Hard Skills and Soft Skills

Subjects: Psychology
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The distinction between hard and soft skills has long been a topic of debate in the field of psychology, with hard skills referring to technical or practical abilities, and soft skills relating to interpersonal capabilities.

skills soft skills hard skills cognition conation

1. Introduction

In today's complex, interconnected world, the importance of having a diverse set of skills for success is undeniable. The ability to define, develop and utilise one's skills is considered a vital part of personal and professional success. This success depends heavily on the acquisition and maintenance of both soft and hard skills. In the modern workforce, employers are searching for the perfect candidate, the one who can bring a combination of skills to the table. Indeed, skills can generally be divided into two main categories—hard skills and soft skills. Hard skills refer to technical or practical abilities, such as programming languages, engineering, accounting, and other occupational skills, whereas soft skills are interpersonal capabilities, such as communication, problem-solving, and emotional intelligence (Cimatti 2016; Laker and Powell 2011).

Although these two types of skills are often categorised separately, it is important to understand their interdependence, as well as their contributions to certain areas of expertise. In recent years, there has been increasing recognition of the importance of soft skills in many areas, including education and business (Andrews and Higson 2008; Succi and Canovi 2020). The so-called "soft skill revolution" has seen a growing interest in developing and assessing these skills, as organisations have become increasingly aware of their value in the workplace. Yet, there is still some debate about what constitutes a soft skill, and to what extent hard skills remain essential for success. Despite the acknowledged value of soft skills, the lack of a standard definition or systematic approach to measuring and assessing these skills poses a challenge when attempting to review and compare them (Dede 2010; Robles 2012; Rasipuram and Jayagopi 2020).

Even before challenging the concept of soft skills, there is the question of what a "skill" is, and how to develop certain skills, as it remains an ongoing area of research for psychologists and educators. Whereas the study of skills has traditionally been associated with individual traits such as intelligence and talent, an emerging field of inquiry suggests that the composition of any skill is made up of several core elements. Overall, skills are an important foundation for development, yet much research is needed to understand better the generic components of skills. Although soft skills and hard skills seem very different in the way they are used and observed, what actually makes them inherently different? If both are actually skills, they may have more in common than it seems.

In recent years, research into the generic composition of any skill, and the relationship between soft skills and hard skills, has gained increased interest due to its implications for workplace productivity.

Researchers have identified that any workplace skill requires a combination of hard and soft skills (van der Vleuten et al. 2019; Lyu and Liu 2021). They have also elucidated that there are shared components between hard and soft skills which could be seen as the bridge between them (Pieterse and Van Eekelen 2016; Kuzminov et al. 2019). This presents an interesting opportunity for educators and trainers to develop individuals in an integrated manner, allowing for an understanding of both technical and non-technical components of skills.

2. From Skills Theories to the Generic Skills Component Approach

2.1. Foundations for the Generic Skill Components Approach

Is the distinction between hard/soft useful? Is there, metaphorically, a scale of “hardness” of skills, like Mohs’ scale for the hardness of minerals, ranging from talc (very soft) to diamonds (very hard)? Numerous authors have raised the idea of a continuum from hard to soft skills passing by a vast mid-scale with semi-hard and semi-soft skills (see Andrews and Higson 2008; Clarke and Winch 2006; Dell’Aquila et al. 2017; Hendarman and Cantner 2018; Lyu and Liu 2021; Spencer and Spencer 1993; Rychen and Salganik 2003). Le Boterf (2000) suggests that skills are better understood as a continuum, with some skills containing both hard and soft components.

The generic skill components approach builds upon these recent findings, suggesting that all skills can be understood through a shared framework of five distinct components: knowledge, active cognition, conation, affection, and sensory-motor abilities. This integrated approach has the potential to reconcile the traditional distinction between hard and soft skills, providing a more comprehensive understanding of the complex nature of skills and their development.

