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# Artistic-cultural perspectives in technical-professional training at UTFPR-Brazil

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ABSTRACT

In this research, we intend to study the role of art in the creative process, in engineering courses at the Universidade Tecnológica Federal do Paraná, as a technological innovation factor. This qualitative research is characterised as a method for adopting a naturalistic and descriptive perspective. The sample is composed of students and graduates (10); teachers, coordinators and directors of Education of the Pato Branco Campus (10); Dean (1); Entrepreneurs (4). In the analysis and discussion of results from semi-structured interviews, we opted for Content Analysis, having in perspective the Theory of Social Representations of Moscovici (1978). Among the main conclusions, we highlight the valorisation of creative, interpersonal and communicative skills as fundamental competences in the formation of an engineer. It is also highlighted that the role of art in engineering can enhance creativity and constitute a factor of technological innovation. This can promote the imagination and the capacity for necessary and fundamental abstraction in the design of engineering projects and the communicational plan. The integration of art in formal training, at the moment, does not constitute an institutional option, nor does it contribute to a significant dialogical relationship between curricular activities and extracurricular artistic activities.

KEYWORDS: higher education; engineering; art; creativity; communication; culture.

## INTRODUCTION

Starting from the idea related to education and learning that "it means going beyond the narrow utilitarian and economist vision, seeking to integrate the multiple dimensions of human existence" (UNESCO, 2016, p. 8) and that "knowledge is inextricably linked to the cultural, social, environmental and institutional contexts where it is created and reproduced" (UNESCO, 2016, p. 21). Thus, the importance of Education (Higher Education) becomes evident in terms of properly training professionals working in production activities (Markett, 2004). and, at the same time, assuming their "huge responsibilities in the training of competent and trained professionals" since "Education is public, that is, everyone's heritage and responsibility" (Dias Sobrinho, 2019, p. 2).

The theoretical focus of this study looks for references in Adorno (2013), Heidegger (2009), Kant (1990), Marcuse (1977) and Rancière (2005, 2010) to support the understanding of art and aesthetics as critical knowledge of society, and art is approached not in its mere enjoyment or for mere consumption, but in the formative aspect of the individual. Also, by the relation of appropriation of its internal logic, of its formal law, where, by its constitutive elements, it is configured in a critique of society and the context affected by the rationalities (Weber, 1994) of the instrumental world, tracking the knowledge of the subjects involved in the educational process, and in understanding the practices and circumstances related to art (Bosi, 1985; Costa, 2009; Grinspun, 1999; Ostrower, 1977;

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Pareyson, 1984; Rancière, 2010; Veloso et al., 2016) and to creativity in the processes of creation and technological innovation (Akamine Junior, 2012; Bazzo, Pereira, & Linsingen, 2000; Benjamin, 2012; Bonatto, Silva & Lisboa, 2013; Conte & Devechi, 2016; Costa et al., 2021; Dias Sobrinho, 2009; Grotowski, 1968; Valério & Bazzo, 2006; Vieira Pinto, 2005).

Qualitative in nature (Bisquerra, 2009), the study was developed at Universidade Tecnológica Federal do Paraná (UTFPR), it sought to understand the intervention of art and its aesthetic expressions (Leonido, 2006) with the training of engineers to verify if there are activities that contribute to and with the creativity of academics, which may become a technological innovation when applied to technical-scientific knowledge combined with the process of human training together with technological training. Regarding the method and the analysis and organisation of the data, Content Analysis was used, embodied in Moscovici's Theory of Social Representations (1978, which considers common sense knowledge as true knowledge, which allows for the explanation of certain practices in educational institutions. Based on this model of theory, applied to the processes of cognition, knowledge is not built individually but based on the interaction between subjects. It is noticed that this theory is an important tool to understand as knowledge or cultural practice, in the specific case of theatre aesthetics, is significant as a practice to be considered in the educational environment.

The proposal that accompanies Content Analysis refers to a decomposition of the discourse and the identification of units of analysis or groups of representations for the categorisation of phenomena, from which it becomes possible to reconstruct meanings that present a deeper understanding of interpretation; in the Social Representations Theory, the basic theory is the subjective interpretation of the individual in their own reality and, therefore, the choice of this theory to research in the UTFPR universe, which is based on content analysis as a method of analysis of the discourse declared by social actors.

