

Training and gamification

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RIASSUNTO: A seguito della quarta rivoluzione industriale e della pandemia mondiale, i processi lavorativi hanno subito importanti cambiamenti. Il presente articolo analizza la gamification della formazione per gli adulti, sottolineando la valenza che questa può avere per un apprendimento trasformativo. Nello specifico, ci si vuole focalizzare sull'acquisizione della capacità di lavorare in circostanze mutate, evidenziando, oltre che un approccio eutagogico, l'importanza delle emozioni nel processo trasformativo di apprendimento.

PAROLE-CHIAVE: Eutagogia, apprendimento, gamification, emozioni.

ABSTRACT: As a result of the Fourth Industrial Revolution and the World Pandemic, the work processes have undergone major changes. This article analyses the gamification of training for adults, stressing the value it can have for transformative learning. Specifically, we want to focus on the acquisition of the ability to work in changed circumstances, emphasizing, as well as a heutagogic approach, the importance of emotions in the process of transformative learning.

KEY-WORDS: Heutagogy, learning, gamification, emotions.

1. A new space-time

The work processes have been put into crisis by two events that have characterized the 21st century: the digital revolution and the global pandemic.

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The first, commonly known as the *Fourth Industrial Revolution* or *Industry 4.0*, refers to the transformative wave of manufacturing industry work processes. In their research, Oztemel and Gursev (2020) define *Industry 4.0* as a *manufacturing philosophy* that links new automation systems, versatile data exchange, and greater innovation within the design, process, and production stages. (Rangraz & Pareto, 2021). In other words, it seems that industries are exposed to several new technologies in different ways than before. We can talk about *big data*, *the Industrial Internet of Things*, *Cloud Manufacturing*, *Advanced automation*, *Additive manufacturing*, *Wearables* and *augmented reality* (Costa, 2019). The workspace is redefined in terms of “facilitated ecosystem” and the computer system, able to interact continuously with the physical system in which it operates, as well as the advent of machine learning, inevitably, generate a revisiting of roles within the work organization and imply the need for the acquisition of new skills for workers (Costa, 2019).

This aspect, in part, has been generalised and exacerbated by the Covid-19 pandemic, where telework, that is the decentralisation of production and of the workplace through the use of digital technologies, was the working methodology that most occurred during the lockdown (OECD, 2019). According to the OECD Skills Outlook report (2019), for example, with 36% Italy is in last place among the OECD countries as a share of the population able to use the Internet in a complex and diverse way and Italian workers are among those who use less information and communication technologies (OECD, 2019).

Although telework is a work practice dating back to before the pandemic, it has no longer concerned either the choice of the worker or the specific field of reference, but it was an obligation that everyone had to meet by highlighting the criticality mentioned above: the need to acquire new skills. However, which ones?

The demographic curve of the nation, therefore the old age of the workers, is perceived as a negative factor on the employment and employability. Technological change can reduce the results of old technological skills, generally held by older workers, and increase the return of new skills related to emerging technology – held by younger workers (Bachmann et Al., 2022). In fact, this does not imply the objective job security of the last or the first. On the contrary, older workers are more likely to benefit from internal power and, as such, can be more protected from

change than younger workers, who are more affected by changing market demand and increasing job instability due to limited time spent in the company (Bachmann et Al., 2022; Dottori, 2020). The intent of the elaborate, however, is to focus on the challenges that the transformation towards *Industry 4.0* has generated on existing staff, especially adult staff, being perceived as the most at risk.

2. The training process

In the context of the digital revolution and in a new working environment characterized by new relationships, the training of the worker should be aimed at investing in skills that highlight and improve the complementarities between man and machine (Costa, 2019; Dottori, 2020), as problem solving skills, adaptability, creativity rather than on tasks that can be performed by the machines themselves (Dottori, 2020).

Yet most human competence studies pay particular attention to the effect of technologies (Rangraz & Pareto, 2021). Digital competence includes knowledge, skills and attitudes in interacting with ICT (Technologies of Information and Communication). As Rangraz and Pareto (2021) wrote, “the problem in question becomes *how to learn to work with ICT*, rather than *how to adapt to the changes created in work that is influenced by technology*”. In other words, competence seems to be defined as the ability to work with ICT and not as the ability to work under changed circumstances (Rangraz & Pareto, 2021). This is important in debates about the competence of the existing workforce and limits the development of skills that underpin transformative thinking – problem solving, adaptability and creativity.

