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Assessment of visual sub-competencies through Visual Rubrics: case studies based on the Common European Framework of Reference of Visual Competencies (CEFR-VC)

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ABSTRACT

In the second version of the Common European Framework of Reference for Visual Competence (CEFR VC) discussed in this journal issue, the main competency dimensions: creation and reception are represented in 16 sub-competencies, with an overarching competence dimension of metacognition. Visual Rubrics (VRs) support the assessment process of visual competency through an in-depth understanding of the content and levels of competences developed in an art education programme. Activities and their quality are captured in symbolic visualizations (images and explanatory textual rubrics) that scaffold the learning path and turn the competence development process into a metacognitive experience. Based on the first version of the Common European Framework of Visual Literacy (CEFR-VL), VRs for secondary-level art education were successfully employed in five European countries as summative assessment tools. In Hungary, the VR development continued with the new version of the framework, the Common European Framework of Visual Competency (CEFR-VC to explore the adaptability of VRs in a variety of educational settings. The tool proved to be useful in formal, school-based education as well as in the informal educational environment of museums. In this article, we explain the structure and imagery of the VRs and discuss their reception by art educators.

Abbreviations: CEFR VC: Common European Framework of Reference for Visual Competence; CEFR_VL: Common European Framework of Visual Literacy; VR: Visual Rubric

KEYWORDS

Developmental assessment; situations; visual subcompetency: visual rubrics: teacher education

Introduction: (Visual) Rubric in education - a Procrustean bed or a compass?

'To elevate the role of arts education, measure it!' The title of a summary of educational policy suggestions suggests that the best way to incorporate the arts measures

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into the accountability systems of American states is to establish their reliable and continuous measurement (Kisida et al., 2017). The authors argue that the arts are vital components of the 'Every Student Succeeds Act', 2015, that requires the states to provide students with a well-rounded education. The need for authentic and accurate assessment methods has been intensified in Europe with the growing importance of accountability in the first decades of the 21st century (Kárpáti, 2019). However, assessment may be considered authentic only if it is much more than a rigid and bureaucratic technicality.

A recent study indicates that assessment tools should go beyond measuring skills and support the professional reflection of teachers to gain deeper insights: 'Contemplation and critical reflection in our professional learning and practice as educators allows the imagination to envision a pedagogical future which offers learning environments which appeal to students from multiple backgrounds, abilities and learning styles' (Anderson et al., 2021, 105). In her literature review of current research trends in visual literacy, Brumberger (2019) identifies the need for research methods with a distinct disciplinary identity that enrich the methodological repertoire of the field and, opening new trajectories, support visual literacy research.

Visual Rubrics (VRs) have the potential to meet these claims. Through visualizing attainment targets, they possess a distinct disciplinary identity and may provide sophisticated results on performance levels. They may offer an alternative to traditional, narrative evaluation of student work and, as a developmental assessment tool, may enrich the conceptual understanding of students related to visual culture at the same time. Haanstra et al. (2015) suggest that rubrics are useful both for summative and formative assessment as they provide early and informative feedback. They can be employed for scoring and for explaining scores to better understand criteria, but also as an instrument for defining the contents of education. Constructing the conceptual structure and imagery of the VRs requires detailed planning of classroom activities and their assessment, and therefore they support the professional development of teachers. Finally, as a developmental assessment tool, VRs enrich conceptual knowledge about visual culture and provide immediate feedback about competencies that are outstanding, thus facilitating talent detection and at the same time point out areas of improvement. Using the same VR as their students, art teachers can compare their understanding of an aesthetic concept, the quality of a product, or the achievement of a developmental level – or the lack of it – quickly and accurately, during the final phase of the creative process.

The classic, verbal rubric can be either *generic* (to be used for a variety of learning content) or *task specific*. Rubrics that are *holistic* in nature evaluate end results, while *analytic* ones focus on processes. Regrettably, criteria of evaluation as well as definitions of levels of achievement are often unclear as they are based on educational documents that the rubric user may not know or be unable to retrieve. However, when developed and piloted properly, rubrics are appropriate tools for the assessment of complex tasks which aim at diverse solutions – like a design project or an expressive artwork. If introduced at the beginning of a learning sequence, rubric criteria inform students about their levels of achievement, and their prospects during studies and thus promote self-regulated learning. (Panadero & Romero, 2014). *Analytic rubrics* can be useful if certain

sub-competencies are required for higher-level tasks and both teacher and students need detailed transparent information on entanglements. On the other hand, holistic rubrics are often better in the domain of art education where sophisticated creative work cannot be categorized in detail. Previous research proves that holistic judgement of art works is equally valid as analytical assessment (Boughton, 2013).

Text-based rubrics have rarely been used in art education, probably because they were found too rigid for artist teachers to adapt to their objectives. VRs, however, support the understanding of assessment criteria and developmental levels through symbolic representations. Therefore, art educators consider them authentic assessment tools for educational processes involving the acquisition of visual language. A standardized sets of competence visualizations containing verbal and visual scoring guides to assess the development of creative and receptive sub-competencies identified in the Common European Framework of Visual Literacy (CEFR-VL, discussed through examples in Wagner and Schönau (2016)) was developed by the Amsterdam Academy as a self-assessment instrument for secondary level art education (Groenendijk et al., 2018).

The toolset was popular with art educators: successful pilots were undertaken in five European countries, using VRs as summative assessment tool employed at the end of a learning unit (Groenendijk et al., 2020). A systematic comparison of primary and secondary school curricula in European countries (Kirchner & Haanstra, 2016) showed that there are many similar educational contents and objectives in documents. The developmental process of the CEFR-VL framework showed that there is a common European understanding about key competences to be developed through art education. The success of the international VR pilot has proven the culture-free character of the tool: images were easily interpreted by art teachers and their students in the five countries as they utilized elements of a visual language used around Europe. Thus, VRs were found to be generic tools of assessment for art and design education.

