SKILLS ENGINEERING AND LEARNING PATHWAYS

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Since the end of the 1980s, the skills-based approach has made its mark on many aspects of education, whether initial or continuing, higher education or vocational training. In particular, it is used as a reference in the design of curricula, the awarding of diplomas through VAE (Validation des Acquis de l'Expérience), the construction of individual training itineraries, and as a lever for the support and development of professional projects.

The polysemy of this concept demonstrates both its richness and its complexity. While it may seem impossible (and undoubtedly undesirable) to reach a consensus on the definition of a skill, the insights provided by various pioneering authors (including LEBOTERF, ZARIFIAN, WITTORSKI, MALGLAIVE, etc.) allow us to propose what seems to characterise this concept: a series of effective actions, faced with a family of situations; actions that the person manages to master because they have the necessary knowledge, the ability to mobilise this knowledge wisely and the ability to act on situations in a timely manner and in a way that is adapted to their environment in order to identify and resolve problem situations.

It is therefore a set of activities that a person organises to achieve a precise and effective result. Competence is in fact the possible transfer of knowledge through a response adapted at the theoretical, technical and relational levels to a problem situation.

The competency model is generally based on two main concepts. The first is behaviourist, the second socioconstructivist. The latter seems to us to be more enlightening than the former with regard to the current context of lifelong learning, because on the one hand it endeavours to account for the complexity of activity in a work situation, and on the other hand it places the emphasis on the individual's action and his or her "support in acting", a fundamental notion in our view in the context of the individual pathways that take place within increasingly diversified learning environments and outside the formal field of training.

The socioconstructivist approach thus provides a link with vocational didactics, which distinguishes between the task to be performed (prescribed work) and the activity (real work), and therefore between the epistemic and pragmatic registers of knowledge. Here we are between the cognitive model and the operative model, to better define the proximal zone of development (VYGOTSKI), the zone in which skills are built by and in situation.

The socioconstructivist approach is based on the assumption that entry through skills implies entry through people and not through activities: while there is always knowledge (from a variety of sources)

We know today that the knowledge "under" a skill is not enough to "do", and that "knowing how to do" does not enable the "knowing how to do" (i.e. acting) that is built up along the way, in a singular, original and unique way by each acting subject. Competence can therefore never be reduced to theoretical or procedural knowledge that is codified and learnt like rules, even if these rules are inescapable.

To illustrate this point, here is a look at some of the authors mentioned above:

To define competence, Gérard MALGLAIVE **(**1998**)** refers to theoretical knowledge, procedural knowledge and know-how.

He points out that theoretical knowledge has no direct operational relationship with practice. For him, the only practical effect of theoretical knowledge is to make known, not to make do, to say what is and not what

should be. As a result, theoretical knowledge says nothing about the goals to be pursued by

action, nor does it in itself determine the means of achieving it. On the other hand, it does enable us to adjust practical interventions to reality very precisely, and to predict their effects, their success or failure. Theoretical knowledge is the indispensable foundation for the effectiveness of the knowledge that regulates action, known as procedural knowledge**.**

Know-how always (and increasingly) covers multiple realities. It intersects with theoretical knowledge and procedural knowledge, which are at the interface between concepts and operational elements that enable people to act appropriately in a given situation. This is where the importance of professional support (sometimes referred to as "tutoring") comes into play, enabling each person to situate themselves in relation to their professional environment, to develop their mental representation system, and to draw on their driving forces (generally referred to as "soft skills") to act appropriately in a given situation: this is where support comes into play as part of social and educational regulation practices, rather than as a means of transmission.

MALGLAIVE points out that know-how can refer to the specific gestures of a practice, what the Anglo-Saxons call "skill", a term that can be translated as dexterity. From this perspective, know-how not only enables us to produce acts, but also to do so with skill and dexterity (the trick tomorrow). This skill or ability is based on internalised knowledge that has become unconscious (and often acts against a backdrop of affect) for the person performing it. It is therefore difficult to self-assess one's skills, but by analysing one's professional practices and making an effort to reflect on them, and with the help of appropriate support, it can gradually be possible to map out one's skills.