## METHOD

It is a qualitative research, designed as a Case Study (Bisquerra, 2009), whose objective was to explore the environment and data resulting from (and in) context, having as the object of study the Engineering courses of the Universidade Tecnológica Federal do Paraná (UTFPR — Campus Pato Branco, Brazil) and its relationship with the expressive-theatrical universe.

### Participants

In the Sample (Flick, 2007; Ghiglione & Matalon, 2001; Guerra, 2005; Ruquoy, 2005), 10 students ($n$= 5 Computer Engineering and $n$= 5 Mechanical Engineering) participated in this study. Engineering from UTFPR, involved in the creation of projects; 10 teachers ($n$= 5 Computing and $n$= 5 Mechanics); Dean of UTFPR ($n$= 1) and entrepreneurs/employers ($n$= 4).

### Instruments

Data collection was carried out using semi-structured interviews (approved by the Ethics and Research Committee of UTFPR — Opinion No. 2,163,357), applied in places, dates and times, in accordance with the Term of Commitment, after a contextualisation initial, followed by an in-depth explanation of the theme. The interviews were recorded using a digital audio recorder (and then transcribed). In conjunction with this, a survey was carried out on the social context and on the historical-institutional contents that had the power to represent the group of individuals. The configuration of the interview scripts was framed by the Theory of Social Representations by Moscovici (1978). This is fundamentally concerned with the interrelationship between subject and object and how the process of conceiving individual and collective knowledge takes place in the construction of Social Representations.

### Procedures

The interviews were scheduled at times, dates, and places previously indicated (in the work or academic context of the participants), and the Term of Commitment assumed by the research was provided. Work context: graduate students and entrepreneurs. Academic context: academics and professionals at UTFPR. Immediately before the interview, the interviewees were given general and specific information about the purposes of the study. Each interview lasted an average of 50 minutes. All interviewees authorised it to be fully transcribed. The data analysis technique used was Bardin's Content Analysis (2011). For the author, this type of content verification appears as a set of communication analysis techniques that use systematic and objective procedures to describe the content of messages. The content analysis process involves a set of operations or steps: 1. delimitation of objectives and definition of theoretical references; 2. constitution of a corpus; 3. definition of categories and units of analysis; 4. quantification (if necessary); 5. interpretation of the results obtained (Vala, 1986). The different phases of content analysis are organised around three poles: 1) data pre-analysis; 2) exploration of the material; 3) treatment of

results: inference and interpretation (Bardin, 2011). From an operational point of view, the content analysis starts with a reading of the speeches expressed in the interviews in order to reach a deeper level, going beyond the meanings expressed in the material.

The definition of the system of categories can be done a priori or a posteriori or by combining these two processes (Bardin, 2011). A priori, when the researcher intends to verify formulated hypotheses, having defined, in advance, the categories. A posteriori, when the categories were not previously defined, and there is no theoretical assumption to guide their elaboration. This type of analysis is called an 'exploratory procedure'. In this study, the construction of the categorical system was made a posteriori. The categories and their respective subcategories were submitted to a panel of experts in order to comply with the fidelity standards (intra- and inter-coders) and to obtain the validity of the entire process. The research points proposed by the interviews reveal how the relationship between art occurs in engineering courses and its function in this context as a factor of technological innovation according to the Theory of Social Representations. The researched reality ranges from the reality of the academic education of the engineer to the moment of his/her insertion in the labour market through the employer. It should be noted that the scripts are structured in three dimensions, and in this study, the dimension of social representations will be addressed (Table 1).

## RESULTS

The presentation of the results was carried out question by question, followed by the most expressive or privileged answers by the individuals who constituted the various groups of participants. In this way, a more global and integrated view of these was valued in view of the topic under study and the questions asked to the interviewees. The proposed questions were organised, analysed and synthesised based on the dimensions of representations, practices and aspirations. We present a set of answers to the questions presented to the interviewees about the understanding of the skills and competences that are most relevant in the academic education of engineers; the importance of art in the skills required of them; about the relationship between art and innovative projects; and about the relevance of imagination in the search for solutions to problems in the field of engineering. At this point, we will focus on the Representation Dimension and do an analysis from Q1 to Q4 (Table 2).

