diagram, rather than presenting complex information straight away.

Annex 2: pilot glassblowing *with steel pipe*

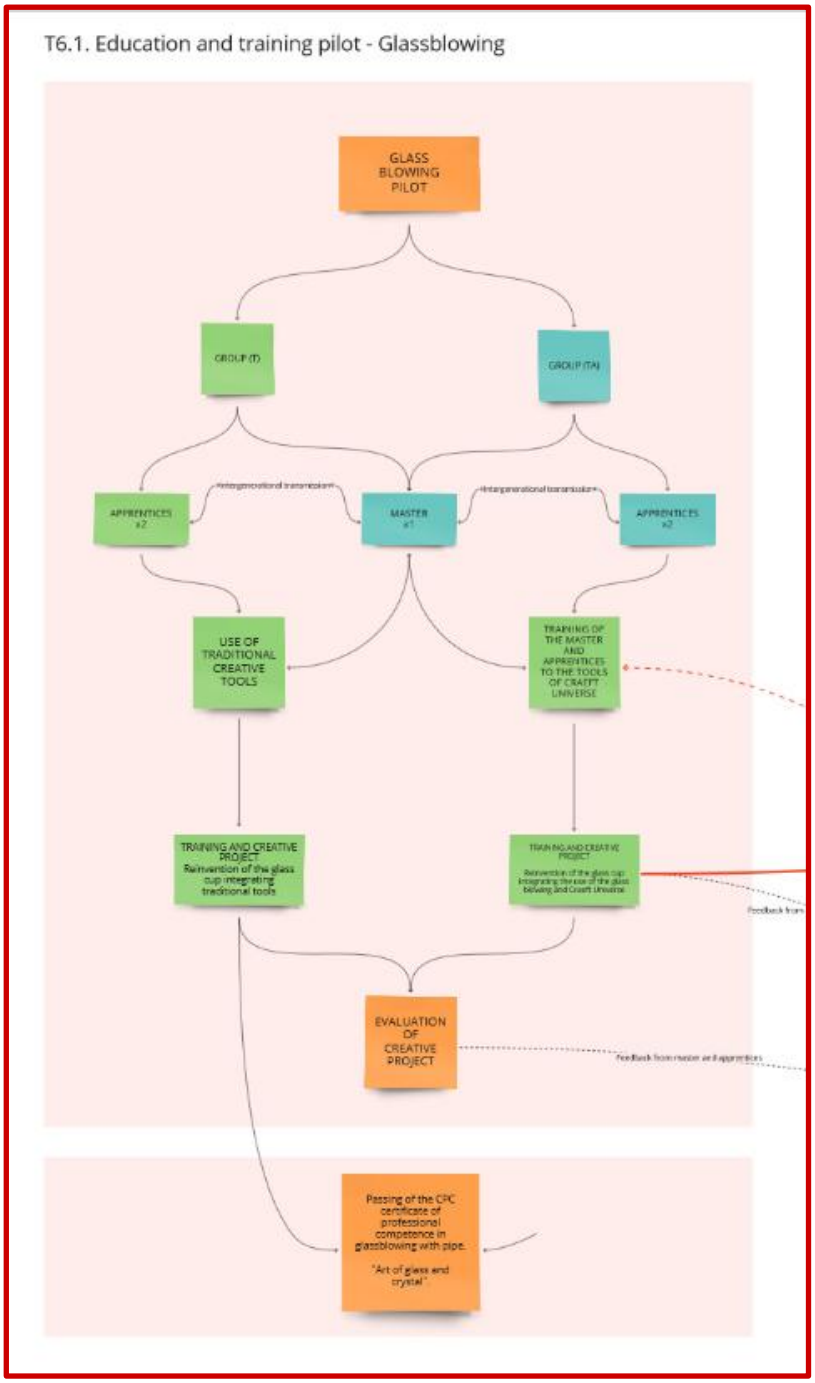


Figure 88. Pilot glassblowing synopsis - board 1.

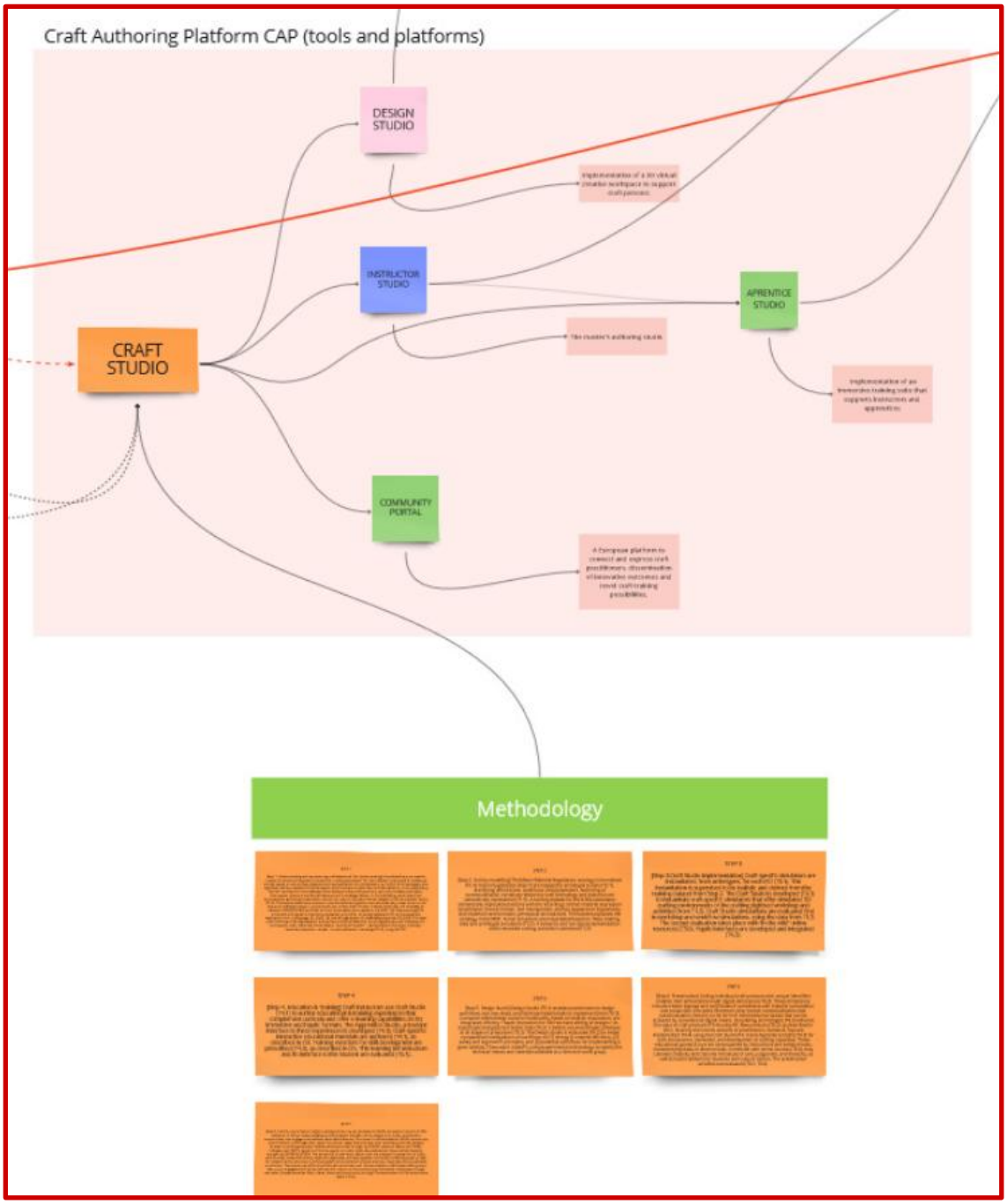


Figure 89. Pilot glassblowing synopsis - board 2.