Research on authentic and convincing assessment methods has been intensified in Central and Eastern Europe, too, with the growing importance of accountability in the first decades of the 21st century (Kárpáti, 2019). In a follow-up study to the international usability experiment mentioned before, we wanted to investigate the process of developing new VRs for distinct interventions in art education, thus proving the flexibility and adaptability of the tool.

Developing Visual Rubrics based on the CEFR-VC

For the definition of sub-competencies to be addressed, we selected from those described in the CEFR-VC (Schönau et al., 2020), adding new sub-competencies to comply with the educational objectives of our projects.

CEFR-VC: a research-grounded basis for the development of assessment tools

In art education, curricular outcome requirements are generally described as competencies or dispositions that enable us to use visual language. They are outcomes of demonstrable behaviour, not merely intentions, aims or objectives (Wagner & Zapp,

2017). The European Framework of Visual Literacy (in its revised version, renamed as Visual Competency) offers structured definitions of two major domains of using visual language: production and response to images, as well as reflection on their major visual subdomains in a non-hierarchical structure, indicating their interrelations eachother, with reflection (metacognition) and with basic competencies.

Based on the analysis of curricula in 21 countries (Kirchner & Haanstra, 2016), the first framework lists 16 sub-competencies which can be related to both production and response. Some of these are closer to the productive, others to the receptive domain or overlap both. They are activated in specific *situations* that call for visual communication, design and construction, creative expression or responding to a form of visual culture.

The new name for the framework, Common European Framework of Visual Competency (CEFR-VC) distances the domain from the concept of 'being literate' – an expression primarily indicating reading and writing skills (Schönau et al., 2020). Being visually competent means the combined use of knowledge, skills and attitudes manifested in specific situations that require the use of visual language. This framework adheres to the original intention of the European Network of Visual Literacy to develop a framework that addresses the combined use of learnable knowledge, skills, and attitudes that are demonstrated in specific situations (Kárpáti & Schönau, 2019).

Based on the analysis of visual skills research in four countries, further items were added to the original 16 sub-competencies and they were grouped under the two major subdomains: producing and responding. Correlations were also clarified in terms of linear and non-linear sequences of sub-competencies: non-linear in producing, linear (with activities following each other in a certain order) in responding. The key feature of the revised framework is its interdisciplinary character. The cognitive, affective, and psychomotor activities indicate a wide range of use of visual language far beyond the arts and thus indicate the increased role of art education in our (increasingly) Pictorial Age (Schönau et al., 2020).

Producing

- to generate visual ideas: produce innovative ideas and/or indicate novel connections among datasets through images, often without the need of verbalization. Infographics, an emerging genre on the borderline of arts and science is an example.
- to do visual research: scientific visualizations, such as dynamic representation of models and processes or the representation of networks may serve as examples.
- to make visual images: to realize visual ideas.
- to present one's images: to enhance, emphasize, interpret or contextualize creations through sharing them with an audience.
- to evaluate one's images and image-making processes: self and peer assessment that contributes to a deeper understanding of actions and results.

These sub-competencies are concrete enough to be explained to school-age children (on different levels of understanding, of course) but also flexible enough to invite specifications or interpretations related to individual projects.



Responding

Eleven sub-competencies related to this subdomain were structured into four temporal phases that are based upon one another:

- A. visual scrutiny
- research on relevant contextual information
- C. evaluation
- D. communication.

These phases involve four generic competencies in the subdomain of 'responding':

- 1. to look at images with an open mind: to observe, undisturbed by previous expectations, experiences or prejudices.
- to research images: to identify important aspects of their form, function, style, util-2. ity, etc., that enables their identification, interpretation, categorization, etc.
- to evaluate images: to assign spiritual, material, cultural, etc., value to an image 3. and thus further its understanding.
- 4. to report about images: to share ideas about images, assuming the role of impartial observer, colleague, user of an image system, critic, etc.

The overarching competence dimension of metacognition was retained, as it addresses reflection on producing and responding alike. This competence system may answer the increasing need for formulating a curriculum for 'Visual Literacy in the K12 Classroom of the 21st century: from college preparation to finding one's own voice', as the title of Anderson et al. (2021) indicates. This structure enabled us to develop new rubrics that addressed certain situations of visual culture more directly and thus serve the purposes of self-reflection, assessment and evidence-based educational innovation.

Research questions and experimental design

When introducing VRs in Hungarian art education, our research questions related to their flexibility and adaptability:

1. How far can we visualize sub-competencies, without losing their complexity of meaning?

The experiment answering this question involved our first set of VRs, developed to support self and peer assessment in a secondary grammar school with 50 students aged 15. Their creative work was guided by the teacher who utilized the VRs to support developmental self-assessment: a process that enhances creative performance through a structured observation of self, developing a metacognitive awareness of creation (Schönau, 2012). Students were invited to use a VR for self-assessment and gain a deeper understanding of sub-competencies involved in their creative process.

Table 1. Experiments with Visual Rubrics in art education and in-service training of art teachers in Hungary.