## DISCUSSION

Q1 — Taking the question related to the main competences that an engineer must demonstrate and the answers of the interviewees, who brought technical competence as the main category, it is assumed that this answer is correlated with the legal and institutional point of view and with the theoretical framework on that competence. It is noticed that, currently, technical competence is not linked to specific knowledge to perform a technical function well. This competence is associated with a global-business vision that demands from the engineer excellence in "the development of competences allied to the development of technological, general and specific professional competences, including the scientific and humanistic foundations necessary for professional performance and citizen performance" (UTFPR, 2018, p. 18). Thus, the theme of art, within the scope of this research, addresses the global aspects of engineering education, brought together with the technical issue, with regard to the stimulus "critical and creative performance in the identification and resolution of problems, considering the political, economic, social, environmental and cultural aspects, with a humanistic vision in meeting the demands of society" (UTFPR, 2018, p. 25), by the intervention of art in these environments, as sensitive thinking, capable of contributing to the development of potentialities such as critical thinking and creativity, mentioned in the legal bases that make up the institutional political project and by engineering theorists.

As a second category, it appears that the assumption of knowing how to relate well with people in the work

Table 1. Study dimensions.

| Dimension | Purpose |
|---|---|
| Representations | A set of questions that asks respondents about the understanding of the skills and competences that are most relevant in the education of an engineer. |
| Practices | A set of questions enquiring what has been done or will be done, in terms of quantity and quality (by educational institutions), about the implementation of projects, disciplines and other activities that contribute to the training of engineers, within the scope of art and theatre. |
| Aspirations | A group of questions enquiring what the interviewees would like to see done, that is, what proposals (projects, disciplines and other activities) they present for an engineer's education that includes cultural and artistic activities in their training process. |

Table 2. Summary of categories: Representations Dimension.

| | | | |
|---|---|---|---|
| Q1 - In your opinion, which are the main competences that an engineer should show? Justify. | | | |
| Goal | It intends to know the skills required of the engineer by the current job market. | Synthesis | The analysis of the answers allows us to verify that the most evident category was specific and technical knowledge. The second most evident category was the ability to relate, which was highlighted by some interviewees. The third category most mentioned by respondents was the ability to learn quickly. |
| Q2 - In this group of skills, how important are those related to cultural/artistic aspects? | | | |
| Goal | It is related to the importance of art in the skills required of engineers. | Synthesis | The study of the answers given by the interviewees to this question allows verifying that the competences most evidenced were: relationship skills, expression, communication and reasoning training, innovation, team management and improvisation. Regarding the most evident category, the ability to express and communicate was highlighted by some interviewees. The category of reasoning training, innovation, team management and improvisation was also mentioned by some interviewees. |
| Q3 - Can cultural training, such as theatre, and music, contribute to technological innovation? | | | |
| Goal | The third question dealt with whether cultural and/or artistic practices/experiences are significant at the time of elaborating an engineering project. | Synthesis | All respondents answered affirmatively. In their justifications, the categories that stood out the most were: promoting the capacity for imagination, useful and aesthetic creations, and creativity and innovation. Regarding the category's capacity for useful and aesthetic creations, several interviewees mentioned it, as well as what refers to the category promotes creativity and innovation. |
| Q4 - Do you see any relationship between art and the processes of training engineers? Justify | | | |
| Goal | The fourth question in the Representations Dimension deals with the relationship between art and innovative projects | Synthesis | All respondents answered affirmatively. In the answers, the most evident categories were: art develops the capacity for innovation, enhances your professional vocation, develops personal training and motivation, improves communication and expression skills, develops creativity and favours interpersonal relationships |

environment comes as an important category for the participants as one of the main competences for the performance of engineers. The human interpersonal relationship is considered a competence valued in the professional environment of the engineer (Bazzo & Pereira, 1997), as it was found that the interviewees in this study and the theorists who refer to the subject observe that it should be part of a profile developed throughout the pedagogical practices at the university: good interaction in groups and in projects involving multidisciplinary areas. The competence of knowing how to relate well with people is associated with other professional training competences, such as good coexistence in the work environment; fluent communication, which will allow for problem solving; or finding a solution collectively through the various responses arising from and in the workgroups (Novaes, 1980; Silveira, 2005).

In the third category, the importance of the engineer's proactive posture is highlighted in the search for solutions to problems, quickly and creatively, based on the received technique and on the active human profile developed. In this perspective, fast learning is the engineer's commitment to the company or to what he is performing professionally in the work environment (National Academy of Engineering, 2005).