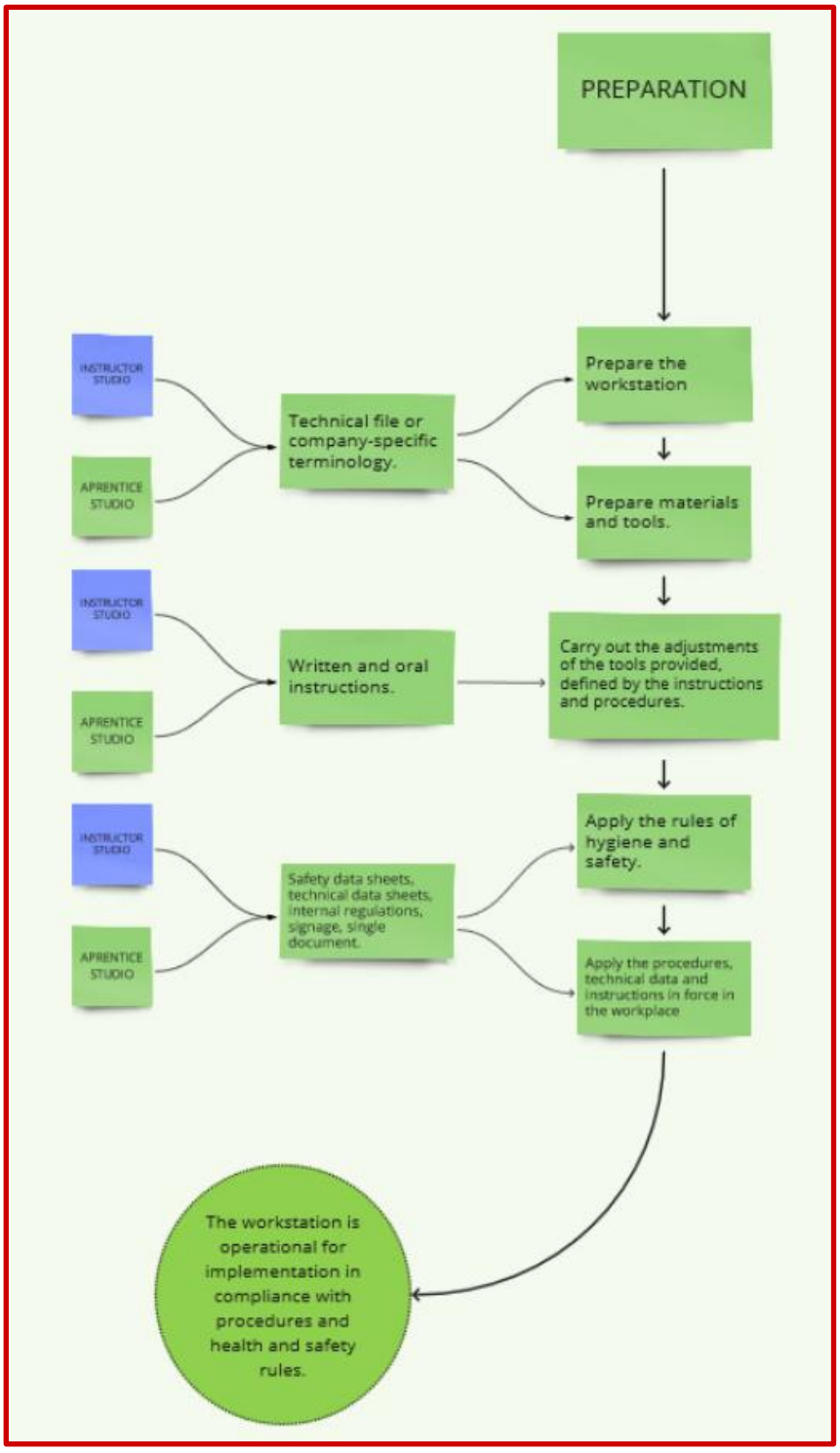


Figure 90. Pilot glassblowing synopsis - board 3.

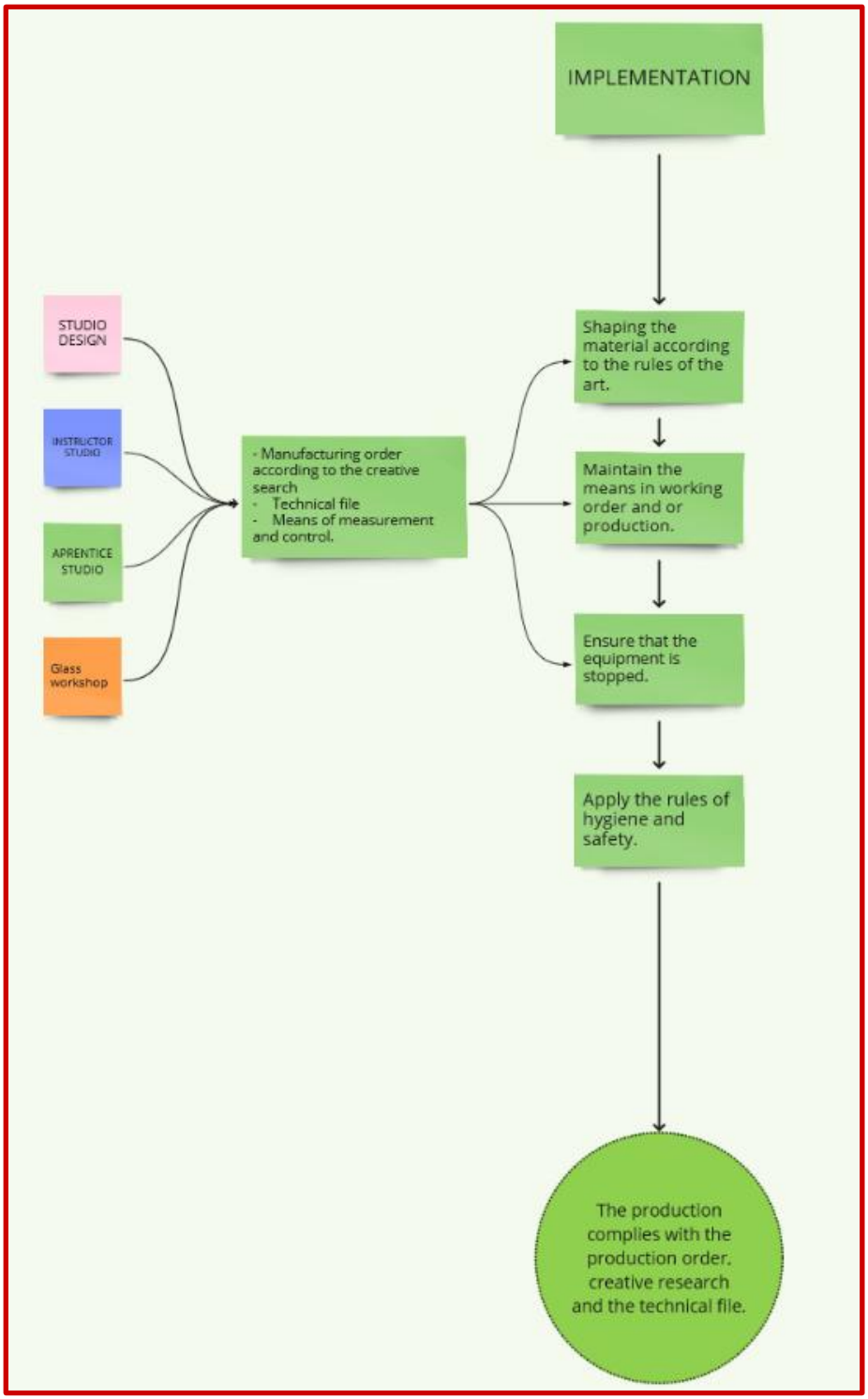


Figure 91. Pilot glassblowing synopsis - board 4.