Cases	Age of participants	Number of students	VR use	Date
1) Using VRs in art education: secondary grammar school, individual work	15 years	50 students from 1 school	Self-assessment: deeper understanding of sub-competencies involved in the creative process	January– March 2021
Using VRs in art education: secondary grammar school, group work	17.3 years	178 students from 5 schools	Assessing the quality of collaborative performance in art education	September– December 2021
3) Using VRs in inservice art education	25–45 years	40 teachers of different disciplines from 28 primary schools	Assessing individual performance in art appreciation	September– December 2021

2. Can we create symbols, sensitive to different levels of performance and responsive to social contexts of schools that support self-, peer- and teacher assessment of student performance with equal efficacy?

The second experiment involved students in the last year of secondary grammar school (average age: 17.3 years), The VR was developed to assess collaborative projects and was piloted in art education classes at school and individually, as part of home assignments. In the second case, students had no teacher support and had to rely on the textual and visual versions of the rubrics to clarify assessment criteria related to a certain educational content. For this study, we observed the use of the VR in five classes, with three art teachers and 178 students altogether.

3. Are the VRs flexible enough to be utilized by a wide variety of learners (including participants of in-service teacher training courses) for a diversity of projects?

The third case study involved museum-based in-service teacher education. In an art museum, a VR on perception, observation and analysis of works of art was introduced to 40 teachers from 14 senior primary schools, participants of the in-service course. The teachers came from a wide variety of educational contexts, ranging from laboratory schools in the capital to small village schools. As a course task, they included the VR in an art education programme with a museum education session in focus.

Our three educational experiments were documented through participant observation (Case 1 and 3), online or face-to-face focus group interviews with participant groups and selected individuals whose use of our VR was found intriguing (Case 1 and 2), and the analysis of all VRs filled out at the end of each project. In Table 1, we summarize the collection of data. In the next part of the article, we discuss developmental considerations and user experiences of VRs in the three educational situations indicated above. In a further publication, we will analyse the performance of the participants in the three arts-based interventions.



Experiments with VRs: using CEFR-VC as educational scaffolding

The first part of all three experiments involved developing the assessment framework for the projects: selecting sub-competencies that would be in the focus of our developmental efforts. Then, we planned the methodology of interventions that were likely to enhance them. Finally, visualizations that represented the selected sub-competencies were designed. For the case studies discussed here, Zsuzsanna Paál, the second author, graphic artist and art educator, developed VRs that were piloted in the three experiments, in primary and secondary schools in Hungary, to reveal potential benefits and handicaps of their use in contrast to already established assessment tools of visual competencies.

Before utilizing the new VRs in the experiments, they were piloted in three groups matching in age and previous knowledge those to be involved in the experiments. Images that failed to represent competencies and their levels in a recognizable and easy to interpret manner were modified or excluded. Both user groups: teachers and students participated in the pilots to ensure that the meaning of the VRs was understandable for all stakeholders, and the tools were easy and efficient to use.

We used the *developmental assessment model* that integrates learning with evaluation.

The assessment of technical skills should only be done as a formative activity. The technical tools, media and techniques are practical instruments that demand skills in handling these effectively. Students can be informed and advised, not judged, when it comes to the development of skills in handling these tools. Skills, materials and techniques per se lack meaning. Only when these tools are used by students to give form to meaning, the making of art becomes a relevant activity. What should be assessed is the effectiveness of the processes used and the product made regarding the expression of the intended meaning.

If students are given the responsibility for their own learning process, they also need to know how to evaluate their own results. Learning to assess one's own work according to one's own criteria is the next step. Finally, any assessment done by a student should result in a new assignment, formulated by the student and which elaborates on what he or she has done before. A student can also decide to look for a new challenge, as he or she will find new meanings to investigate and express. Assessment thus becomes an instrument in the student's own artistic learning and development (Schönau, 2012, p. 50).

All three cases were designed to employ developmental assessment. In Case 1, students were empowered to assess their own development through VRs showing previously defined sub-competencies that their teachers introduced in detail and explained their relevance to the creative task. In Case 2, explanation of task requirements and concepts was provided in a textbook that also contained the VRs to be used. In Case 3, art teachers interpreted their own learning through VRs that they discussed in terms of their professional experiences.

As the VRs, the tools for assessment were essential parts of the methodology of the experiments; we will briefly describe the process of VR construction here, using the tool developed for this task as an example (Figure 1(a,b)). The VR design process starts with selecting the part of the curriculum and the task to be assessed through the tool. The art teacher selects visual competencies and sub-competencies to be developed during the next lesson or series of lessons. In our case, the comprehensive and research-based resource, CEFR-VC was employed to identify and describe the structure

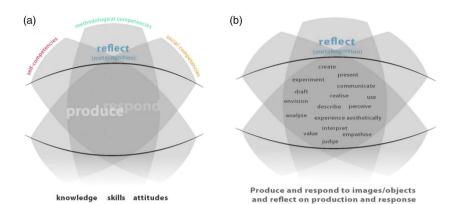


Figure 1. (a,b) The first European Framework of Visual Literacy. Source: http://envil.eu. Description with examples from educational practice: Wagner and Schönau (2016).

of visual competencies. After identifying them, the art teacher develops one or more tasks for their development and designs the creative process or the experience of art appreciation. VR design is the last phase of the educational planning process. Expressive and funny images are designed to visualize relevant competencies and their levels of attainment. Images may or may not be connected to the tasks. VRs are equally effective when they represent a competence in general or in a certain situation or context. Witty, even humorous rendering of competences make a VR less schoolish, more artistic, and motivating for students to engage with.