Q2 — Based on the statements received, it is understood that knowing how to be, within knowing how to do, is an essential condition and making the various cultures and their expressions, technological or artistic, interact is important because Strauss (1993, p. 14) explains that "the diversity of cultures is the fact in the present and, also by right in the past, much greater and richer than everything we are destined to know about it". It is evident that knowledge is not closed in systematisations, it is added to a subject that integrates social and cultural diversity and, therefore, must form it for autonomy and emancipation, for knowing how to act within a constructivist perspective, with an emancipatory critical knowledge (Adorno & Horkheimer, 1973; Taille et al., 2016). Thus, it is understood that where culture has space, intellectual exchanges occur with intensity and promote the development of all individuals because "in the ideas present in culture, autonomy means being able to consciously and competently situate oneself in the network of diverse points of view and conflicts present in a society" (Taille et al., 2016, p. 17).

The issue of communication or the need to develop it in the courses surveyed is brought up recurrently throughout most responses, followed by interpersonal relationships. In this way, there is an insufficiency in engineering courses, addressed mainly by academics and graduates. In their speeches, there is, overtly or between the lines, a request to improve, in their respective courses, the communicative issue. This request is understood, making an analysis of what Bazzo and Pereira (2006, p. 46) stand out when they express themselves about

communication as an important tool, stating that "An efficient professional is, above all, the one who he knows how to use his knowledge, his memory, his reasoning and his ability to research. But he is also someone who knows how to express himself, effectively communicating ideas and results of his work". The ability to search, select and store information is a preponderant factor in ensuring that professionals in the technological area can keep up with state of the art in their profession. Only then can he develop his work well and communicate what is important in his area of expertise.

The category of reasoning training, innovation, team management and improvisation was also mentioned by some interviewees. With regard to the development of individual skills in professional training, such as creativity, art and the presence of environments that promote culture (collective capacity), what Barracho and Dias (2010, p. 52) highlight is important: "Individual capabilities develop through the acquisition of new attitudes, behaviours, skills and functions, as the social gains inherited from history are appropriated. In this way, the different intervening systems (psychological, social and cultural) are present and involved in the individual's development". That said, it reiterated the importance of strengthening the human capacities of engineering professionals today with regard to the expansion of experiences with art and culture. In other words, when acquiring technical-scientific knowledge, there must be a space for social interactions beyond the room and classroom, where there is the exercise of expressiveness, dialogue and social coexistence "in reality, society and the individual are not antagonistic things. Culture provides the raw material from which the individual makes his living. If she is poor, the individual suffers; if the individual is rich, he is likely to take advantage of the opportunities that are offered to him" (Benedict, 1934, p. 77).

Q3 — When referring to each of these answers, it is clear that the words imagine, art and communicate are associated with the creative and innovative act, in engineering, at the time of developing creative projects. This association permeates the responses of all those involved in the training process of UTFPR engineers and also that of entrepreneurs who employ these professionals, confirming the role of art in sensitivity to perceive the world and imagine beyond what is set and bring it to the ingenuity, for creation (Machado, 2009).

In the case of engineers in training, thinking creatively to innovate means having in their training something that enhances creativity and guides them towards technological innovation. Therefore, thinking about a reality different from the one he already knows is to use what he learns in the technical and scientific areas and add sensitivity, affection, and emotion for the experiences and experiences that may stimulate creativity (Marcondes, 2017). In this case, through perception, imagination and sensitive thinking, there is a potential for engineering and designing technological innovations. For, art generated in the heart of technology lives (Domingues, 2009) since, through aesthetic expressions (such as theatre, music and drawing, new forms of coexistence are projected with reality in order to improve systems and processes, as well as to train, as a subject of action and thought, the engineer in contemporaneity, as indicated by the participants' responses. Theatre, for example, makes for an identity and reference to life in society as a reflection, enhancing the imagination, coming to impact the processes of creation and technological innovation.