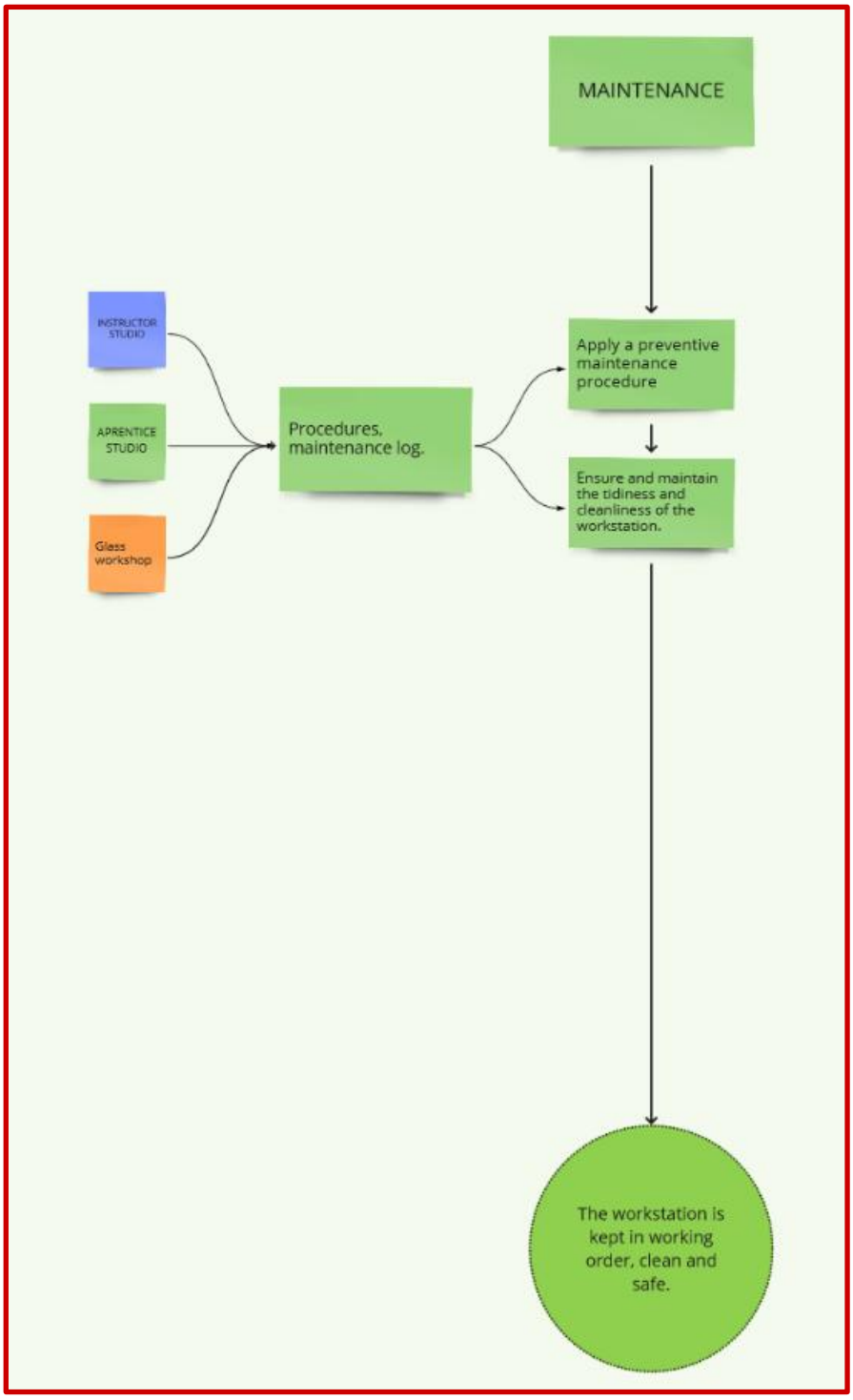


Figure 92. Pilot glassblowing synopsis - board 5.

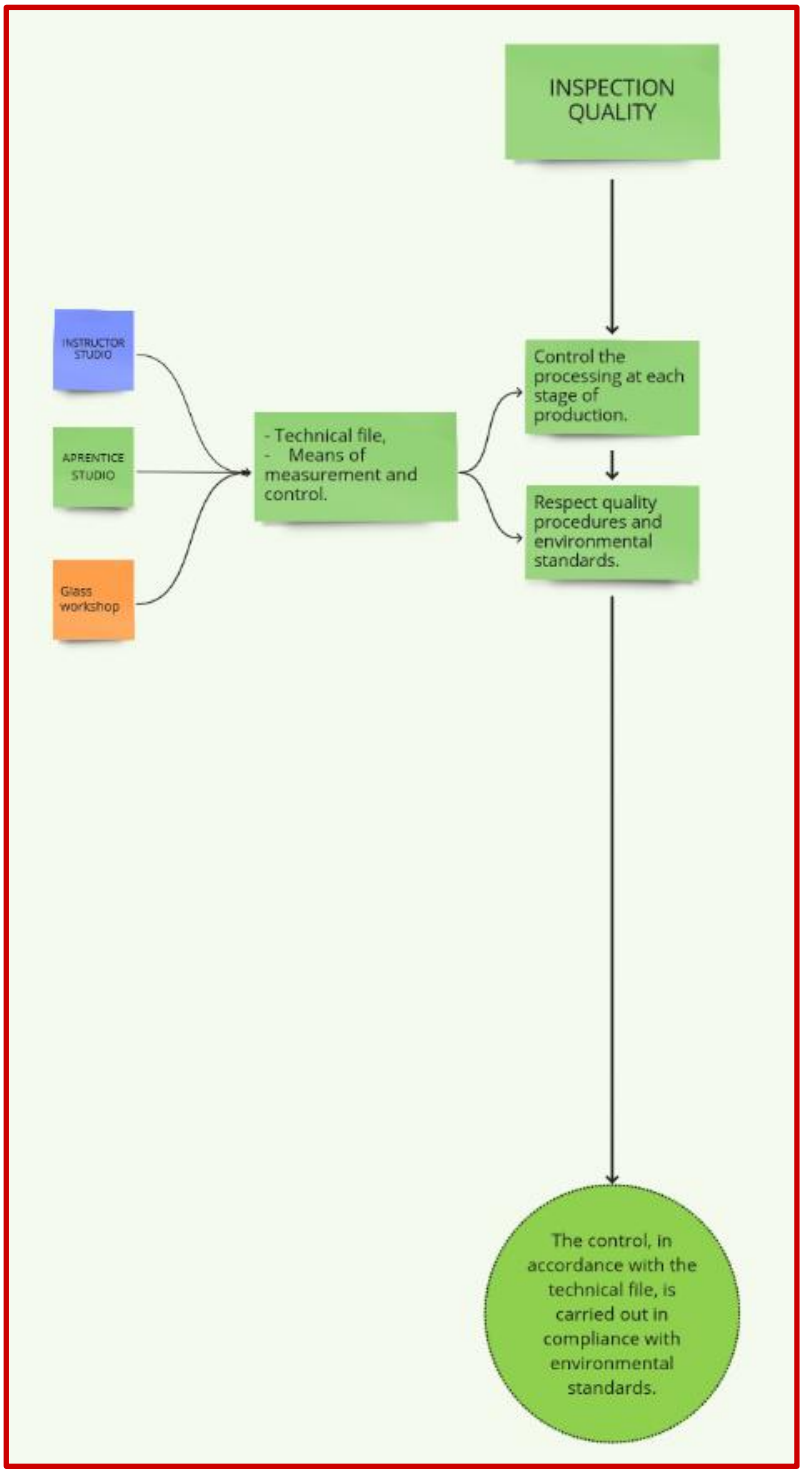


Figure 93. Pilot glassblowing synopsis - board 6.