Know-how is therefore human action that has been learned and experimented with formally (in training), informally (outside training) or non-formally (through experimentation, which builds experience).

They are expressed in a singular way in the articulation of two transformations:
   a) Transforming object (the person acting)
   b) Transformed object (solving a problem)

Skills can therefore be located, they have a beginning and an end, they have a trajectory that can be identified in the skill. MALGLAIVE has called this aspect the kinetics of the act. The difficulty in a pedagogical approach will be to make this kinetics clearly explicit within the skill.

For LE BOTERF (2001), competence can be compared to an enunciatory action which cannot be understood without reference to the subject who utters it, or to the context in which that subject is situated. In this context, it seems important to grasp both the actor and the action (a not inconsiderable point in the pedagogical engineering approach), i.e. "enaction" (from the English term to enact), which reinforces the need to support (in the sense of guiding) the individual in his or her skills-building journey (whatever its nature).

For ZARIFIAN, competence corresponds to an individual taking the initiative and responsibility for situations with which he is confronted.

The word initiative comes from the word initiate: to start something in the world. Taking the initiative is an action that modifies what already exists, that introduces something new, that starts something, that creates. All skills therefore have an innovative component that is specific to the individual in action.

The word "responsibility", "spondere", means to answer for... The competent person is accountable for the initiatives he or she takes and their effects, not only in terms of the social judgements that will be made about him or her (or of an evaluation system), but also in terms of his or her sense of responsibility, i.e. in consideration of his or her willingness to take responsibility for the situation, which can only be unique. Taking responsibility is thus the counterpart of autonomy and decentralisation of decision-making, including in training systems.

The main 'ingredients' of competence :

From these different interpretations and approaches, it is possible to identify the main elements that make up a skill: although they are closely interwoven by each individual, identifying them separately gives a better understanding of how each person links them during their learning process:

   → **Theoretical** knowledge (understanding, interpreting)
   → **Procedural** knowledge (how to do things)
   → **Procedural** skills (knowing how to proceed, knowing how to operate)
   → **Experiential know-how** (knowing how to do things, knowing how to behave)
   → **Social** skills (knowing how to "be", behaving appropriately)
   → **Cognitive** skills (information processing, reasoning)

As we said earlier, it is from the original and singular way in which each learner meshes these ingredients that we can understand the cognitive transformation operations that a subject carries out in a work situation within environments that necessarily influence learning choices and methods: this meshing is only possible through action. We hypothesise that taking action makes it possible to better identify the role of training, whose essential function today is to support people in their lifelong learning trajectory: entry through action (or through reflexivity about action) must take precedence over entry through transmission (today largely surpassed by the circulation of knowledge on the web). In this context, the two components of 'traditional' training systems need to be completely rethought: training engineering and pedagogical engineering.

By breaking down and analysing the work situations they experience, each component is revealed in the sense of a "work situation".
"Photographic' of the term. This breakdown involves analysing accounts of work. This approach requires us to 'decompartmentalise' areas of knowledge which, while woven together, are relatively closed. The analysis of work situations by practitioners, coupled with a reflexive approach to learning strategies, forms the basis on which the so-called core skills are defined: this area of analysis is the ideal place for revealing the various ingredients of the implementation of a work situation, a practice or a trade, independently of "prescribed" work, which is merely a representation of the activity, particularly for high-risk trades or so-called "fuzzy" trades (JEANNOT-2005).
This work of reconscientising knowledge that has become unconscious leads the individual to break the habitus (as defined by Bourdieu), to emerge from an unconscious reproduction of work by enabling him to indicate how he acts in the face of the unknown (new situations), how he creates, invents and introduces innovations into his daily practice. The role of coaching here is to support and facilitate this reconscientisation in order to better adapt (in the cognitive and social sense of the term) to his work environment(s).