With regard to the category that promotes creativity and innovation, it can be seen, in these statements, that art within the university makes a difference in the creative stimulus. Considerations about this are expressed in the importance given by the interviewees to playful, relaxing spaces and multiple environments that favour innovation if they were present in the teaching-learning environment. The issue of creativity and inventiveness in engineering and technology innovation goes through activities with art in the human formation of academics and, therefore, as a function of creative, inventive and ingenious capacity, which promotes innovation (Bazzo & Pereira, 2006; Colenci, 2000). It is understood that the three categories brought up as most representatives of the role of art in the training of engineers are linked to the development of the creative capacity of academics, in a continuous exercise, with activities that improve their perception, sensitivity and imagination to create. They have, similarly, in aesthetic expressions, such as theatre, spaces to resignify life in society and its creations and, from there, bring innovations and improvements to society, that is, innovation.

Q4 — It is understood that creativity is directly related to the ability to innovate. A prerequisite to leverage the success and sale of products in the market, and is highly requested from professionals in various areas. In engineering, it is a recurrent discourse in congress programs and is part of the objectives and goals to be achieved in the profile of the future engineer in the political-pedagogical projects of higher education institutions. However, what is seen are curricula closed to creative experiences or that generate innovation in simple collaborative experiences at the university. It is understood, then, that there is a gap in the training of the engineer in terms of motivation and encouragement of creativity and technological innovation (Bazzo & Pereira, 2006). Art, therefore, through aesthetics, enhances creativity, individual reflection, and coexistence with the collective have human references of individual feelings and coexistence in society.

In this coexistence, in this case (in the university), it provides experiences with knowledge (scientific basis) and technique (execution). "Metal is an important achievement both for art and for Science and Technology" (Wilson, 2009, p. 493). And the answers of the interviewees are joined to them. The academic community affirms that, in order to design in a creative and innovative way, it is necessary to have training that develops human characteristics of perception, imagination, refined senses and very sensitivity. However, the current education of engineers at UTFPR has little, or no space in its curriculum for subjects that contribute to or meet the characteristics pointed out in these answers.

With regard to the category, it enhances their professional vocation and develops personal training; the professional activity of the engineer is materialised in projects and creative actions that, allied to execution and technique, must be associated with experience and social interaction. In other words, he will interact and communicate his creations and projects to the society for which he works and will give the projects meaning and utility. Bazzo and Pereira (2006, p. 94) warn about the importance of communication in engineering courses,

> A quality that is often relegated to the background by some engineering professionals is communication. But the fact is that good communication today is much more important than it must have been some time ago […] communication is a significant and essential quality for good professional performance. From this, the importance of the universality of knowledge in human formation becomes evident. Montenegro (2004, p. 54) underlines: ... teaching blocks intuition as it ceases to use creativity.

It is understood that the engineer's communicative expression, both to sketch his first ideas in a project through the drawing and to communicate them to a group and, later on, to society, undergoes a good communicative performance, proactive of the created ideas. In this case, the importance of developing the engineer's communicative skills in training is essential so that he can interact with the context (the collective) in the sum of his technical-scientific intellectual actions, to communicate and present the practice of his ideas and creations in problem solving, that is, as technological innovation.

However, the spaces for discussion, experience and communicative coexistence beyond the classroom at UTFPR are restricted. The interaction between students and the academic community is due to the interaction in the classroom and some lectures, seminars and congresses in the engineering area, where students are invited to participate. Spaces for social interaction linked to activities of discussion and reflection on society and its needs and problems are not considered in the teaching process in a remarkable way, to the point where students play a more active role in the communication process. The reference that is made bringing the presence of art in this context, through aesthetic expressions, such as theatre, for example, comes as a proposal to stimulate and more effectively motivate students in the communication process, where their participation in theatre performances or of music, or of theatre plays, or the presence in artistic-cultural events can contribute in this formative process. Thus, it is understood that art and its expressions are also a counterpoint, as they could, by their experience and practice in engineering courses, favour communication as an important skill in the training of engineers.

With regard to the category that develops personal training, the importance of the universality of knowledge in human training is highlighted. Montenegro (2004, p. 54) points out that "teaching blocks intuition as it stops using creativity. […] This is exactly what happens with creativity: due to lack of use and stimulation, it atrophies". Society tends to stratify itself, refusing change. It is self-defence, as changing can lead to the loss of positions of current advantages. Industry, in turn, is adapted to mass production, repetition and routine. Even in schools and repeat what has been learned.