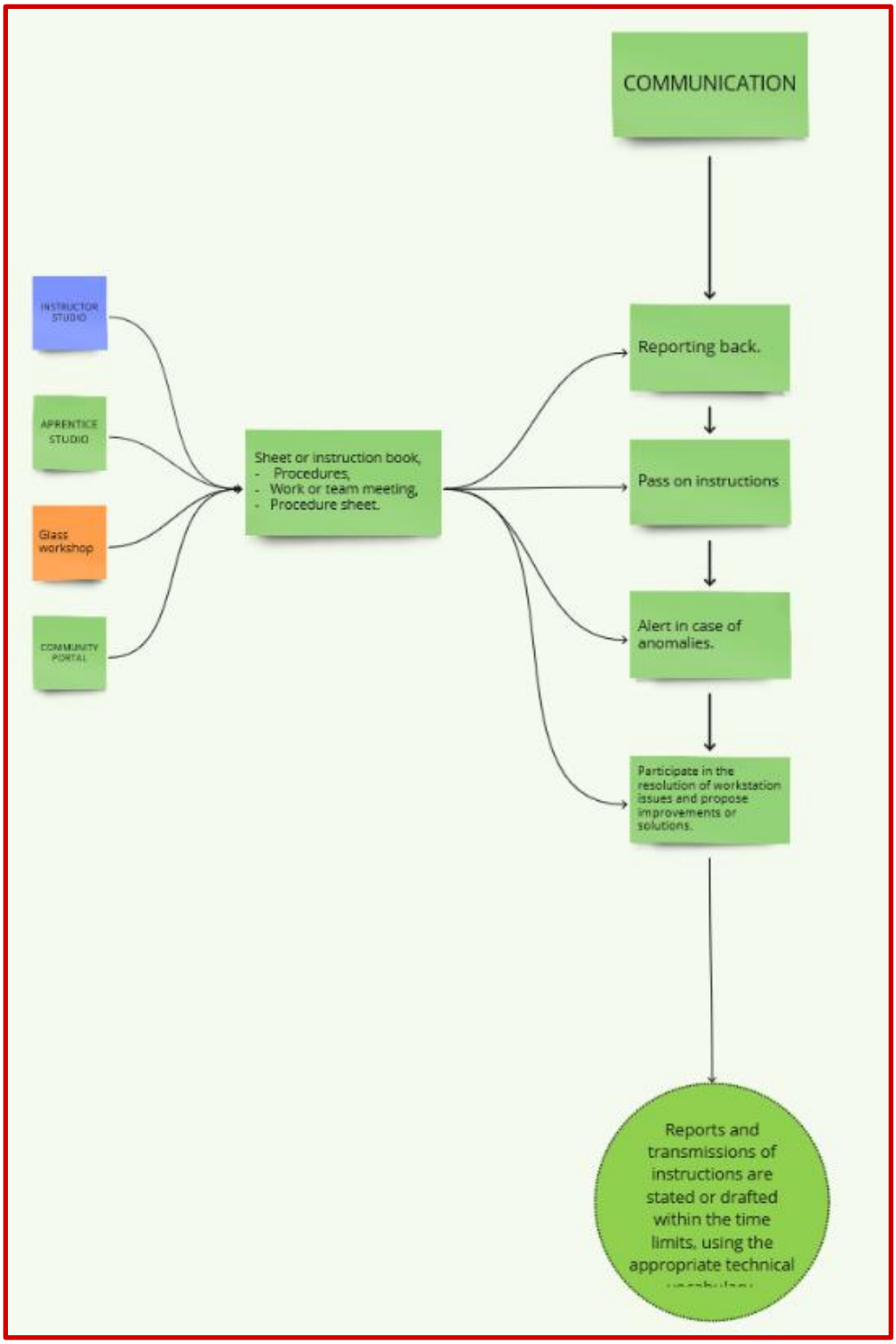


Figure 94. Pilot glassblowing synopsis - board 7.

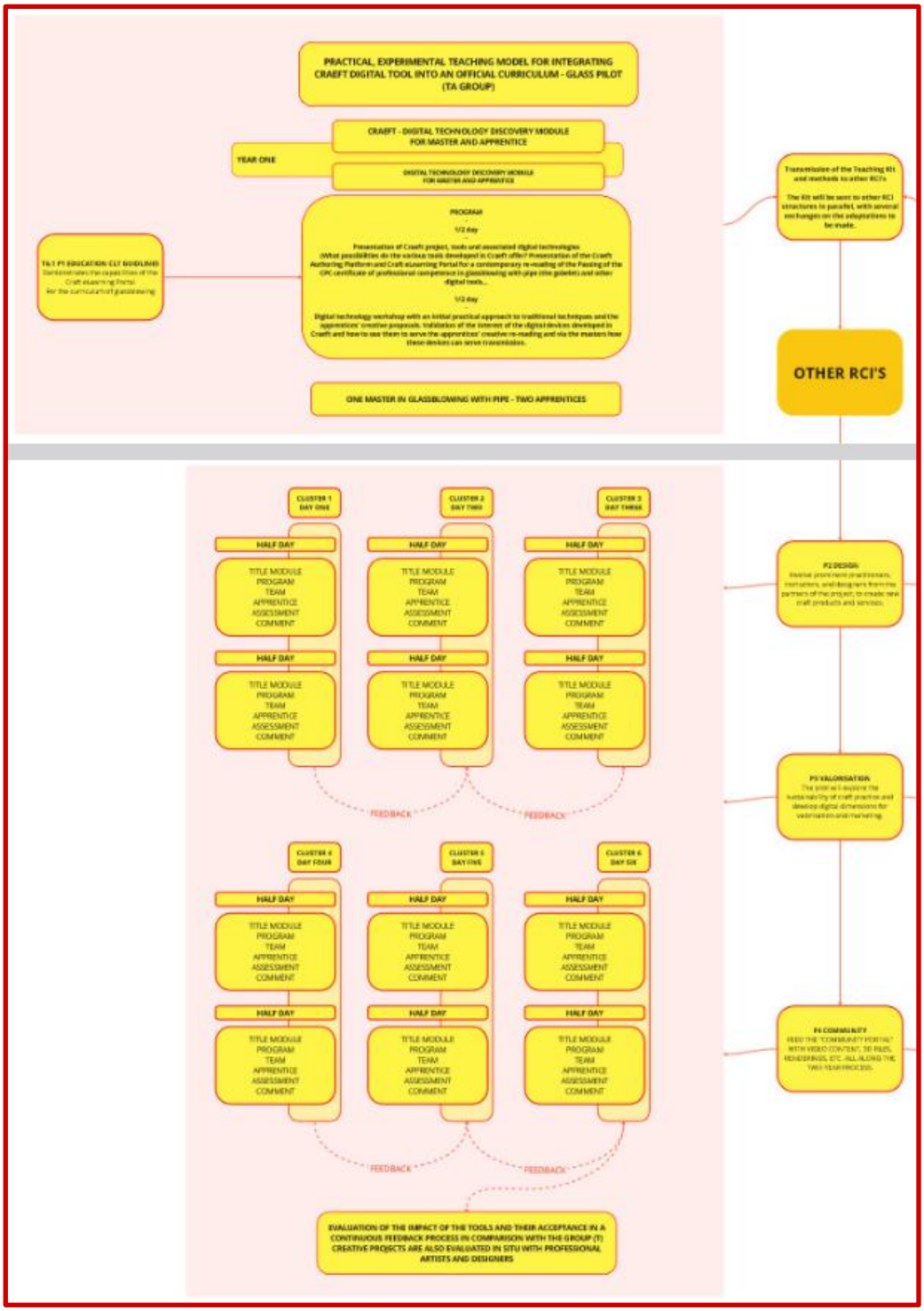


Figure 95.Pilot glassblowing synopsis - board 8.