Experiment 1: media campaign: inviting students to integrate their knowledge in visual media, design and psychology

Here is an explanation of the images and text on the VR developed for the media task:

- 1. Doing visual research: the series of images is about engaging with a new area represented as an exhibition space. The basic level shows the researching student peaking in. On the image representing the second level, he is approaching the door to take a closer look. This symbolizes a modest effort to do research for his task. The third, more intensive research activity is represented with the figure entering the room where visual information is found. On the last image, the researching student is immersed in the field he/she is about to study, wearing a t-shirt printed with the motives of the paintings, to show intense appropriation.
- 2. Planning: the essence of this activity is innovation. The representation of the first level shows a figure, reclining against a work of someone else. He is not ready yet to get away from the solutions of others. Higher achievement levels of the criterion are symbolized with the figure, gradually turning into a tree: growing a few branches (developing the first ideas), then more leaves (elaborating selected ideas). Finally, the tree-figure reaches out, representing the complete plan, firmly rooted in the ground. The body language of the figure shows increasing confidence and self-assurance.

- Producing a visual work: the image shows the development of skills involved in 'making', as in makerspace. The growing work of art and its increasing complexity indicate higher levels of production competence. Here again, the body language of the protagonist indicates development: stepping out of the comfort zone of following others, and increased self-assurance and joy over the artwork completed.
- Communication of the results of production means presenting and, if need be, defending one's creative product in public. Two features indicate growing bravery and articulation of the artistic merits of the work: the body language of the author, from shy to self-assured, and the visibility of the product, hidden from sight at first, and shown with pride to all, effectively demonstrating its merits. The use of campaigning posters to symbolize the competence of communication is directly related to the task.

Fifty students at the Secondary School of Visual Arts in Pécs, a county seat of Hungary with rich cultural tradition, received a media campaign task to popularize eco-friendly products. For students of Grade 10, with an average age of 17.5 years, developing a campaign that involves traditional and digital media - poster design and video – was both challenging and engaging. Before starting to develop their advertisement campaigns, students received an assessment sheet with VRs and accompanying Text Rubrics to explain criteria that would be used for judging their work. Discussion of the meaning of concepts soon revealed that there was more to this task than drawing and filming: research on potential audiences and effects of images were also required. Normally, students would have grabbed their sketchbooks to generate visual ideas, but on their VR sheet, the competency 'to do visual research' was the first criterion. So, they started watching, with a critical eye, advertisements of similar topics and searching for research on their use. Thus, they developed their competency to research, and to evaluate. Given the relaxed, studio atmosphere of the class, students could continuously report on interesting images that they identified, sharing their new insights about the visual culture of contemporary advertising.

Experiment 2: collaborative creation, individual assessment: project-based assessment through VRs

After the experiments described above, we continued using the VR in 4 schools of three cities and presented the method at three meetings of teachers. In two of these, art educators gathered to hear about current trends in their profession, the third was a meeting of teachers of different disciplines with an interest in assessment methods. Teachers were invited to evaluate the VRs and reflect on their usability in different educational settings. We expected examples of potential VR use in visual art education and were surprised to hear that teachers of other art forms: drama and music education, also found the tool an authentic and flexible form of assessment and expressed interest in development or piloting.

Interaction among the designer, Zsuzsanna Paál, and participating teachers of performing art forms resulted in VRs for drama, dance and music education. Competences featured on the VRs seemed to be applicable for collaborative projects in the visual arts as well. Our second experiment involved testing a VR to assess an art project involving visual competencies as well as verbal and psychomotor skills. We developed detailed Text Rubrics and VRs to be used by students and their peer groups without the mentoring of the teacher, for home assignments. The VR was piloted in three schools, with 173 students of Grade 11 (average age 17.3 years). Feedback was collected through student and teacher surveys.

The central part of a VR-based educational process is judging the level of a competency or sub-competency achieved. Peer and self-assessment in a collaborative setting may be different and result in arguments. Therefore, the sophisticated, still easy-tointerpret visualization of levels is crucial. Using items from a VR for assessing directing skills as an example, we show how the levels of performance are symbolized. Figure 2

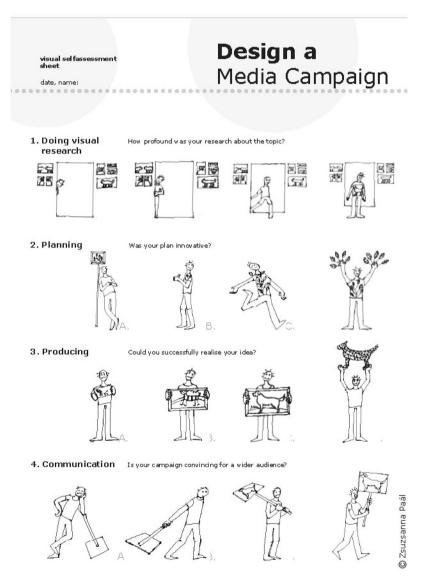


Figure 2. VR assessment sheet for this task: 'Design a Media Campaign!' Translation of the criteria in the text below. Content and images: Zsuzsanna Paál.

shows two criteria for the holistic assessment of the skill set active during drama performance are represented. For Criterion 3, Acting performance, the top row on the image, the question explaining the criterion asks about the level of three important expressive means of acting: mimics, body language and sound. The series of images depicts masks, the ancient symbol of theatrical play. The first one is blank - even one of the strings that attaches the mask to the head is missing. This is the symbol of 'no acting effort'. The second image suggests that both strings are in place - basic acting is observable. The third string shows the eyes, indicating some theatrical effects are intended and achieved. The fourth level features both eyes and mouth: the mask is complete, acting endeavours are multifaceted.

