

# Importance of empirical knowledge in civil works

*Importancia del conocimiento empírico en obras civiles*

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Se presenta este artículo sobre la importancia del conocimiento empírico con el fin de dar a conocer la necesidad, incidencia y aplicación de dicho conocimiento en obras civiles. Además, se realiza con el fin de documentar sobre el tema que involucra a maestros de obra, ingenieros, obreros y demás participantes de obra, pero que no cuenta con difusión. El artículo se realizó mayormente en la Universidad Distrital Francisco José de Caldas, Facultad Tecnológica con el apoyo de obreros de la zona, maestros de obra, ingenieros civiles y demás participantes de obras en la universidad y en zonas aledañas. Se establecieron necesidades del pensamiento empírico y se dejó claro que no es lo único necesario para un buen desempeño en obra civiles, llegando a la conclusión de que el conocimiento empírico y el conocimiento académico son necesarios para desempeñarse de la mejor manera en obras civiles pues ambos conocimientos son importantes para ciertos momentos de la vida laboral.

*Keywords:* Academic knowledge, civil works, empirical knowledge, field of action

This article is presented on the importance of empirical knowledge in order to make known the need, incidence and application of such knowledge in civil works. In addition, it is made with the purpose of documenting the subject that involves masters of work, engineers, workers and other participants of work, but that does not count with diffusion. The article was mostly written at the Universidad Distrital Francisco José de Caldas, Facultad Tecnológica, with the support of workers from the area, master builders, civil engineers and other participants in the work at the university and in the surrounding areas. It established the need for empirical thinking and made it clear that it is not the only thing necessary for good performance in civil works, reaching the conclusion that empirical knowledge and academic knowledge are necessary to perform in the best way in civil works because both knowledge are important for certain moments of working life.

*Palabras clave:* Campo de acción, conocimiento académico, conocimiento empírico, obra civil

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## Empiricism. Historical reference

### Empirical knowledge

Empirical knowledge or empiricism is that knowledge acquired through experience of practice and direct contact with reality (McNeill & Nicholas, 2019). This knowledge is acquired through continually repeated actions, whether or not we have scientific knowledge (Fig. 1) (Li, Jiang, Song, & Liu, 2017).



Figure 1. Example of how empirical thinking develops (Cobaem, 2017).

Empiricism is a philosophical current that arose in England in the 17th century and spread during the 18th century, whose maximum representatives are J. Locke (1632-1704), J. Berkeley (1685-1753) and D. Hume (1711-1776) (Prieto, 2011; Rawbone & Jan, 2019).

They considered that the senses generated impressions or ideas in the mind, what we would know as visual images that is to say that something is seen in a certain colour and with a certain shape and they maintained that these sensory data were mental states or objects that are presented to the mind and are within them (Anstey & Vanzo, 2016; Pihlström, Stadler, & Weidtmann, 2017; Westphal, 2017). The human mind behaves like a blank piece of paper that acquires content through experience.

For empiricism, experience is the basis of all knowledge, not only in terms of its origin but also in terms of its content. One starts from the sensitive world to form the concepts and these find in the sensitive their justification and limitation.

### Empirical knowledge in different fields of work

Empiricism, when understood as all knowledge obtained through practice, supposes that this can be obtained in the practice of diverse processes, such as labor processes, whether they be in construction, manufacturing, or transportation, among others (Cooper & Stowe, 2018). Due to this, in different labor environments this phenomenon is presented, with which people without official training carry out a great deal of work, and how is it that people with official training are not totally capable of carrying out their work due to the lack of this knowledge (Fig. 2).

In the work environment it is essential to have great skill in the tasks to be performed, but for this it is logical that one



Figure 2. Variety of work fields citepMaile2017.

must have time for practice and experience in what one is going to do and that is why the knowledge obtained through practice (empiricism) will take precedence, since this will provide those who have it with a familiarity and comfort with their tasks and results. The comfort and familiarity that empirical knowledge gives the person, will mean that their results will be better and more efficient. At this point it will be shown that this trait is present in all types of environments but that this trait is given in each work environment in different ways as it can be that in companies receive personnel not trained to perform a task in which they have no knowledge and through the performance of this task learn to do and do it well, this is how more than one person acquires the understanding of a trade and is linked to the industry. There are cases that demonstrate that professions such as bricklaying are the product of empirical knowledge, which are generally learned and perfected through years of practice.

Empirical knowledge is an indispensable part in the formation of people from the most basic learned in the growth of each, as in the development of a profession or work (Goldenfein, 2019; Martínez, Hernández, & Acero, 2016). Indispensable in the formation of any person, but this phenomenon is present in every field and its presence in the work environment diagnoses the quality of the processes that these will perform and this is how empiricism in every work environment has an impact. The impact is not easy to measure, but it is easy to observe and that is how in each labour field it has an importance and impact.