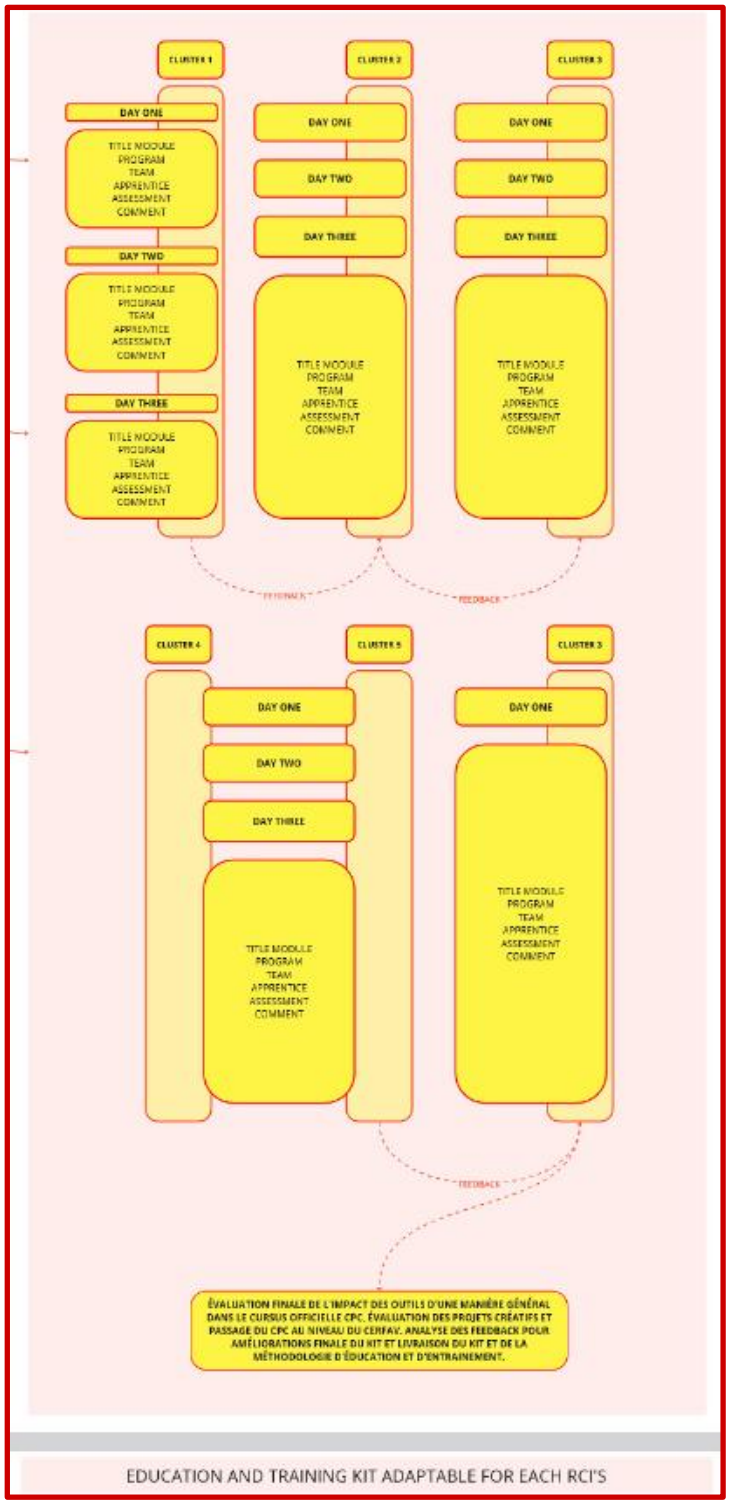


Figure 96. Pilot glassblowing synopsis - board 9.

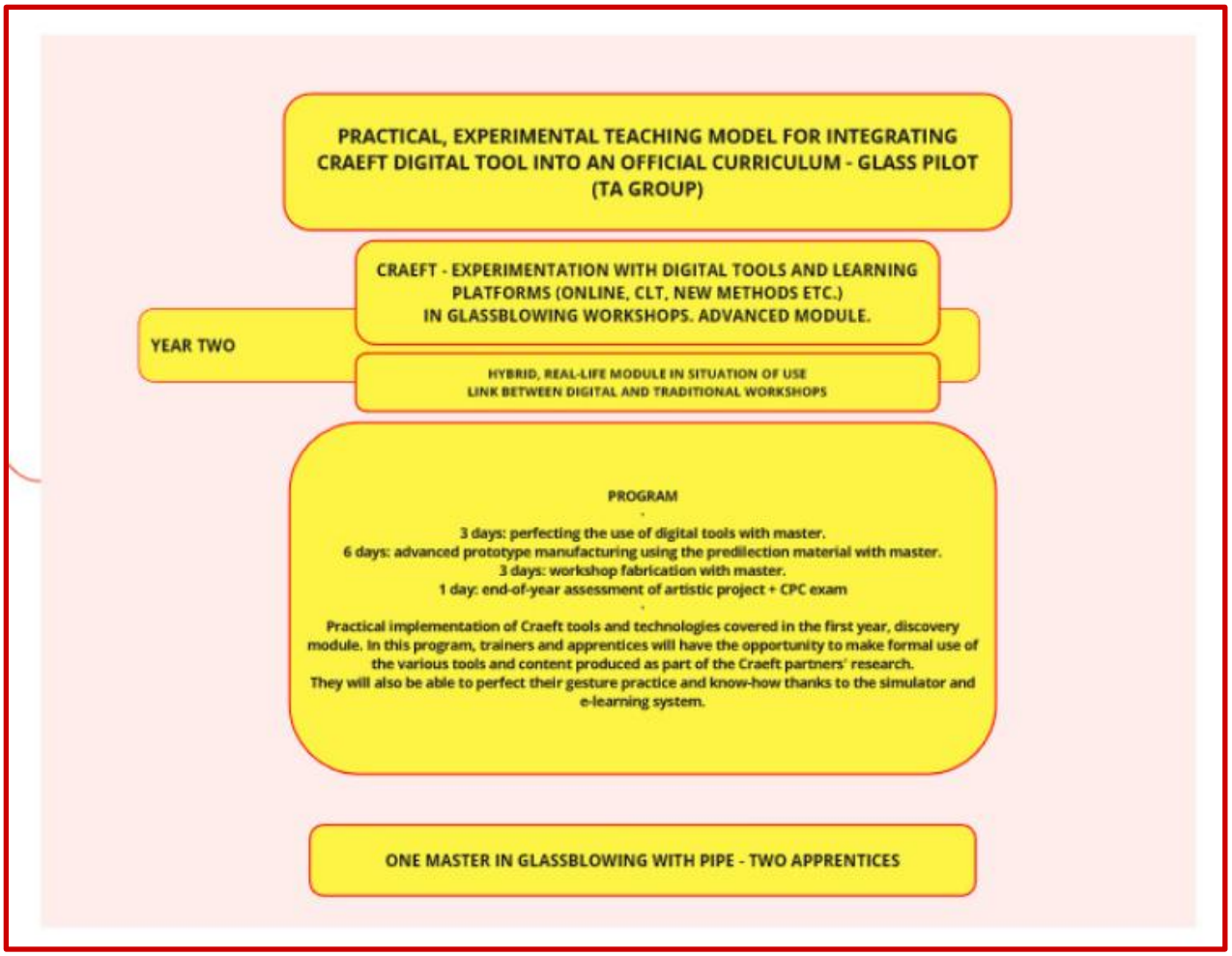


Figure 97. Pilot glassblowing synopsis - board 10.

Annex 2 Glassblower Apprentices Clusters' programme

First-year apprentices

subjects	**cluster**					
	1	2	3	4	5	6
glass blowing						
Gathering the glass with punty	2 days					
Gathering the glass with a blowpipe		2 days				
Mould a balloon glass			1+2 days	2 days	2 days	
cross-cutting courses						
HSE	x	x				
Technology		x	x	x	x	
Technical drawing	x	x				
XR discovery		1 day				
FabLab				1,5day		
Project			1 day			1,5 jour

Figure 98. First-year apprentices clusters programme.

Second-year apprentices

Subjects	**Clusters**					
	7	8	9	10	11	12
glass blowing						
mould a balloon glass	1 day					
mould a goblet	1 day					
CPC revision		2 days				
CPC revision			1 day		1 day	
CPC revision						x
cross-cutting courses						
HSE	x					
technology	x	x	x	x		
Dessin technique			x	x		

XR discovery						
FabLab						
Project	4 days	4 days	4 days	4,5 days	3 days	

Figure 99. Second-year apprentices clusters programme.

Cross-cutting courses

end of project + installation 2 days + project assessment 1 day

care, judgment, dexterity

CRAEFT

User Guide

This project has received funding from the European Commission, under the Horizon Europe research and innovation programme, Grant Agreement No 101094349.
http://www.craeft.eu/

Abstract

The user guide is a practical guide to building a training session, face-to-face or distance learning. This document describes step by step the way and tips to implement a training session. This document is intended to help other RCIs implement the experiment.

Preamble

By questioning the role of Craeft digital tools in learning, we notice that they do not replace the workshop experience.

- Digital tools can be used to supplement and reinforce training in fundamental concepts.

Example: in cross-disciplinary subjects, the 5 essential concepts via the e-learning portal.

- Help with preparation before going into the workshop
    - the safety rules that absolutely must be observed
    - know the work process
    - prepare the tools

The concepts covered in one session will be revisited as a backdrop or reminder in a subsequent session, to create links between the knowledge, make sense of it and help understanding.

The aim is to encourage memorisation by reinforcing mental patterns (cognitive load theory) and organising memory recall (Ebbinghaus forgetting curve).