The top row shows levels of acting through the ancient symbol of theatrical play: the mask. Levels of acting are symbolized through a more and more detailed image of the mask, starting from the lowest level, where there is no evidence of acting and no mask: two mugs are seen. The bottom row in Figure 2 represents levels of directing through the simplified image of the director that many representations have burnt into our minds: a man with a loudspeaker. The basic level of directing is symbolized by the figurine listening to his megaphone for directions, instead of using it properly and make himself heard. Level 2 shows the opposite, equally useless behaviour: shouting on end. Level 3 shows the existence of directing ideas, but they are presented in an insecure tone, while Level 4 represents the director in his optimal capacity, giving directions in a clear and self-assured manner. The symbols for the levels of other competencies on the VR were designed similarly (Figure 3).

The VR used to assess collaboration was utilized by teachers of all art forms, with slight modifications. The VR for visual projects will be presented in the Discussion of results section below

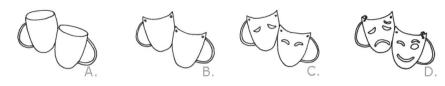
Experiment 3: Museum experience – using VRs at an in-service training about an informal learning opportunity

Museum visits by school classes manifest special educational problems for art teachers and museum educators alike. In a museum setting, students should mobilize competencies of visual perception, interpretation and analysis in an unusual, open setting where new experiences and previously gained knowledge may clash. Museums are rich and sophisticated cultural statements: they express the identity, mentality and history of the nation (Yuldosheva, 2022). Teachers leading a museum visit should possess high levels visual competencies themselves to be able to support the encounter of their students with an artwork. However, professional training in visual literacy is still rare in higher education. At universities and colleges, students, who routinely communicate through images and symbols in their private life, encounter an overwhelmingly textual world where their visual experiences and creativity is not utilized (Kędra & Žakevičiūtė, 2019).

In our third experiment, we tested a VR that helps teachers of all disciplines to conceptualize and assess museum learning of their students. The participants were 40 teachers of different disciplines from 28 schools, participants of an in-service training course on methods of museum education. The experiment was related to our third research question: are VRs flexible enough to be utilized by a wide variety of learners

3. Acting performance

How did you perform the play through your mimics, body language and voice?



4. Directing

How did you realise team management and direct the play in line with your intentions?

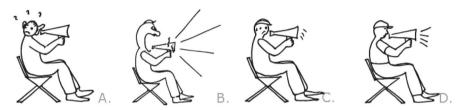


Figure 3. Visualizations of acting performance (top row) and directing (bottom row). Content and images: Zsuzsanna Paál.

(including teacher participants of in-service training courses) for a diversity of informal learning tasks? This experiment needed a VR that includes visual perception, observation, interpretation and analysis task – competencies that seem to be more difficult to visualize than previous concepts. Below, we show items that can be used for assessing the results of a visit to an art museum (Figure 4).

These simple series of images relate to the intensity of observation, without indicating its target. Therefore, the VR may be used for visits at a museum of natural science, technology, art or any other type of exhibition, where objects on show have to be scrutinized in order to understand and enjoy (Figure 5).

Art educators often employ the Tableau Vivant task to playfully facilitate understanding the composition of an artwork. This item, although referring to Michelangelo's David, was used for a variety of artworks, as the levels of performance clearly indicate the quality of the tableau, from no similarity of the posture through failed interpretations to perfect imitation.

Forty teachers from 14 different senior primary schools (teaching Grades 5–8, students aged 11–14 years) participated in two teacher training programmes of 30 h each, organized in an art museum in Budapest. After the introduction of a model of developmental assessment, the CEFR-VC framework and museum education methodology, guided tours of the collection and site visits to museum education programmes were organized. Participants were invited to test the museum education methods and the VRs and report about their experiences.

Discussion of results

The developmental assessment model for using the VRs started with a competence development plan based on the curricula of teachers, followed by the definition of



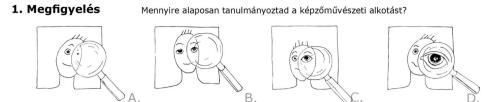


Figure 4. Visualization of the sub-competency of Observation. Content and images: Zsuzsanna Paál.



Figure 5. VR criterion specially developed for the task Tableau Vivant. Content and design: Zsuzsanna Paál.

minimal, average and optimal levels, and continued with designing VRs that mapped the creative learning space. The intention of using the tool was to introduce project objectives in an easily understandable way and raise student awareness of the competences to be used for completing the tasks. At the end of the art education process, the VRs were used to perform self-, peer- and teacher assessment. After presenting some examples to illustrate the design process of the VRs and showing the style and method of visualizations in the first parts of this article, we will now discuss qualitative results about their usability.

Our case studies were documented through participant observation (Case 1 and 3), online or face-to-face focus group interviews with participant groups and selected individuals whose use of our VR was found intriguing (Case 1 and 2). Comparison of all VRs filled out by teachers and learners was used to test the validity and usability of the tool. Our results indicate that the tool is very popular among art educators because it helps students understand the developmental objectives of art education in a way that is best suited to its content: through images. The VRs were found flexible and easy to adapt for new tasks, as they represent competencies and sub-competencies as individual series of symbols for competence levels. These items may be freely compiled in new tools to suit an art programme where some competencies will not be developed (and therefore, their related assessment items should be discarded) and new competencies added through images representing them. The tool, that were first conceived to assess the development of the initial set of sub-competencies in CERF-VL (Groenendijk et al., 2018; Groenendijk et al., 2019), can be adapted to the more detailed competence list of the second version of the Framework, the CEFR-VC.