2.2. Discrediting Skills as Discrete Entities

Working on a generic structure for all skills implies that skills are not discrete entities as such. Researchers believe there is a necessity to clarify that aspect, before moving towards the construction of a generic skills approach. Consider the following arguments:

1. Overlapping and interrelated nature of skills: Skills are often interconnected and interdependent, making it difficult to clearly separate them into distinct categories. For example, the successful application of technical skills often depends on the presence of effective interpersonal skills, and vice versa (Kavé and Yafé 2014; Gardiner 2017). This overlap and interrelatedness challenges the idea that skills exist as discrete entities (Greenwood et al. 2013; Bean et al. 2018).

2. Contextual factors: The relevance and importance of specific skills can vary depending on the context in which they are applied. This contextual variability can lead to differing interpretations and classifications of skills, further

challenging the idea of skills as discrete and stable entities (Perkins and Salomon 1989; Hall and Magill 1995; Widdowson 1998).

3. Evolving skill requirements: The rapidly changing nature of work and technological advancements requires individuals to adapt continuously and develop new skills. As a result, the boundaries between different skill categories may become increasingly blurred as individuals are expected to possess a diverse and dynamic skillset (Dede 2010; Hargood and Peckham 2017; Dominici 2019).

4. Limitations of terminologies: The use of specific terminologies for hard and soft skills can sometimes oversimplify or constrain the understanding of the multidimensional nature of skills. By focusing on specific aspects or dimensions of skills, these terminologies may inadvertently perpetuate the idea that skills are discrete entities, rather than acknowledging the complex, interconnected permeable nature of skill development and application (Matteson et al. 2016; Lyu and Liu 2021).

The overlapping and interrelated nature of skills, the continuum perspective, contextual factors, evolving skill requirements, and the limitations of terminologies contribute to the difficulty of treating skills as discrete entities. Recognising these challenges can help researchers and practitioners develop more nuanced and integrative approaches to skill development and assessment. Building on this analysis, researchers believe there is a need for a unified approach to the structure of skills.

2.3. Using Goldstein and Hilgard's Work as a Core Basis

The ambition to find a generic structure for skills is not new. Goldstein (1989) proposed a framework, with four components structuring any skill: cognitive, affective, motivational, and behavioural. In Goldstein's, cognitive components involve the understanding and knowledge associated with a skill, such as problem-solving and analytical skills. Affective components involve emotions and attitudes, such as self-awareness and empathy. Motivational components involve the drive and determination to succeed, such as perseverance and ambition. Last, behavioural components involve the actual physical performance of a skill, such as hand-eye coordination and agility.

Although the literature is filled with definitions and discussions about skills, researchers choose in this article to use the work of Goldstein (1989) as a primary basis. His work, both theoretical and empirical, provides a comprehensive framework for understanding, designing, implementing, and evaluating skills development in organisations.

Applying these four components to hard and soft skills, researchers can see that all skills are composed of the same elements, but with different weights depending on the context in which they are used. For example, a hard skill such as programming would require a higher level of cognitive ability but lower levels of affection. In contrast, a soft skill such as active listening would require a higher level of affection but lower levels of cognition. In that way, Goldstein's framework seems a relevant basis to reconcile soft skills and hard skills. However, it is necessary to take a step back and take a closer look at Goldstein's components.

Goldstein's work relates to Hilgard's (1980a) 'Trilogy of Mind', which describes human consciousness in terms of three main dimensions: cognition, conation, and affection. Hilgard (1975, 1980b, 1986) examines learning, personality, and hypnosis, and how they interact with one another to shape the understanding of the mind. Hilgard's trilogy is itself based on the 'Trilogy of Mind' that Emmanuel Kant espoused.

Hilgard's conception of these concepts differs from Goldstein's:

- Cognition is the ability to think and solve problems, acquire information, and understand the world around us. It entails the processing of ideas and facts which allows the user to make better-informed decisions.
- Conation is the preferred pattern of actions and choices, integrating the results of cognitive processes to take action in order to achieve the objectives. It relies on the capacity to plan, as well as to monitor and evaluate the goal-driven performance.
- Affection is the ability to build and maintain relationships with others, stimulating social interaction and facilitating collaborative work. It involves the capacity to understand and empathise with others' needs, as well as the ability to develop positive social networks.