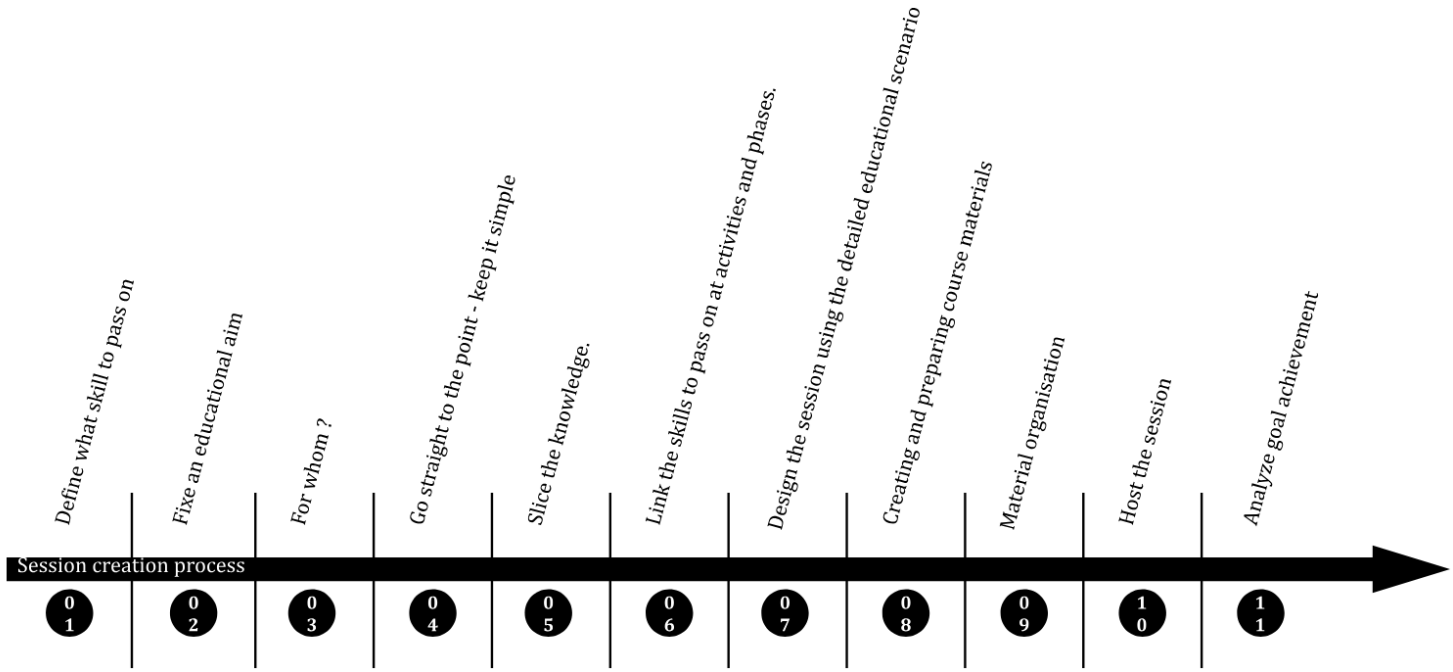


Figure 100. Synopsis of the phases of a session.

1 Define what skill to pass on

photo credit: Craeft

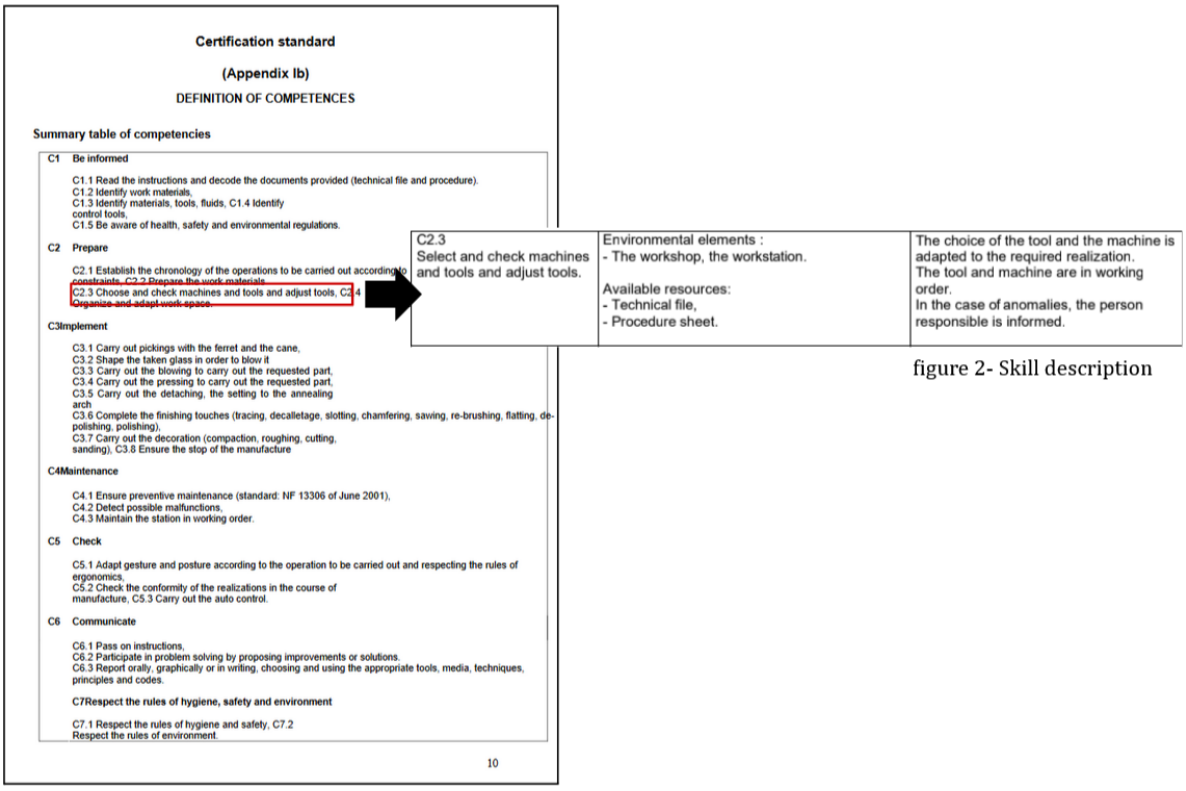
What skill, what gesture, what part of the craft, I would like to pass on in the course I'm creating, through the e-learning platform or in presential?

Example: for the glassblowing curricula, blowing-pipe glassmakers.

Starting from glass and crystal lead glass art referential

- "I'm select" the activity → C2. Prepare
- "I'm select" the skill → C2.3 Choose and check machines and tools and adjust tools. (fig. 2)

"I'm select" is the elementary task → preparing the workplace for blowing a cup.



Certification standard

(Appendix Ib)

DEFINITION OF COMPETENCES

Summary table of competencies

C1 Be informed

C1.1 Read the instructions and decode the documents provided (technical file and procedure).
C1.2 Identify work materials,
C1.3 Identify materials, tools, fluids, C1.4 Identify control tools,
C1.5 Be aware of health, safety and environmental regulations.

C2 Prepare

C2.1 Establish the chronology of the operations to be carried out according to constraints, C2.2 Prepare the work materials,
C2.3 Choose and check machines and tools and adjust tools, C2.4 Organize and adapt work space.

C3Implement

C3.1 Carry out pickings with the ferret and the cane,
C3.2 Shape the taken glass in order to blow it
C3.3 Carry out the blowing to carry out the requested part,
C3.4 Carry out the pressing to carry out the requested part,
C3.5 Carry out the detaching, the setting to the annealing arch
C3.6 Complete the finishing touches (tracing, decalletage, slotting, chamfering, sawing, re-brushing, flatting, de-polishing, polishing),
C3.7 Carry out the decoration (compaction, roughing, cutting, sanding), C3.8 Ensure the stop of the manufacture

C4Maintenance

C4.1 Ensure preventive maintenance (standard: NF 13306 of June 2001),
C4.2 Detect possible malfunctions,
C4.3 Maintain the station in working order.

C5 Check

C5.1 Adapt gesture and posture according to the operation to be carried out and respecting the rules of ergonomics,
C5.2 Check the conformity of the realizations in the course of manufacture, C5.3 Carry out the auto control.

C6 Communicate

C6.1 Pass on instructions,
C6.2 Participate in problem solving by proposing improvements or solutions.
C6.3 Report orally, graphically or in writing, choosing and using the appropriate tools, media, techniques, principles and codes.