### Appearance and presence of empirical knowledge in civil works

The empirical knowledge appears in works at the moment in which a civil engineer sees himself in the task of carrying out the tasks that have been indicated to him (Fig. 3).

It is necessary to go through a vulgar knowledge, a knowledge that consists of using a language and techniques present in a certain specific society (Ayala, 2017). This conclusion is reached because of the need to understand the



Figure 3. Example of civil work (Eiffage, 2017).

techniques used in the work by the team that does the work in the most beneficial way for the project.

Interviews conducted on September 20, 2017 with civil engineers at the Universidad Distrital Francisco José de Caldas reveal the opinion they have about recent graduates in civil works.

*They think they know everything. They have a lot to learn. A classroom is not the same as a building site. They have the tools, but they don't know how to use them.* These are some of the most striking opinions with which many other engineers agreed. These opinions make clear the idea that, although university study is very important and leaves several tools, according to these engineers, it is necessary to get a job and gain experience through it to perform successfully in civil works.

### Empirical knowledge in a civil work

#### Is it important?

Before speaking about empirical knowledge in a civil work, it is necessary to emphasize that through it the *common* man knows the facts and their apparent order, creates explanations concerning the actions performed by him, performed without method. It is thanks to personal research that a person without great knowledge can understand how to achieve certain things, can learn to do a job thanks to empirical knowledge (Fig. 4).

When we see how a team works in a civil work, it becomes visible that *practice made the master* (without making any reference to the master builder). It must be clear that a person needs practice in any type of action in order to do it better, do it more efficiently, and well, this is when empirical knowledge comes into play.

Making an analogy we can imagine a musician, this imaginary musician has never played an instrument in his life, but he has been studying music theory for several years. After several years this musician considers that he is able to create songs, he knows which notes and chords to combine to create a melody. The problem would arrive when the musician tries to play an instrument to create that melody, in reality the musician can know all theoretical

knowledge about music (Fig. 5), but if he has never practiced with an instrument he will not know how to materialize his knowledge, here it is necessary to have a previous practice, a personal investigation with some instrument to be able to materialize this knowledge.

In civil works it's the same. Today you can see many people who in their lives have studied a lot, but the reality is that if you have never participated in a work very likely when you first try it you will be lost because, although you have a lot of knowledge it will take some practice to participate actively and efficiently.

### Relationship between empirical knowledge and academic knowledge

In order to be able to relate academic knowledge to empirical knowledge, we can return for a moment to analyse the analogy of the musician (Fig. 6).

Looking at the analogy from another point of view we can *turn it around* and think that this musician has played an instrument since he was very young, but has never studied a bit about theory. Although the musician will have the ability and some experience with the instrument he will have trouble (as in the previous example) creating melodies, because, although he has all the necessary skill to materialize the melody he does not have the knowledge to create it.

And that is the point, it is not about two types of exclusive knowledge that cannot coexist, let alone two types of knowledge that are in conflict with each other. They are two types of knowledge that are valid and necessary for the life of any human being.

Returning to the field of civil works is the same, a person can perform very well in a job with the empirical knowledge he has acquired, and likewise someone can perform very well with the academic knowledge he has. Both of them will have problems in some areas because they don't have the kind of knowledge they need and that's why these two types of knowledge are related.

We can see academic knowledge as a set of tools that one has, and empirical knowledge as the knowledge of what should be achieved.

On the one hand, with academic knowledge you can have many tools, but finally you do not know how or where to use them, with empirical knowledge you know what you should arrive at, but you do not know if you arrived correctly.

These two thoughts are useful and necessary to each other as far as civil works are concerned, the ideal will always be to have all the knowledge available, because, although with only one of the two you can progress in works, having both knowledge will help to solve problems more easily, reaching an end in the right way and finally helping to create the work with an excellent job.