In this approach, conation has a clear link with cognition and action, and researchers believe that, with some adaptations, it can be a promising way to apprehend motivational aspects, known as "volition" in some frameworks. Cognition should be treated as an active dynamic process. In this process, knowledge is acquired, used, transformed, and produced. It is however useful to distinguish the knowledge itself and the information-processing actions in which this knowledge is used.

Affection as seen by Hilgard seems richer than what is envisioned by Goldstein and relates better to the concept of emotional intelligence (Goleman 1995). Goldstein underlines the importance of the body actually taking action. However, calling it behaviour might be confusing, regarding the extensive literature about behaviour, and the way behavioural psychology apprehends it. Following Goldstein's definition, researchers believe sensory-motor abilities to be more appropriate as a component name.

Considering these adjustments, researchers propose the following revised framework for any skill, composed of five distinct components:

- Knowledge includes both external knowledge or facts, such as technical job-related knowledge, as well as internal knowledge, such as memory (Bloch 2016; Zagzebski 2017).
- Active cognition involves perceiving and processing information to form decisions and opinions, such as perception, attention, and judgement (Bickhard 1997). The analysis of the environment and the context falls under active cognition.

- Conation is the component that describes preferences, motivations, and volitional components of behaviour. It is the drive or impulse to act and is often referred to as the “will” or “willingness” to act (Csikszentmihalyi 1990). Researchers believe it goes beyond motivation as referred to by Goldstein.

- Affection: Affection is the ability to empathise with and manage feelings in order to build and maintain relationships with others.

- Sensory motor abilities: Sensory motor abilities refer to the ability to control and coordinate movements. This includes the ability to perceive, interpret, and respond to sensory input, as well as the ability to plan and execute movements. Examples of sensory-motor abilities include balance, coordination, and fine motor skills.

Using this framework, it becomes possible to describe both soft skills and hard skills in the same way. With time, researchers believe the distinction between both types of skills may become either obsolete or insufficient. Only the specific content and weight of each component would matter in order to describe a skill, to determine the overlap between two skills, or the transferability from one skill to another.

2.4. Developing the Generic Skill Components Approach

The generic skill components approach aims to provide a comprehensive understanding of the structure and composition of any skill. This approach posits that all skills, whether hard or soft, can be understood in terms of five distinct components: knowledge, active cognition, conation, affection, and sensory-motor abilities. By examining these components and their interactions, researchers can gain a more in-depth understanding of the nature of skills and their development.

This approach is supported by previous research that has identified common elements across various types of skills. For example, Rychen and Salganik (2003) propose a model of key competencies that includes cognitive, intrapersonal, and interpersonal dimensions, which align with the active cognition, conation, and affection components of the generic skill components approach. Similarly, other studies highlight the importance of cognitive, affective, and behavioural processes in the development and application of both hard and soft skills (Parlamis and Monnot 2019; Soto et al. 2022). The approach extends beyond existing models by incorporating sensory-motor abilities, which are often overlooked in discussions of skill development. This inclusion acknowledges the importance of physical and perceptual abilities in the successful application of many skills, particularly in fields such as sports, manufacturing, and healthcare.

This approach has several potential applications and implications for various fields, including education, training, and management. By understanding the generic components of skills, educators and trainers can develop more effective and holistic approaches to skill development, integrating both technical and non-technical components. In the workplace, a greater understanding of the generic composition of skills can help inform hiring decisions, performance evaluations, and employee development programs. If a skill has a major active cognition component, the resulting pedagogic engineering will be very different compared to a skill with a major knowledge component.

Further research is needed to refine and expand upon the generic skill components approach. Future studies could explore the interactions between the different components, as well as the impact of contextual factors on skill development and use. Indeed, the generic skill components approach highlights the importance of context in the development and application of skills, suggesting that educators and trainers should consider the specific environments in which their students or employees will be applying their skills. This may require the development of more context-specific training programs that focus on the unique challenges and opportunities presented by different work environments. Additionally, researchers could investigate the potential for more distinct skill categories and their implications for various domains.