C7Respect the rules of hygiene, safety and environment

C7.1 Respect the rules of hygiene and safety, C7.2 Respect the rules of environment.

10

C2.3 Select and check machines and tools and adjust tools.	Environmental elements : - The workshop, the workstation. Available resources: - Technical file, - Procedure sheet.	The choice of the tool and the machine is adapted to the required realization. The tool and machine are in working order. In the case of anomalies, the person responsible is informed.

figure 2- Skill description

Figure 101. CPC referential.

⚠ - If you don't have any referential, you need to formalise it with the master craftsman and define the activities and skills.

2 Fix an educational aim

Formulate the three components of an educational objective:

- Observable behaviour
- Achievement condition
- Performance criteria (if assessed)

👆 - Definition of the operational educational objective.

Example:

- Observable behaviour: at the end of this session, the learner will be able to prepare the workstation for blowing a cup.
- Achievement condition: in the workshop using the technical file and the procedure sheet (see referential, skills table.
- Performance criteria (if assessed):
    - The choice of the tool and the machine is adapted to the required realisation.
    - The tool and machine are in working order.
    - In the case of anomalies, the person responsible is informed.

3 For whom?

Define the audience for the training session, adjust the method, the tools, activities and educational aids and any difficulties suspected at the outset.

Example:

For apprentices, encourage an inductive approach, starting with them, their interests and what they already know. Encourage experimentation and demonstration, summarise knowledge using practical exercises and adapt the pace of training.

👆 - See the principles of the experiment, page 5 of the educational kit.

4 Go straight to the point - keep it simple

Select the key information, most relevant for understanding.

⚠ - this stage is difficult because we often would like to pass on as much of our knowledge as possible.

This is a difficult stage for the trainer, as it is essential to select and summarise the fundamental concepts to be passed on, focusing on the objective of the session.

Example: preparing the workplace for blowing a cup.

Skills/tasks:

- choosing the right tools
- prepare the bench
- prepare the mould
- check, maintain and adjust tools

Cross-cutting skills:

- ❖ know how to read a technical file
- ❖ know the procedure, or know how to read the procedure sheet
- ❖ comply with health, safety and environmental regulations.

Not needed skills for this session:

- ➢ checking and adjusting tools not used for this work sequence
- ➢ how the tools are made
- ➢ the work position on the bench (to be seen in another session linked to implementation)
- ➢ etc.

5 Slice the knowledge

The learner studies simple concepts one by one and then assembles them into more complex concepts. This method is based on the mental patterns of the cognitive load theory and is part of the pedagogical progression.

The trainer will have to break down the skill to be taught into elementary tasks, or learning units.

👆 - In this point, we implement the cognitive load theory, see the intrinsic load and element interactivity effect, see page 59 of the educational kit.

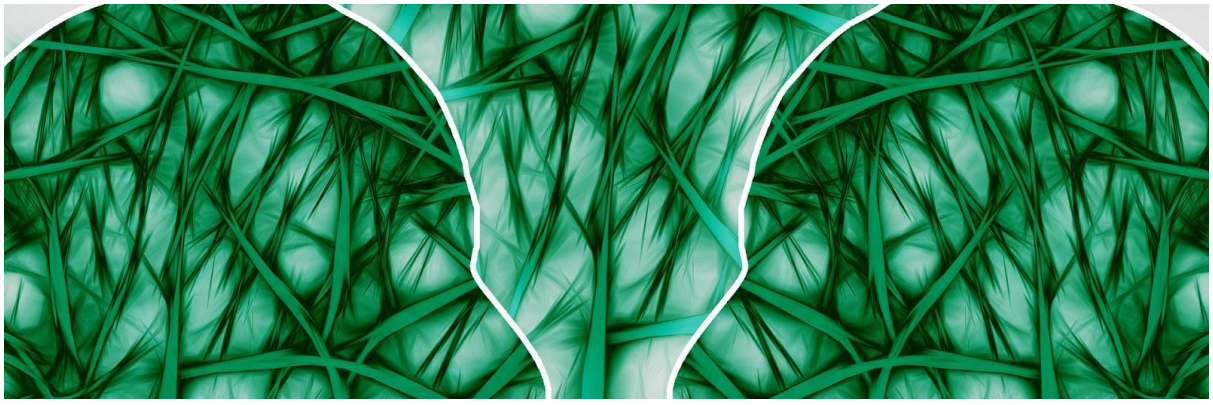
👆 - The smallest "slice" of skill will be the capability, which is the control of an elementary task forming part of competence, see glossary, page 56 of the educational kit.

Example: preparing the workplace for blowing a cup

Skill sliced in capability, elementary task:

- Choosing the right tools (list of tools depending on the task)
  - jacks
  - shears
  - pincer
  - bloc
  - mould
- prepare the bench
  - positioning the bench in the workshop
  - placing tools on the bench
- prepare the mould
  - placing the mould
- checking, maintaining and adjusting tools
  - check
    - are the jacks waxed
    - are the pincers unwaxed
    - is the mould waxed

6 Link the skills to pass on at activities and phases



Which Craft tools are associated with the skills to be passed on? photo credit: Gerd Altmann -

👆 - See the definition of activities and phases on pages 10 and 11 of the educational kit.

⚠ - At this stage, for each ability or skill to be acquired, you can define whether it is knowledge, know-how or interpersonal skills, and the level of mastery expected.

If necessary, you can refer to the referential.

This stage will enable us to define which skills or abilities will be imparted using which Craeft tools, e-learning platform, Design Studio, and Apprentices Studio. Example:

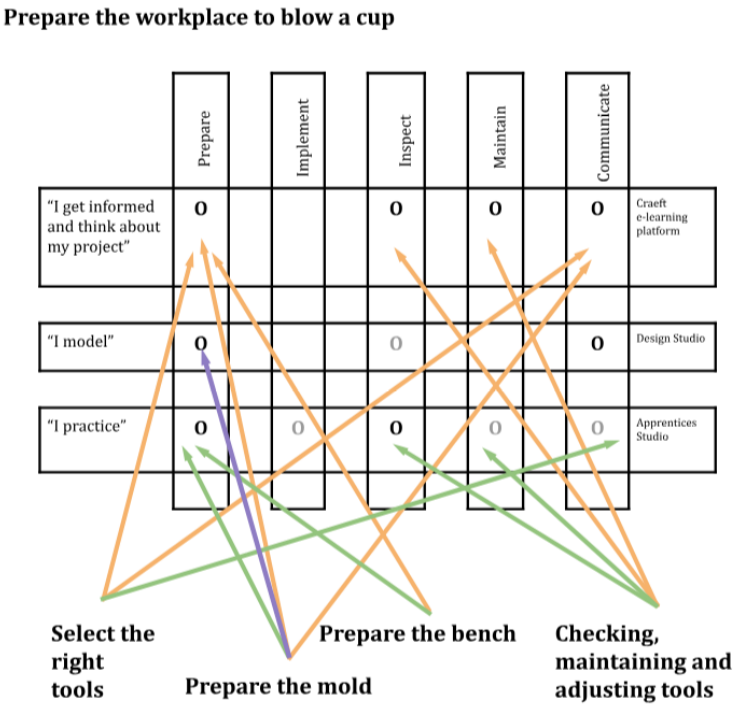


Figure 102. Distribution diagram of skills in the scenarios.

Skills/Capabilities	Type of skills (taxonomy)			Craeft tools used		
	know	know-how	interpersonal skills	e-learning	Design Studio	Apprentices Studio
Select the right tools.	X			X		
Prepare the bench	X	X		X		X
Prepare the mould	X	X		X	X if specific shape	X
Checking, maintaining and adjusting tools	X	X	X	X		X

Figure 103. Distribution table of skills in the Craft tools usages.

7 Design the session using the detailed educational scenario

“What I’m doing at this time of the session with what tools?”

The detailed educational scenario is a time frame for the training session.

Based on this framework, everything remains to be worked out: how to implement the method to achieve my objective, what activities and materials will I create, carry out and use at each stage of the session.

⚠ - In this creation session phase, the choice of educational tools will implement The educational approach and method.

👆 - See educational principles, page 13 of the educational kit.