Results of Experiment 1: reflecting on media use while designing a media campaign

The research question related to this study: 'How far can we visualise sub-competencies, without losing their complexity of meaning?' was answered through the analysis of artworks, and VRs filled out by 50 students in a secondary grammar school aged 15. Their explanation (voice recorded during the assessment process at the end of the art class) about choosing levels for each competence were also utilized in the evaluation of the usability of the assessment tool. Below, we show a student artwork and the related VR filled out by the student (Figure 6(a,b)).

The representation of competencies may take a wide variety of forms. Interpreting a VR requires the name of the competence to associate it with the image and interpret the visualization of different levels accordingly. Student responses showed that understanding the meaning of the pictures representing different competencies required the name of the competence on the VR. However, the interpretation of competence levels was self-explanatory and easy to follow. In some cases, also an explanation from the teacher about their meaning was found necessary, but students needed detailed verbal rubrics only during the first few uses of the assessment tool. Later, the introduction of the tool after the description of the theme of the lesson was sufficient. Students may ask clarifying questions, but the names of competencies and the

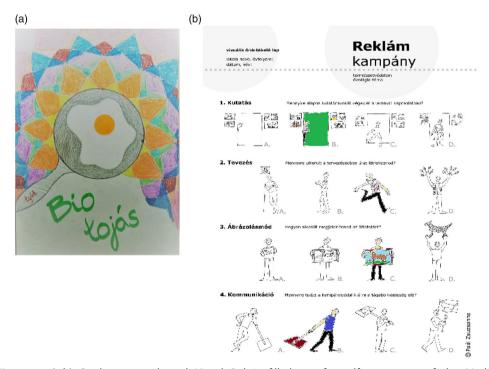


Figure 6. (a,b) Student artwork and Visual Rubric filled out for self-assessment of the Media Campaign task. Girl aged 15 years. Visual Arts Secondary School, Pécs, Hungary. Teacher: Katalin Styrna.

visualizations are almost always enough to understand assessment criteria. The teacher of the above-described intervention, Katalin Styrna reported the preference of the students for the visualization of assessment criteria (VRs) to descriptions (Text Rubrics) because they found them more motivating, easier to understand and find their level of accomplishment. Therefore, she did not introduce verbal rubrics in her teaching programmes (Figure 7(a,b)).

These findings were reinforced by later observations of the use of VRs in 12 schools of different sociocultural characteristic in three geographical regions of Hungary. During a school term of 6 months, we documented different types of VR use. Selfassessment sheets were handed to students before, during and after the realization of tasks or projects of different complexity and were found most useful when presented at the beginning of the lesson, to clarify the task, and used at the end of the lesson for realizing accomplishments and future learning needs. Teachers provided oral explanation, but rarely handed out the written form of rubrics. We have never experienced any deep misunderstanding or endless debate about the meaning of criteria and their levels as the VRs grew out of the educational practice of the art teachers utilizing them. Thus, the answer to the first research question: in the Pictorial age, when children and youth create and read images with increasing sophistication (Hooft-Graafland, 2018), concept-related visualizations can be employed with brief explanations. The meaning of VRs does not lose its complexity, if teacher-led discussion helps students interpret the meaning of images and related names of competencies before

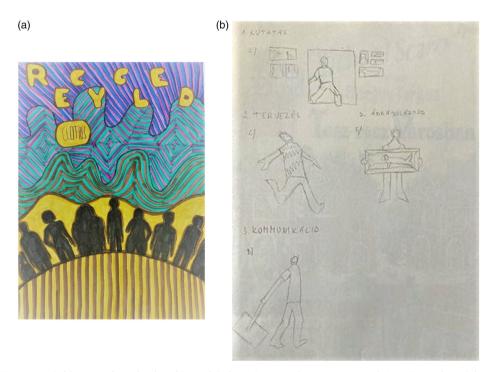


Figure 7. (a,b) Artwork and related Visual Rubric. Boy aged 15 years. Visual Arts Secondary School, Pécs, Hungary. Teacher: Katalin Styrna. Here is a special take on the media campaign task and the use of VRs. This student found it more appropriate to copy the suitable criterion levels on a sheet of A4 size drawing paper — an arrangement making the work and its assessment easier to compare and discuss.

they start their art task. The rubrics considerably support the assessment process, as teachers report student remarks like 'Finally I understand why I have to learn art at all'.

Results of Experiment 2: using the VR for collaborative work, without teacher mentoring

The research question that this experiment was designed to answer is about the potentials of symbols on a VR to indicate different performance levels. Many of the art and design projects require co-operation - an important competence that should be assessed in all disciplines. Therefore, a VR applicable for projects of different disciplines, targeting subject-specific or interdisciplinary themes was developed. For assessing some of the major competencies responsible for high-quality group work, the VR designer selected the following, holistic criteria (Figure 8):

- 1. Motivation to work together on the task or project. The image is explained through this question: 'What was the disposition of your group like, when you started the task?
- 2. Professionalism: success in completing it. The question explaining this criterion brings in two important aspects: scheduling and keeping time. 'How could you distribute tasks and realise it in a reasonable timeframe?'
- Collaboration: the quality of planning, sharing and executing tasks within a team. Related question on the assessment sheet: 'How was your participation in group work?'
- Success: satisfaction with the accomplishment of the performance of the group. 'Was your collaboration successful, did you reach your goal?'

Our experiment involved five classes of secondary grammar schools, with three art teachers and 178 students (average age: 17.3 years). Students found the VR helpful for evaluating collaborative work and filled out a VR about group performance individually. Group discussion that followed was useful to clarify collaborative process and realize ways of its improvement. A national jury of expert art teachers and educational evaluation experts decided that the VR should be included in a digital textbook for Visual Culture (the name of the discipline for art education in Hungary) for Grade 12. The jury emphasized the importance of using visualizations to support the understanding of assessment criteria and levels both by the teacher and students.