Identifying skills is therefore more a matter of being a researcher than a technician: it is a process of analysis that enables us to move from "standardised" thinking (the work required) to affected, altered thinking that is fundamentally dialectical and dialogical. Pedagogical support facilitates this transition, starting with t h e individual's identification of the ingredients of his or her competence, and then enabling him or her to organise, arrange and order them in a way that can be objectified and transferred for appropriate action. We will then gradually move towards a mapping of skills that cannot be frozen within rigidly predefined skills frameworks. Skills are, and will remain, an unfinished symphony, played to a score coloured by diverse modes of action and a variety of environments, which themselves develop new skills.

Educational engineering, a skills-based approach :

By focusing on the individual, the skills approach leads to new repositioning and new conceptions of educational engineering, by giving pride of place to the individual activity of the subject. As a result, individual, personalised training itineraries (sometimes referred to as professionalisation itineraries) are being developed. The individual is the protagonist in a process based on his or her own resources, which are transformed, reformed, developed and capitalised on within a learning environment.
The skills-based approach to training therefore requires teachers/trainers to identify and characterise the specific situations encountered by trainees and students: these situations act as levers to facilitate cognitive transfer. Pedagogical engineering thus relies on the analysis of the activity to reconstruct its conceptual structure and identify a certain number of training situations that enable competences to be aimed at (in the sense of the target).
We can hypothesise that the workplace, which includes many informal and non-formal learning environments, is a space for the construction, development and recomposition of the skills of the subject in action.
This hypothesis implies that new pedagogical engineering methods are being put in place within a "work-training" alternation space where the main players involved in the training processes (trainees, trainers, companies) share the power to train (in particular the university and the company).
These new engineering techniques have a number of fundamental features for the design of training courses:

> → An active role for trainees: they are no longer simply entitled to training, but have the right and the duty to play a full part in their own training and career paths.
> → The contextualisation of trainees' actions within actual work situations or problem-solving situations

→ A repositioning of the learner-teacher that implies a new pedagogical relationship

→ The introduction of the major concept of support in training (a space for transition and mediation), which is support towards, through and for change within the transitional situations that people experience in their life course. From transmitters of knowledge, teachers become coaches helping to understand, organise and build training and career paths.

When providing support becomes a way of training and an integral part of pedagogical engineering

In this new reconfiguration, educational support cannot be decreed; it is a complex issue (MORIN 1977) and must be the subject of constant vigilance against a backdrop of ethics; the main benchmarks of the ethics of support refer to a few key words: competence, respect for people and their autonomy, justice, responsibility.

The skills required of coaches are many and varied, and include accepting confrontation, challenging and questioning (evaluating) their practices by learners.

Approaching pedagogical engineering in terms of support implies moving away from a technical conception of training that has long prevailed (and no doubt still prevails), rooted in a liberal, economic vision, and thinking of the training function as a process of transformation of a person involving support towards change.

The "teacher-accompanist" is neither a "guide" nor a "travel organiser" (although there is the notion of a journey, a professional itinerary in training). He acts as a second, and accepts to assist without deciding for the other person which path he should take. In this sense, pedagogical support consists of moving along with the trainee while remaining a little behind, lucid and attentive to his progress. It means travelling with the trainee along a path that is not their own, in the knowledge that the coach will not, in the end, go where the trainee will go. It is in this space of "accompanied freedom" that the transformation can take place, and consequently the building of skills through the gradual apprehension, in a back-and-forth movement, of the different ingredients that make them up. In this context, pedagogical engineering requires a constant updating of the methods of intervention in the service of renewed content.

What the learner needs in order to develop and build skills, and therefore to learn, is an anthropopedagogical relationship (CHARLOT), i.e. a relationship of closeness and trust, but at the same time of distance, in which the learner feels that he or she exists in the same way as others. The learner is also a human being who needs to be supported in order to organise, construct and understand the professional world in which he or she is entering or has already entered.