Inductive approach
From particular to general
Linked educational methods: ● Active ● Active experiential ● Project-based
The learner: “I like doing”

Inductive approach
From particular to general
"I have a project; I'm going to learn the knowledge I need to succeed". Access to skills is direct from the learner to the knowledge, the trainer is a facilitator, and access to knowledge is discontinuous: "I test and start with skill D".

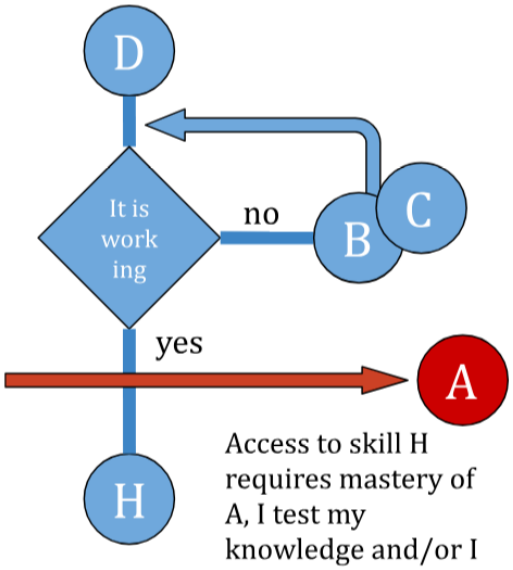


Figure 104. Educational inductive approach.

⚠ - The detailed educational scenarios proposed in the educational kit are focused on presential learning. For e-learning course making, the detailed scenario is the sequencing of the topics.

⚠ - For learners, being able to situate themselves in their training path is one of the sources of motivation.

At the start of the session:

- It is therefore important at the start of the session to set the context
- Review the concepts covered in previous sessions
- Set the aim and communicate the plan for the session
- Discuss the aim with the apprentices to give meaning to the learning.

At the end of the session:

- Summarise the concepts covered
- Assess
- Remedy if necessary
- Put into perspective, looking ahead to the next session

- See the structure of the educational scenario, page 12 of the educational kit.

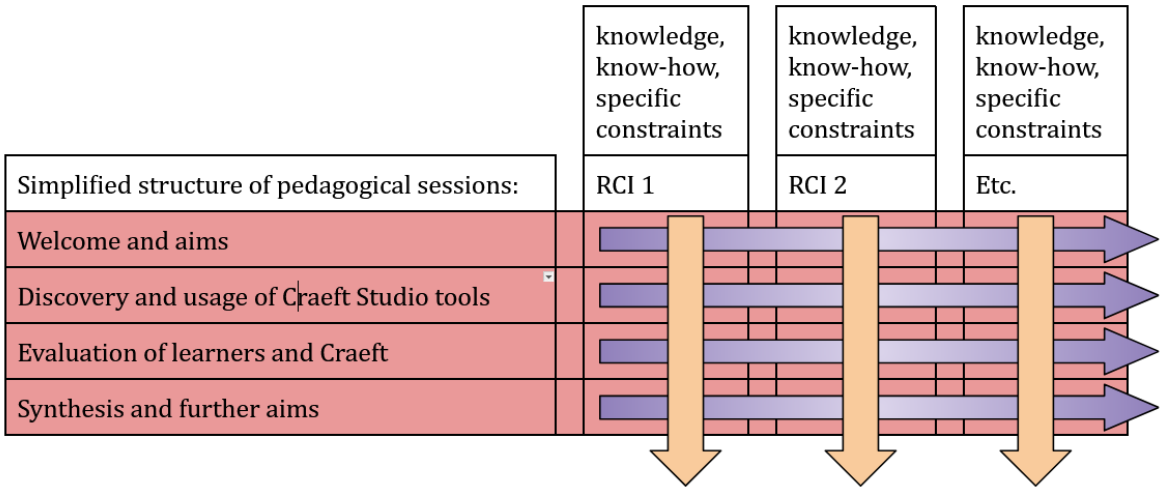


Figure 105. Transversal session phases for all RCIs.

Example: Craeft Studio platform tools discovery session

Session phases	**Not recommended method**	**Recommended method**
Launching / contextualisation		
A reminder of what has already been seen during the presentation of the Craeft project.	"Last time we saw ...." only spoken. (passive attitude / auditory channel)	"Who would like to write on the board what we saw last time? (active attitude / auditory and visual channels)
Course aim	"This is the goal...."	"What do you think we're going to see today?"
Presentation of e-learning platform		
To provide essential guidelines for using the e-learning platform	“Should be known….” (regular classroom teaching) or have a look at the documentation on the website.	• "Who has ever used an e-learning platform, the Cerfav platform for example?" - "What can you tell me about it?" • demonstration by the trainer or "Who would like to try it? • summary "So what's in it for me? (make a note or

Session phases	Not recommended method	Recommended method
		ask someone to make a note on the board)

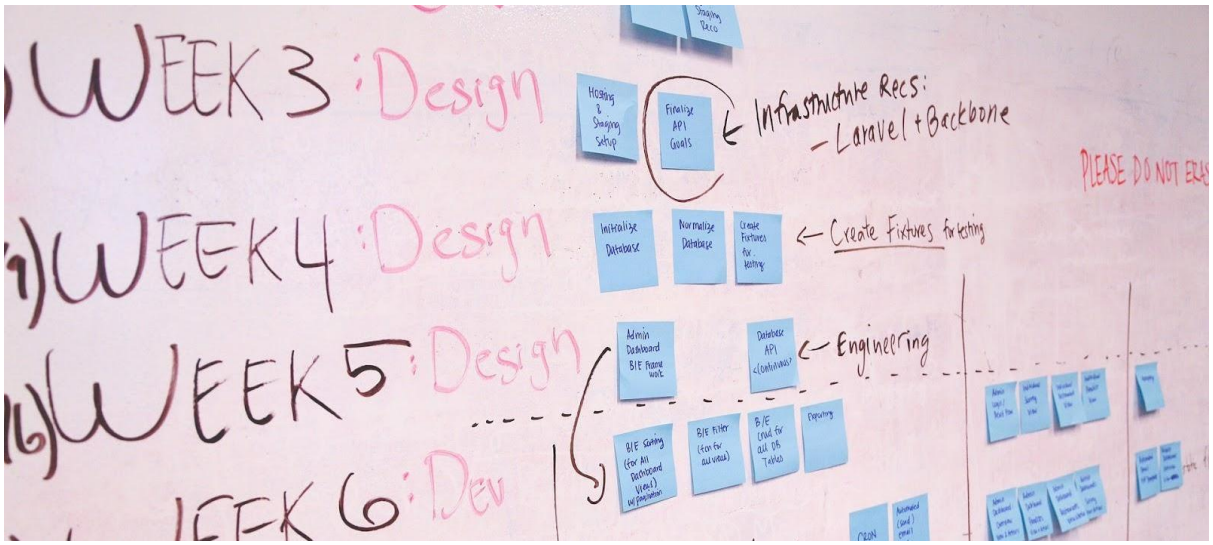
Figure 106. Phases of a session and recommended method.

8 Creating and preparing course materials

This stage takes the shape of the tools designed. It consists of producing the training aids in the form of a text, video, diagram, PowerPoint presentation, quiz, etc.

Example: Search for a video, create a click-and-drop quiz using images on the e-learning platform, write a document, etc.

9 Material organisation



- room reservations
- participants list
- reserving the video projector
- Arrange for printing materials
- Post-it notes, paper, and pens
- felt pens for the blackboard
- Prepare the environment for XR
- etc.

⚠ - Plan this organisation, to avoid last-minute stress.

⚠ - Don't forget to test any installations or devices beforehand.

⚠ - Have a plan B, a paper version of your presentation for example.

📣 - Have your own felt pens for the whiteboard.

10 Host the session

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Everything is ready, all you have to do is run your session! A few tips:

📣 - Have the detailed educational scenario in front of you

- Organise the materials to be distributed (if necessary) according to the session timetable

- On the computer, filing documents for easy access.

11 Analyse goal achievement

After each session, you can take stock of what worked well, what did not work so well or what didn't work at all, and identify areas for improvement.

Example:

- Achieving the learning objective
- Satisfaction survey
- Timing of the session
- Adherence to the proposed activities and materials
- Clarity of materials/comprehension by learners
- Relevance of assessment