Based on the success of VRs among students and teachers as well as educational experts, we may affirmatively answer our second research question: the visual representations of different levels of performance on the VRs support self-, peer- and teacher assessment of student performance in schools of different sociocultural environments with equal efficacy. Therefore, our second research question, 'Can we create symbols, sensitive to different levels of performance and responsive to social contexts of schools, that support self- peer- and teacher assessment of student performance with equal efficacy?' can be answered in affirmative.



Figure 8. Assessment sheet for a project-based task. Content and design: Zsuzsanna Paál.

Results of Experiment 3: using the VR for self-reflection at an in-service teacher education course

Museum visits require a focussed use of sub-competencies involved in the responding domain of the CEFR-VC framework. In an experiment to map the sub-competencies of visual literacy while using it for art appreciation, a group of art educators and curators identified some missing aspects that should be considered when engaging with works of art:

- 1 ... a product of the constructive/creative act of seeing
- 2 ... informed by embodied experience
- 3 ... reflected through metacognition
- 4 ... acknowledging an encounter between two active agencies (that of

the artwork and that of the observer).' (Asher et al., 2020, 91).

In a measurement project using Social Media Mapping (SMM), a digital tool embedded in the Visitracker app that captures visitors' narratives about their encounter with the objects at an exhibition. Self-reported experiences were analysed in correlation with eye tracking and interactions with the resources and other visitors (Christidou, 2020). This way, reliable information about the visiting behaviour can be analysed in detail, and insight in the visual literacy of museumgoers is gained. We presume that using a simple visual tool like a VR may also support the recognition of aspects of a meaningful encounter with works of art. In a workshop for 40 teachers of different disciplines from 28 schools lead by museum educators, we tested a VR including the following sub-competencies capturing important aspects of the museum experience:

- 1. Appropriating information (facts, messages, inspirations, etc.) presented in the exhibition.
- Orienting among works of art in the exhibition space. 2.
- Being inspired by artworks relevant in a variety of ways, from knowledge gain to personal meaning making.
- 4. Enjoyment resulting from encountering the artworks (Figure 9).

On this sheet, the imagery is simple and straightforward, referring to a typical art exhibition, with paintings hanging on the wall and a visitor trying to make connections with them. The levels of the sub-competency Appropriating information show the visitor in a puzzled state of mind first and confronting a picture that gets more and more structured and meaningful later. In the CEFR-VC, a similar activity is called 'the competency to look at images with an open mind'. The next criterion, orienting among works of art in the exhibition space involves two sub-competencies from the CEFR-VC, the competency to research and evaluate images. The wording is different, but if we look at the images symbolizing the levels of this sub-competency, we see the skills of researching and evaluating in action. The third criterion, being inspired by artworks is described among the affective sub-competencies of the framework. However, being inspired through art may be interpreted in a variety of ways, from the excitement of knowledge gain to deeply personal meaning making. Images of the VR are intended to focus on the cognitive aspects embedded in the emotional experience. The visualization suggests a failed attempt at a meaningful encounter (basic level), the realization that there is something relevant in the artwork. Those who achieve Level 3 can capture some of its important aspects, and finally, the highest level of this sub-competency involves a deep understanding of the work resulting in a profound, inspirational experience. Enjoyment experienced at the exhibition is an affective sub-competency symbolized by hands, trying literally to grasp the artwork (a horrible sight for a curator

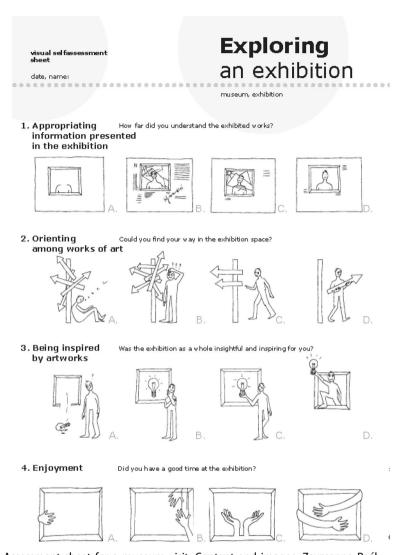


Figure 9. Assessment sheet for a museum visit. Content and images: Zsuzsanna Paál.

or museum quard), and finally, they embrace the work to express an intensive emotional attachment.

The research question related to this experiment; (3) Are the VRs flexible enough to be utilised by a wide variety of learners (including teacher-participants of in-service training courses) for a diversity of projects? - can be answered in affirmative. The VR was tested as a final course assignment by 40 teachers from 28 primary schools, who participated in an in-service course on museum education in a museum of fine art. They tested the tool to evaluate the results of their own museum experience and found it useful for identifying important aspects of encountering works of art.

Conclusion: understanding visual concepts facilitated through a flexible, competence-based tool

With the growing social and economic need for visual competency, tools for its assessment have become integral parts of art education programmes. VRs, an authentic and flexible method for identifying levels of visual competencies and sub-competencies is a mixed methods assessment tool that can be used for summative assessment: quantitative comparisons of performance across class or to support a formative assessment process, comparing different works of individual students. VRs are used as qualitative measures, when competencies that serve as performance indicators are discussed and works exemplifying different competence levels are identified. Flexibility makes this tool unique among assessment instruments. Art teachers are expert visualizers: they have been personalizing the VRs utilized in our experiments. Not particularly fond of assessment in general, they found the task of adapting or completing the sheets with new criteria and designing images for them to suit teaching and learning purposes in line with their professional identity interesting and rewarding.