The role of the teacher is changing within these new engineering structures: he or she is no longer simply a transmitter of knowledge, but is refocusing his or her action towards mediation through support, offering the trainee the right to design his or her own itinerary and content in cooperation with the teaching team and in line with his or her professionalisation 'target'. This posture necessarily implies a decentring of "absolute knowledge". Meaning (direction and significance) emerges through the production of knowledge by the trainee, by himself and about himself within a group.

Valuing skills in pedagogical engineering does not mean radically turning away from theoretical knowledge, but rather asking why such and such knowledge is included in the training system, what is taught, in what order, what the trainee will discover for him/herself, and what is not necessarily appropriate.... To put it simply, no training content can be proposed without explaining how it relates to skills, and no teaching method can be proposed without supporting change, which is a means of building skills.

Thinking about training in this way represents neither a break with the past nor a revolution, but undoubtedly an evolution, and in particular an evolution in the way teachers relate to knowledge and learning. We cannot move in the direction of skills without working on complex situations that require teachers to lose some of their ease in presenting knowledge and venture into a field where they become coaches and organisers of learning situations, thereby increasing the zone of uncertainty in which teaching activity unfolds.

An approach to analysing the ingredients that make up skills :

Based on the framing elements set out above, the elements that make up the skills we have identified on t h e basis of interviews conducted during collaborative work as part of the PSDR Auvergne [1] research programme are set out in the map below.
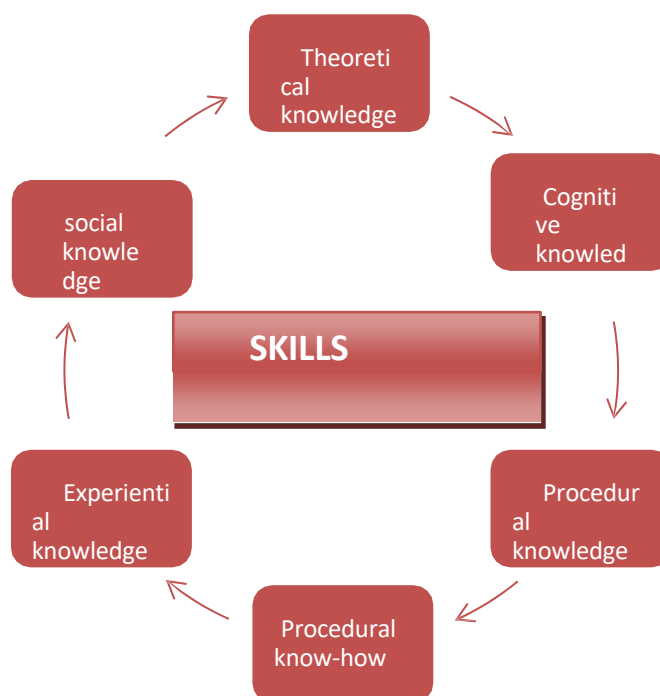
→ Theoretical knowledge: understanding, interpretation of problems, cognitive transfer....)
→ Cognitive knowledge: information p r o c e s s i n g , knowledge transfer, etc.
→ Procedural knowledge: knowing how to proceed
→ Procedural know-how: Knowing how to act, how to proceed when faced with the problem situation.
→ Experiential knowledge: acting from experience at work
→ Knowing social attitude to the task

These 6 benchmarks have been used to build the skills reference framework for tutors who support young people in exile.

The interviews analysed[1] show that people very often rely on experiential knowledge acquired in different ways (most often on the support site), through contact with others (colleagues, partners, structure managers), through self-training but also during "third time": informal meetings, journeys.... This knowledge enables them to adapt to support situations and to develop their skills. It should be noted that experiential learning is generally strongly linked to the motivation to respond to a problem situation or to adapt to a specific situation (here we come back to the socioconstructivist theories of learning). Procedural knowledge comes in third place among the knowledge mentioned, and is revealed by the way in which people describe how they act and proceed when faced with a problem situation encountered in the field.