2.5. Tentative Representation of the Generic Skills' Components Framework

Although the approach needs to be further developed and tested empirically, researchers propose in this research an attempt at visual representation, displaying the five generic components in a diagram (see **Figure 1**). This diagram may be seen as a template to be used for skills description, as proposed later.

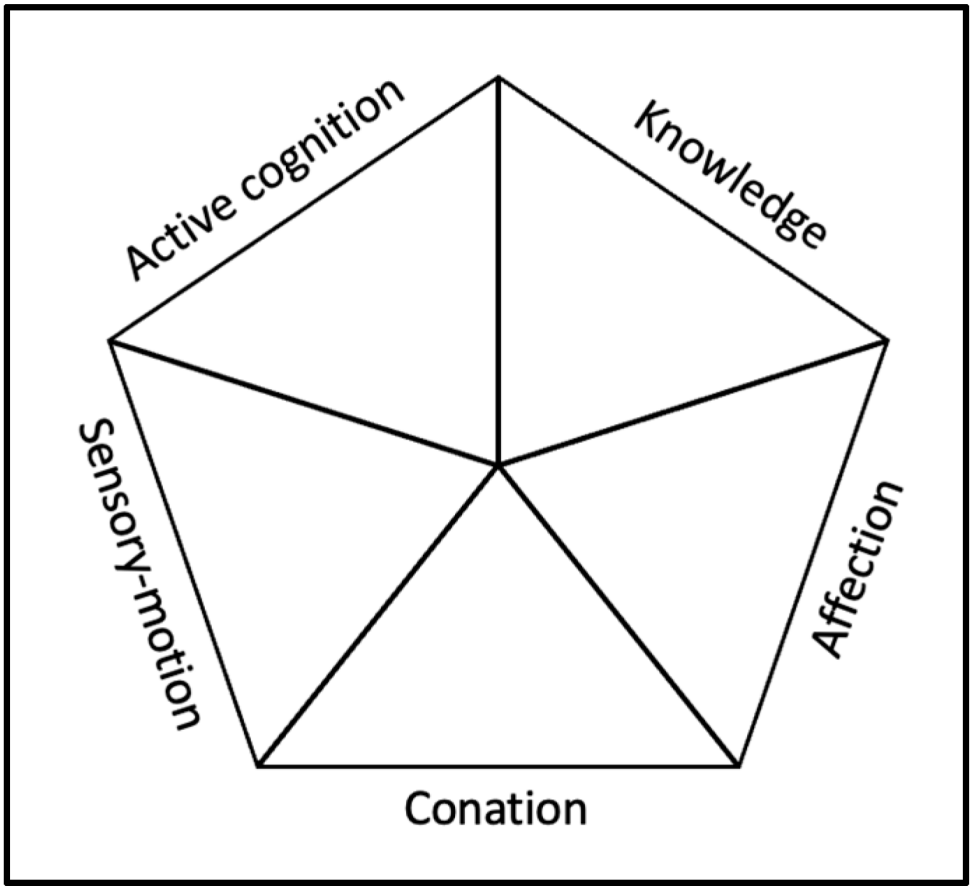

Figure 1. Visual representation of the generic skills' components framework.

The understanding of generic skills components would be that all components exist independently and need to be associated to create the necessary skill. This implies that they are not relative to each other, meaning that for a given skill, it is possible that all components are required at a very high level of mastery or development.

Furthermore, conversely, for another skill, it is possible that all components are required at a very low level. In this manner, all types of combinations are possible, the point being that the necessity of one component at a high level does not determine the level of other components.

2.6. Tentative Representation of Skills Composition Using the Framework

Below, researchers propose three examples of using the framework to represent skills: oral communication, Python programming, and logical analysis. At this stage, the assessment is very basic, as it results in a consensus among the authors, having both theoretical and empirical experience in skills expertise. These specific cases of skill descriptions will need to be challenged in order to be considered consensual, but the purpose of this section is rather to show the possibilities offered by the generic skills' components approach. For each skill, researchers propose:

- A visual representation based on the generic skills' components framework (see **Figure 1**);
- A rating from 1 (low) to 5 (high) for each component;
- An explanation of the importance given to each component in the context of the skill;
- A suggestion of a training program detailed for each component.