In this article, we showed that task-specific VRs can be used reliably as performance indicators related to a variety of art tasks and learning contexts. Using the VRs, art teachers may arrive at a deeper understanding of their pedagogy and its effects on different student groups. On the other hand, VRs enable students to monitor their progress and compare results in different projects developed in a semester or school year. VRs and accompanying text rubrics can easily be developed based on the CEFR-VC Framework that specifies separate sets of sub-competencies for creating and responding in a structured manner. VRs are, as previous research indicated, interculturally valid instruments (Groenendijk et al., 2020). In this study, we showed that they can also be used in the professional development of teachers as a reliable instrument that models a sensitive, developmental approach to art appreciation for educators of different disciplines.

Being informed about the developmental potentials of a task or project was generally appreciated by students. Teachers presumed that the importance art education is emphasized if the structure of skills, attitudes and motives are clearly stated and thus, visual competency assumes a position among accountable disciplines. Digital media should be employed more intensively both for the development and assessment of visual skills (Peña & Dobson, 2021). In further studies, we intend to explore the potentials of administering VRs online, as a digital assessment tool that can be used by students and teachers during the online education periods caused by closures resulting from the pandemic or any other reason. Visualizing criteria emphasizes the interdisciplinary character of imaging. The cognitive, affective and psychomotor activities represented in this assessment tool indicate a wide range of use of visual language far beyond the arts and thus indicate the increased role of art education in our (increasingly) Pictorial Age.

Teaching strategies are very important for the success of using a metacognitive tool like the VR for self and peer assessment. In teaching programmes that consider responding to art is equally important as creating art, the use of VRs can be introduced easily as a tool to enhance the competence domain called Responding. In creation-oriented programmes, the introduction of VRs to develop metacognitive awareness will require more effort. Students' knowledge about the importance of selfreflection is also a key success factor.

Katalin Styrna, an art teacher who teaches both at the Secondary Grammar School of the Reformed Church and the Secondary School of Visual Arts in Pécs, Hungary, reflected on substantial differences between the attitudes towards assessment of her two student groups. Aspiring artists were reluctant to engage with VRs. They considered them incompatible with a creative task that should not be assessed through predefined criteria. Some students were hesitant to undergo self-assessment as they considered their work superb. After discussing the concepts on the VR, they accepted their relevance but were reluctant to dedicate time for self-assessment. They needed time to ponder about possible solutions of their work and skipped the VR if they could not complete it satisfactorily. These aspiring artists had to be won over to assessment activities through multiple, smaller tasks, using shorter VRs. They gradually came to realize the benefits of assessment: VRs revealed high level of visual competence in certain areas and challenges in others. Using the VR as a formative assessment tool, their reflective skills developed along with their visual competence (Figure 10(a-c)).

Students at a non-specialized secondary grammar school, on the other hand, were much more eager to see if their performance met the standards in different visual domains. Their 'artist ego' was not at stake, as they were heading towards a wide range of non-arts professions. Curiosity for the components of the visual language they regularly use in social media also fuelled their self-assessment efforts. As the VRs were available from the start of every learning unit, they could embark on developing a task with in-depth knowledge of requirements. Their motivation was increased as the VRs showed them the potential developmental aspects of the unit. A deeper understanding of their work often resulted in better performance. Similar experiences were reported from the highest ranking Hungarian secondary school, training future scientists and mathematicians, where VRs were well received and are now in regular

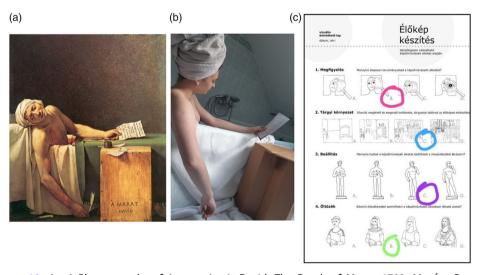


Figure 10. (a-c) Photo remake of Jacques-Louis David: The Death of Marat, 1793, Musées Royaux des Beaux-Arts, Brussels, assessed through this VR according to the following criteria: Observation, Choice of environment, Choice of posture and Choice of garment. Levels selected by a student at the Secondary School of the Reformed Church in Pécs, Hungary manifest skills of self-reflection and responding to artworks. Art teacher: Katalin Styrna. (Source of the reproduction of artwork: https://www.wga.hu/frames-e.html?/html/d/david_j/3/301david.html).

use. Aspiring scientists and mathematicians demanded longer time to discuss criteria and achievement levels, so a dedicated 'metacognitive session' is provided by their art teachers after every project.

Art teachers using VR often reported higher performance of girls: more detailed discussions of individual rubrics, more subtle understanding of visual language development was observed. When comparing discussion notes taken in experimenting classes, however, we concluded that a rich conceptual repertoire of art terms: knowledge about artists, styles and genres, themes and forms of their expression seems to be more important than gender.

Using visualizations to symbolize assessment criteria significantly increases student metacognition already at the beginning of the educational process, when learning objectives are discussed. Through the clarification of competencies involved in the process of creative and/or perceptive use of visual culture, VRs support students to understand the objectives of competence-based education and makes the learning content more explicit for them. For teachers, developing VRs involves clarifying learning objectives and methods to reach them. Visual symbols of competencies must rely on contemporary visual culture that both students and teachers can associate with and should be supported by clear but non-restrictive explanations of the range of meanings and attainment levels that they involve. Therefore, teachers should be introduced in their localization, the creation of new VRs, while taking a critical look at their pedagogical repertoires. Our results indicate that VRs are important tools for evidencebased educational innovation as they support self-assessment of teachers, too.

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