The formatting of engineering courses and the classroom teaching practices of these courses at UTFPR follow traditional standards and are guided by the market, industries and companies to maintain the technical excellence of professionals and, therefore, the time for stimulus to creativity is reduced in this context, being restricted to a few isolated activities in a few projects. It can be seen, in the respondents' answers, that it is necessary, that it is a gap in the course, pointed out by both the academic community and entrepreneurs. Art is included as a proposal to transform this reality, where it does not inhabit, bringing it with the function of developing, in the creative process, with students, practices that motivate aesthetic appreciation in contributing to greater perception and sensitivity of the surroundings. Art and the encouragement of creativity are factors of innovation, as it promotes dialogue between individuals, through the symbolic, as in theatre plays or in front of any other aesthetic expression.

It appears that there is an understanding of the importance of culture, art and cultural evolution in an academic environment for creativity in the development of projects and useful and aesthetic creations. However, this reference to art and aesthetic desideratum is a reality still sought after by managers since the subjects in the technical-scientific area dominate the engineering curriculum.

## CONCLUSIONS

It is thought that the dialogue between art and human sciences, in a context of technological innovation, such as the UTFPR, and the exact sciences may contribute to the idealisation of new products and ideas once the personal skills of imagination, perception, sensitivity and communication will result in a more complete and creative academic training (Auzani, 2020; Sampaio, 2021; Silva et al., 2018). Equally more attentive, more alert, more critical, reflective and sensitive to the problems and solutions of life in society (Bonatto et al., 2013; Conte & Devechi, 2016; Dias Sobrinho, 2019; Marcondes, 2017; Schlindwein, 2015). In other words, "it provides the person with a complete job, involving the intellect, senses, emotion and acquired knowledge — those already built and those subject to change" (Schlindwein, 2015, p. 423). Because Marcondes (2017, p. 67-68) "thus assures that (…) art is something for the experience, that is, what triggers new experiences. There is a construction of meanings in the aesthetic experience". Recent studies demonstrate that "UTFPR Technology has the capacity to innovate, but it has not yet emerged as a differential in the area of engineering and technology" (Costa et al., 2021, p. 371).

However, it was evident in the respondents' answers that aspects related to art and cultural development are few and inefficient in engineering training at UTFPR, as they do not contribute to academic training due to a lack of teacher motivation and investment in this area, such as the hiring of teachers linked to art and culture, and the lack of spaces for the practice of art, music, theatre and dance workshops (Auzani, 2020), through aesthetic expressions, such as theatre classes in everyday learning environments, is related to the creative process and technological innovation sought in this context due to the demand of the labour market.

We sought support in the theoretical basis used and in compensation to assert the potential of art, with the aim of intervening in engineering courses at UTFPR and the need for it to become a formative element in the training of engineers. In this context, with the role of exact sciences in technological education, making the composition between art and engineering was arduous work since there are few bibliographies found that address engineering and art together in a technological university. In terms of technological university, UTFPR is unique in Brazil.

Artistic practices have their resonances in this context, directly, in communicative training, interpersonal relationships and creativity, as evidenced in the specifics. This research is focused on the intervention of art in the creative process for technological innovation. Thus, the debate on the education of engineers is focused on the subject of action, on the perceptive and imaginative capacity to innovate, which may be provided by art and aesthetic experiences, which make them have the most refined sensitivity to observe the world around them, feel the existing needs and needs and act creatively, with technology, promoting innovation.

Companies and partners are asking UTFPR-trained engineers for creativity, proactive posture and the ability to innovate (Ostrower, 1977). However, among the disciplines present in the curriculum of engineering courses at this institution, which trains academics in engineering with high competence and technical-scientific quality, nothing (or almost nothing) develops in order to stimulate creativity (Auzani, 2020).

Art seems to appear in a counter cycle to the means of production (Adorno, 2013), which needs innovation, competitiveness and profit. The training of an engineer, in terms of training human capital, must bring — to the professional field — technical-scientific knowledge, reflection, good communication and interpersonal relationships, which must have been developed in the initial training. It seems to be an arduous and difficult path, but not impossible, as the activities (during two decades) and the research carried out can allow political and academic decision-makers to reflect and invert a conservative academic logic regarding innovation and the relationship between areas of diverse knowledge domains (Auzani, 2020; Leonido, 2006; Silva et al., 2018) but which, as we have shown here, there is potential and interest (from curriculum recipients and from the business community) in creating, maintaining and sustaining this same dialogic relationship between art and technology.

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