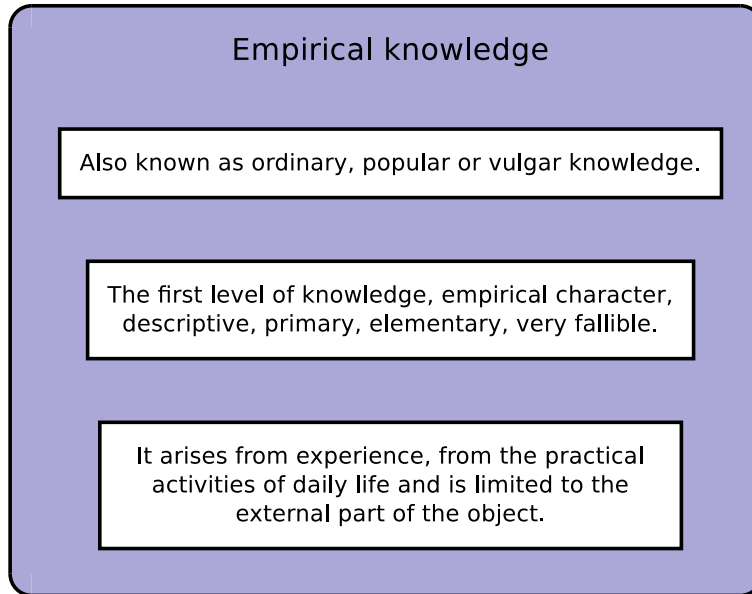


Figure 4. Characteristics of empirical knowledge.

**EL INTENSOS**  
Pasillo

Javier Pérez Sandoval

INTRO GUITARRA RUBATO Dmadd9

D<sup>b</sup>Maj7#11      A7#11      FMaj7#11

Gm11      C7#11      D<sup>b</sup>Maj7#11      G<sup>b</sup>Maj7#11

9 *a tempo* *pp* *p*

15 *mp* G<sup>b</sup> Δ #11

Figure 5. Music score *El intensos* (Quinta, 2017).

### The need for empirical knowledge in a civil work

According to everything explained above we can reach a conclusion about the importance of empirical knowledge in civil works.

With what was discussed in previous sections we can see that empirical knowledge is necessary for a good performance in a civil work. But the conclusion cannot stay there, because it would be wrong to say that empirical

knowledge is the only thing necessary to perform well in a civil work.

For this reason, the conclusion is that empirical knowledge is necessary for the good performance of a worker in civil works, a person can perform well without this knowledge, but at some moments of the working life will see the need for empirical knowledge. In addition, it is to be highlighted that with only the empirical knowledge it will

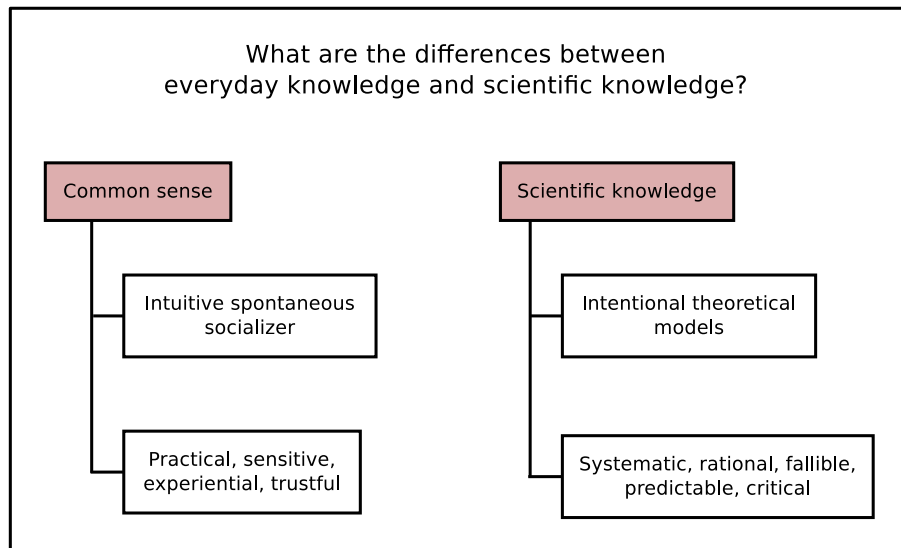


Figure 6. Differences between types of knowledge.

not be enough, because you will also find some cases of your working life in which you will need academic knowledge.

The problem has existed in the social dynamics where the workers involved in civil works become engrossed in thinking that empirical or academic thinking is better than the other.

For this type of case, it is necessary to create awareness of the importance and advantages that possessing both knowledge (empirical and academic) gives a worker. Advantages that will make the workers on site able to perform better and thus allow the civil work to advance in the right way and more efficiently.

### Conclusions

Empirical knowledge is necessary for a good performance in a civil work. The competence in such a work, shall then depend on how much you have so far made use of your knowledge and wisdom and gained experience in the study of this art. When we have empirical knowledge, our knowledge becomes an extension of our rational judgment. In the presence of evidence, we can revise our rational judgment without being restricted to a rationality that is limited to empirical knowledge. When our knowledge cannot be changed without the help of evidence, the space of knowledge becomes so limited that a decision or action on the basis of rational judgment becomes impossible. What is empirical knowledge? In science, it is the practical, inductive facts that you know are true (or invalid) by observation and experimentation.

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