For this reason, it is necessary to reconsider the ways in which training is carried out within companies, in order to better respond to the new adaptive needs of workers.

The educational process is traditionally centered on the pedagogical relationship between teacher and learner, where the former has a fundamental role in decision-making processes relevant to the learner’s knowledge needs, content and skills to be taught and developed and teaching methods to be applied (Hase & Kenyon, 2001). In a society, where information can now be easily traced by everyone thanks to the information

channels of free access, the educational value can no longer focus only on the acquisition of new notions and knowledge or the study of specific disciplines (Hase & Kenyon, 2001). Especially in the training of adults, specifically in the company, it is necessary to prepare people to effectively cope with the *turbulent* environment in which they live by possessing the ability to self-determination; knowing how to learn; using creativity useful for the transformation of knowledge and its own mental patterns; and knowing how to work with others (Hase & Kenyon, 2001).

A heutagogy approach, therefore, recognizes the need to be flexible in learning, placing emphasis not in the outcome, but in the process, which must be transformative.

Our education and training, and management systems, are often designed in such a way as to limit creative thinking. These systems tend to provide people, as a learning package, with both the question and the answer. The heutagogy approach suggests a more active role for the student (Hase & Kenyon, 2001).

2.1. *Gamification for the training of adults*

In order to cope with the change in the pedagogical environment during the lockdown period, where teaching was guaranteed through online platforms, many high schools and universities have introduced a teaching methodology aimed at maintaining the attention of students, their involvement and motivation: gamification. This implies the use of elements of game design in non-recreational contexts, such as the teaching traditionally enjoyed in the teacher-learner relationship and plays a crash between situationality and revisiting the learning space (Nesti, 2017). Gamification has taken hold with the rise of digital and video games since the 2000s and, with the pandemic covid-19, has become an interactive digital activity that, through virtual simulation, allows participants to make accurate experiences, and is able to promote active, participatory and engaging learning paths. It is experiential learning, in which the player takes on an active role and the virtual is a reliable and faithful reproduction of the processes of reality (learning by doing) (Jacomuzzi et Legrenzi, 2021). Specifically, there are elements that make this game an effective learning environment (Plass et Al., 2015) and that could be considered fundamental for adult-centered transformative learning that can adapt to changing circumstances.

The first element is motivation: the game, to entertain and be brought to completion, must motivate the student to be engaged for a very long time thanks to some characteristics of the experience, such as badges, trophies, or the story itself in the case of Graphic Novels.

These structural features allow the student to be in a state of flow (Nessti, 2017) i.e. total immersion. In fact, connected to the motivation, there is the engagement of the player. It can be a) cognitive, afferent to mental processes and metacognition, b) affective, inherent in emotional elaboration and regulation, c) physical, that is, the embodiment of actions, gestures, movements, and finally d) sociocultural, that is social interaction embedded within the cultural context (Plass et Al., 2015).

The third important element is the adaptability of the game, or rather, “the ability of the game to involve each student in a way that reflects his or her specific situation”. This can be related to students’ current level of knowledge, cognitive skills, students’ emotions, or several other variables (Plass et Al., 2015). Finally, the fourth element is protected failure. Failure, therefore, is not regarded as something undesirable, but as a necessary step in the learning process. The reduced consequences of failure in games encourage risk taking, trying new things, and ensuring exploration by the player. They also provide opportunities for self-regulated learning during the game, in which strategies of goal setting, goal achievement monitoring and effectiveness assessment of strategies used to achieve the desired goal are implemented (Plass et Al., 2015). You can see that the *rouge file* of the four features listed by the game is just the emotion. The same described flow state implies total emotional and cognitive involvement.

If the environment, context, matter arouses an emotion it is able to teach something (Immordino-Yang, 2017), the role of emotion, specifically, guides the process of cognitive learning, through an emotional response – able to prevent the individual from falling into the same error by applying previous learning to the new situation (Mezirow, 2003; Immordino-Yang, 2017). In summary, the emotional frame of the game that contributes and attends cognitive involvement, motivation, adaptability and the possibility of failure in a protected environment, allows you to learn by deconstructing and transforming their mental constructs.