(A)Example 1: Oral communication

For the skill "oral communication", which is usually referred to as a soft skill, researchers describe below on a scale of importance of 1 to 5 for each component, the composition for each component (see **Figure 2**):

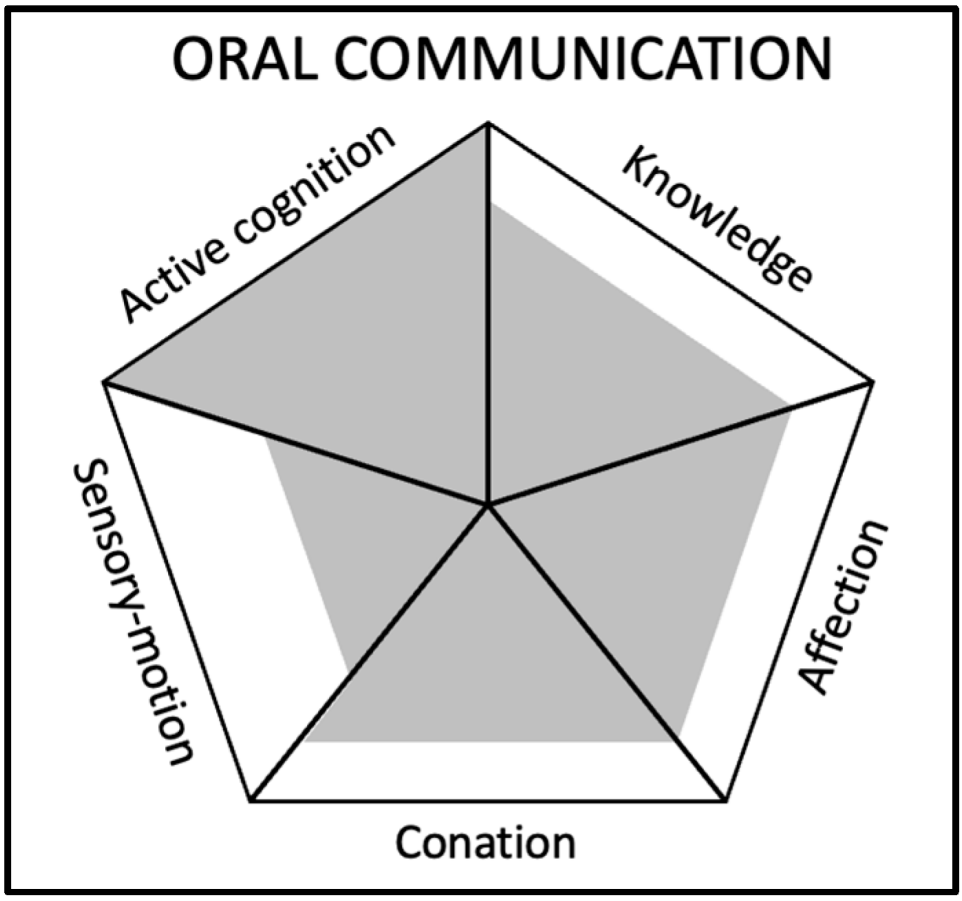

Figure 2. Visual representation of the generic skills components' framework for the skill 'Oral communication'.

- Knowledge: 4/5—Knowledge is essential for effective oral communication, as it involves understanding the topic being discussed, the context, and the audience. Having a solid grasp of the subject matter, as well as cultural and social norms, allows the speaker to convey messages accurately and effectively. Additionally, internal knowledge helps the speaker to convey relevant information and experiences to support their points.