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Procedural knowledge (knowledge of how to proceed) is evoked in the form of procedures to be followed: specifications, objectives to be achieved. This is given less prominence than procedural knowledge, as it is not very common in the world of support for people in exile.

People do not talk much about cognitive knowledge and theoretical knowledge. This does not mean that they are not present or necessary for acting on skills. The difficulty of "re-conscientising" the theoretical knowledge that has been the subject of a cognitive transfer and on which the action of the skill is based may partly explain this low level of mention. It is interesting to note that the evocation of theoretical knowledge (formal knowledge) tends to be negative: people tend to point to what they lack rather than to what they have learned about the subject.

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[1] See the report on the analysis of tutors' needs in the RENT project: Analysis of tutors' needs - Erasmus Expertise

on which they rely in their work. On the other hand, it is interesting to note that experiential knowledge seems to encourage the learning of theoretical knowledge through self-training. This aspect is an invitation to revisit the dialectical relationship between the affective and the cognitive that the subject experiences during a learning process.

The foregoing discussion shows that informal professional learning (CARREand CHARBONNIER) plays a central role in the construction and development of skills, so that they can be better adapted to the situations encountered. CARRE and CHARBONNIER define informal professional learning as follows: "*any phenomenon of acquisition and/or lasting modification of knowledge produced outside periods explicitly devoted to instituted training activities and likely to be invested in the professional activity*".[2] It would seem that the specific nature of the territories, social, economic and cultural environments, etc. in which work is carried out accentuates this feature. In this context, it seems complex (or even difficult) to define a clearly defined workspace, based on stabilised work situations. Inherent in this aspect is the fact that skills cannot be stabilised (in the sense of being replicated in a work situation) and, consequently, the changing nature of activities means that people have to set up a permanent learning dynamic. In this context, we hypothesise that the territories, and more particularly the various professional, cultural and social activities that develop there, are a source of skill-building and are extraordinary places of learning, the contours of which are still difficult to identify, but which will necessarily have to be incorporated into training schemes in the near future.

This aspect highlights the need for a bottom-up approach to training provision, based on data from the field to adapt training content, and the need to design a teaching system to support informal learning.

This type of engineering involves designing training to support change rather than the traditional model of transmitting knowledge. In the light of institutional environments, areas of tutor autonomy (areas where skills are being built up), gaps left empty by initial training, areas of innovation, creativity and initiative-taking, structured support for this informal learning is undoubtedly an essential lever for developing learning. This presupposes that pedagogical engineering is based, on the one hand, on the recognition of a personal approach to learning (through the design of unique training itineraries) and, on the other hand, offers tools (analysis of practices, cross-examination of identical situations, self-training, etc.) that make it possible to integrate experiences in the regions as a collective learning space. We read that the people acting as tutors or faced with problem situations need to be listened to, not necessarily provided with answers in the form of formal knowledge, and are asking for support in interpreting the situations they encounter.

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[2] **CARRE Ph. Et CHARBONNIER O.** (sous la direction de) (2003) Les apprentissages professionnels informels L'Harmattan, collection savoir et formation p20

These new approaches imply that the pedagogical engineering calls upon two very distinct attitudes in training: non-directiveness in the content, which would make it possible to take into account training experiences emanating from diversified fields, and directiveness in the container, the psychic envelope and the thinking-self (ANZIEU), which responds to the need for security, essential and structuring in any learning process, to allow the tiling of new mental representations conducive to enriching skills.

This approach implies a complete turnaround in the design of educational engineering, which is still based more often than not on pre-identified, 'pre-formatted' training content in the 'closed vessels' of formal learning institutions.

From this point of view, a distinction needs to be made in training between so-called core skills, which act as a "safeguard" against dispersion, and more mobile, shifting skills, specific to the contexts in which the individual is (or will be) acting - skills whose content is constantly evolving, changing and being repositioned in constantly changing, shifting fields.

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