This corresponds to the “learner-centered” approach of Rogers (Hase & Kenyon, 2001), who states that 1) the role of the teacher is to facilitate

student learning – in the gamified context, in fact, the teacher proposes the game conveying with the learning, but the student has an active role in the process; 2) People only learn significant things they perceive as involved in maintaining or improving the self-structure – in that case, the motivation generated by the game can be functional. 3) Experience, if assimilated and reflected, would involve a change in the organization of oneself, but tends to be negated or distorted by the process of symbolizing one’s own mental constructs; 4) moreover, when one is perceived as inconsistent with the self, things can only be assimilated if the environment provides the optimal conditions for learning. 5) Finally, the educational system, that most effectively promotes meaningful learning, is one in which the threat to oneself is minimized – the possibility of protected failure (hence learning by trial and error, which generates cognitive restructuring) it ensures the ability to internally resolve the inconsistency between the scheme to be learned and your mental constructs.

3. Neuroscience, emotions, learning

As it transpired earlier, according to Mezirow (2003) transformative learning is “the process of change in a frame of reference” or rather “the social process of building and appropriating a new or revised interpretation of the meaning of one’s own experience as a guide to action” (Ali & Tan, 2022). Although the role of emotions in mental constructs is also stressed by the author, stating that “our frame of reference is composed not only of our point of view, but also of mental habits that are habitual ways of thinking, feeling and acting influenced by assumptions that constitute a set of codes”, Taylor (2001) criticizes the theory as describing a process that is too rationally driven and unbalanced by the role of emotions (Ali & Tan, 2022). He is the first to put emotions at the center of the theory of transformative learning and does so by collecting new evidence from the field of neuroscience to argue that there is a fundamental interdependence between emotions and rationality (Damasio, 1995; Rizzolatti & Sinigaglia, 2006). As mentioned above, the brain is a predictive organ capable of anticipating the emotional results, and not, of our action using previous experiences. If our expectations fail, there is an error of prediction which leads to a change in the brain, biophysically, resulting in up-

dates to the internal model and worldview so that better decisions can be made in the future (Ali & Tan, 2022). This also happens in games, which simulate the surrounding reality and, regardless of these, society itself generates dilemmas to which people must respond. Another example is the confusing dilemmas, which serve as a catalyst for the transformation of perspective into adult learning.

When dilemmas, anomalies or crises occur that are inconsistent with our assumptions and beliefs, a transformation occurs in adults. To help solve these dilemmas, we start to reflect and challenge our mindset (Ali & Tan, 2022).

Thus, by combining neuroscience, transformative learning and heuristics, Ali and Tan's research (2022) aims to propose a deeper understanding of people's emotional experiences in the transformative learning process. This paper aims to be limited to gamification, as a training methodology for the digital revolution and new work processes. This emotional experience can be dictated by the story of the game, the customization of the game, the adaptability of the game, the cognitive and emotional effect that an error can generate.

The authors also believe that many problems in contemporary societies, and in this case in Industry 4.0, can be traced, in part, to closed-minded attitudes that limit curiosity. Linking it to the demographic curve, it decreases from early to late adulthood (Ali & Tan, 2022) and can be considered a type of epistemic emotion, namely an emotional need to close the gap in knowledge or understanding (Ali & Tan, 2022). Shin and Kim (2019) distinguish between backward curiosity and forward curiosity. Backward curiosity implies inconsistency (the contrast between expectations and unusual events) and mispredictions or confusing dilemmas. And if we think about what's been said so far, transformative learning involves solving curiosity backwards, but it implies something more. In some stages of transformation, a sense of uncertainty prevails, and individuals must learn to "cope with ambiguity, uncertainty and contingency" (Ali & Tan, 2022). This sense of uncertainty is what defines curiosity forward, namely "the feeling of doubt" (Shin & Kim, 2019). According to Ali and Tan (2022), in an alternative interpretation, "transformative learning is also about curiosity, marked by inconsistency and uncertainty, resolved by discovery and action".

What skills to acquire and how?

As mentioned above, the purpose is not to conform to the scientific debate on the acquisition of technological skills, but to promote the development of a competence that is the basis of transformative learning and that includes the acquisition of other skills: know how to learn. This competence is linked to self-determination, to the centrality of the learner in the pedagogical process and, as we have seen from the research of neuroscience, is not exempt from the emotional flow. An American scientist named Eric Kandel, starting from experiments on a marine mollusk, demonstrated that basic learning generates changes in the functioning of neurons and the way they connect with each other (Alonso, 2019). Knowledge of how to learn, including creativity and curiosity, and the restructuring of one's own constructs, however, are not something that develops in an environment dictated by the hierarchical relationship of the teacher-learner. Situationally, including involvement, protected failure and, why not, fun, can be the most suitable way for such development: play, in our case.

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