- Active cognition: 5/5—Active cognition is crucial for oral communication, as it involves perceiving and processing information in real-time. Effective oral communication requires the speaker to pay attention to the audience, adapt the message based on audience reactions, and make judgments about what information to share and how to present it. It also involves critical thinking and problem-solving skills, as the speaker may need to respond to questions or objections from the audience.

- Conation: 4/5—Trait extraversion can support oral communication because it motivates the speaker to engage with the audience and present the message confidently and persuasively. A strong willingness to act can also help the speaker overcome any anxiety related to speaking in front of others.

- Affection: 4/5—The ability to empathise with and manage emotions is important for connecting with the audience and creating a positive atmosphere during oral communication. Understanding the emotional state of the audience can help the speaker adjust their/his/her tone and approach while managing their/his/her own

emotions can ensure a calm and composed delivery. Additionally, being able to express warmth and enthusiasm can make the message more engaging and persuasive.
- Sensory motor abilities: 3/5—Although not as critical as other components, sensory-motor abilities still play a role in oral communication. The ability to control and coordinate movements, such as gestures and facial expressions, can help the speaker convey a message more effectively and make a stronger impression on the audience. Proper posture, eye contact, and voice modulation are also important aspects of oral communication that rely on sensory-motor abilities.

It is interesting to observe that using the framework, it appears that all components are relevant to the skill of oral communication. This example shows the value of such skills that can be underestimated in their complexity.

To develop the skill of oral communication using this framework, a pedagogical program could be designed as follows:

- Knowledge:
  - Provide learners with the necessary knowledge related to the subject matter they will be communicating, whether it is through lectures, research, or reading.
  - Encourage learners to integrate this knowledge into their communication to increase their credibility and effectiveness.
- Active cognition:
  - Provide learners with opportunities to practise active listening and critical thinking to understand better the needs of their audience and adapt their communication accordingly.
  - Encourage learners to use visual aids or other communication tools to increase their impact and effectiveness.
- Conation:
  - Provide learners with opportunities to practise oral communication in a safe and supportive environment, such as through role-playing or group discussions.
  - Encourage learners to take risks and learn from their mistakes, building their confidence and willingness to communicate effectively.
- Affection:

- Integrate exercises and activities that promote empathy and emotional intelligence, such as reflecting on the emotional impact of communication or practising active listening.
- Encourage learners to build positive relationships with their audience, as this can enhance their effectiveness as communicators.

- Sensory motor abilities:
  - Provide learners with opportunities to practise their oral communication skills, such as pronunciation, articulation and voice projection exercises.
  - Encourage learners to practise clear and effective body language to enhance their overall communication skills.

Overall, a training program created according to the skills generic components approach should emphasise the importance of all five components of the framework and provide learners with the opportunity to develop each one in a holistic and integrated manner. By focusing on all the aspects of oral communication, learners can develop the skills they need to communicate effectively and build positive, meaningful relationships with those around them.

(B)Example 2: Python programming

For the skill “Python programming”, which is usually referred to as a hard skill, researchers indicate the importance of each component on a 5-point scale, and describe, the composition for each component (see **Figure 3**):

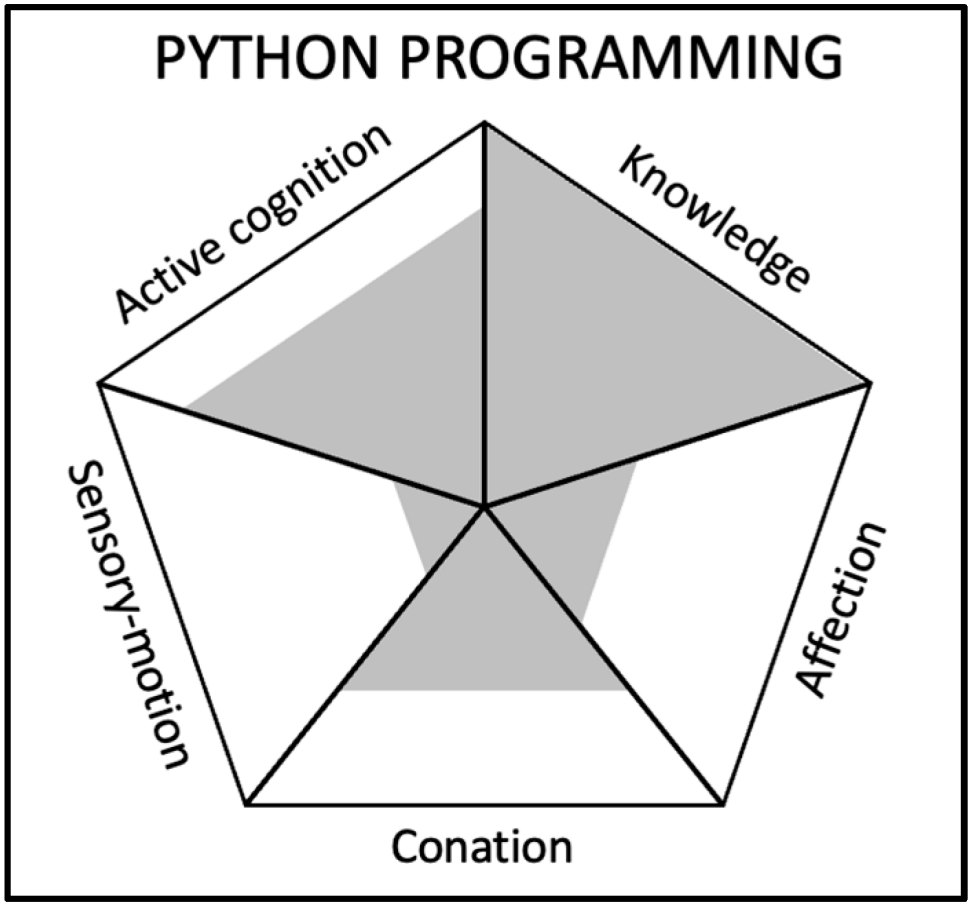

Figure 3. Visual representation of the generic skills' components framework for the skill "Python programming".

- Knowledge: 5/5—Knowledge is crucial for Python programming, as it involves understanding the syntax, functions, libraries, and best practices in the language. A programmer must be knowledgeable about programming concepts, algorithms, and data structures to effectively use Python in various applications. This includes both external knowledge, such as learning from resources and documentation, and internal knowledge, such as remembering previously learned concepts and experiences.

- Active Cognition: 4/5—Active cognition plays an important role in Python programming, as it involves perceiving and processing information to form decisions and opinions. This includes understanding the problem being solved, designing an appropriate solution, and troubleshooting any issues that arise during coding. Active cognition also involves adapting to new programming paradigms, tools, and techniques.

- Conation: 3/5—Conation is moderately important in Python programming. Although having the motivation and willingness to learn and improve one's programming skills is important, it may not be the primary driver for success in this field. However, showing perseverance, and having a strong drive to problem-solve, debug, and optimise code can contribute to better overall performance and growth as a programmer.

- Affection: 2/5—Affection has a lower importance in Python programming compared to other components. While empathy and emotional intelligence may not directly contribute to programming skills, they can still play a role in building positive relationships with teammates or clients, understanding user needs, and contributing to a healthy work environment. Good communication and collaboration skills can also help when working on projects with others.

- Sensory Motor Abilities: 1/5—Sensory motor abilities have minimal importance in Python programming. While basic motor skills are needed for typing and using a computer, the primary focus in programming is on cognitive and knowledge-based skills. However, maintaining proper ergonomics and posture while working at a computer can help prevent physical strain and promote overall well-being.

It is interesting to observe that using the framework, it appears that active cognition and knowledge seem to be the most important components for the skill of Python programming. However, conation is not to be underestimated. Knowledge is commonly associated with hard skills, whereas active cognition and conation are commonly associated with soft skills. Although knowledge seems more important than the other components, researchers believe the importance of other components is generally underestimated when considering Python programming as a hard skill, as context matters. This example shows value for such skills that are unfairly considered hard skills with little to no consideration for the potential complexity of the context, or the motivation of the programmer.

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