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2   **A Systematic Review of Soft Skills Taxonomies: Descriptive and Conceptual Work.**

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21   **Abstract**

22   When the notion of soft skills appeared in 1972, one of the main conclusions was that soft skills are

23   essential, but insufficiently observed, known and assessed. Fifty years later, the extensive literature

24   about soft skills still struggles to find agreement on a definition of soft skills, besides their cross-

25   functionality and their opposition to hard skills. These divergences contrast with the consensus about

26   their contribution to work performance. To remedy this apparent paradox and better understand what

27   soft skills are, this article proposes a systematic review of articles and organizational reports dealing

28   with soft skills taxonomies. It also embraces taxonomies of notions that are considered as synonymous

29   with soft skills (generic skills, transversal skills, employability skills, etc.), to delimit the boundaries of

30   this concept. Connecting the resulting soft skills taxonomy with the dimensions of adaptive

31   performance allows us to establish that soft skills play a major role in adapting successfully in a

32   professional environment. This research contributes to delimit more precisely the definition of soft

33   skills, their taxonomy, characteristics, and added value concerning adaptation in order to propose new

34   perspectives on this theme. In addition to determining the skills considered as soft, this review

35   examines their implicit dimension and their multiple interconnections.

36   **Keywords:** soft skills, soft skills taxonomy, adaptive performance, systematic review.

37

38   **A Systematic Review of Soft Skills Taxonomies: Descriptive and Conceptual Work**

39   Soft skills are a 50-years-old concept, brought to light by the US Army (Whitmore, 1972) and

40 now wide-spread in the world of work (Royo, 2019). They are indeed considered as essential to

41 improve work performance (Hagemann et al., 2017; Ibrahim et al., 2017) and employability (Cimatti,

42 2016; Cinque, 2016; Succi, 2019), especially in a volatile, unpredictable, changing and ambiguous

43 (VUCA) environment. However, despite a half century of research, their definition is still unclear

44 (Cukier et al., 2015; Kechagias, 2011; Matteson et al., 2016).

45   Since their origin, soft skills have been defined in a negative way, as opposed to technical

46 skills, called 'hard skills' (Heckman & Kautz, 2012; Whitmore, 1972). This approach of soft skills is

47 generally associated with the statement that many predictors of performance at work are not

48 acknowledged and trained enough within the educational system and firms, leading to a gap

49 between employers' expectations and employees' capacities (Blom & Saeki, 2011; Dujardin &

50 Feutrie, 2017; Hamid et al., 2014; Hurrell, 2016; Lerman, 2013; Robles, 2012). In this view, "soft

51 skills" can be considered as an umbrella term designed to broaden the scope of essential skills, in

52 order to avoid previous pitfalls in human resources systems (McClelland, 1973). The definitions that

53 result from this "corrective" function of soft skills do not really offer an understanding precisely what

54 soft skills are, what they are not and the links between soft skills and performance in a

55 transformational context. We propose to tackle these issues.

56 **Soft Skills: An Unclear Construct**

57   As stated before, the lack of a clear positive definition of soft skills leads to an array of issues

58 regarding the delimitation of soft skills. First, soft skills are sometimes labeled as "non-cognitive

59 skills", in order to emphasize their lack of visibility in academic and professional curricula and

60 evaluation (Brunello & Schlotter, 2011; Heckman & Kautz, 2012; Kautz et al., 2014). However, many

61 other authors emphasize soft skills involved in cognitive processes, such as "divergent thinking",

62 "reflexivity" or "critical thinking" (Chamorro-Premuzic et al., 2010; Cinque, 2016; Royo, 2019; Snape,

63   2017). Similarly, soft skills are sometimes equated to "social and emotional skills" (Kechagias, 2011;

64   Lippman et al., 2015; Schleicher, 2017) or even "people skills" (Matteson et al., 2016, p. 1), whereas

65   some elements cited as soft skills do not necessarily involve social or emotional stimuli, like

66   "resource management" or "goal setting" (Cinque, 2016; Cobo, 2013; Kantrowitz, 2005; Mahasneh &

67   Thabet, 2016). This demonstrates a tendency to reduce soft skills to a salient subset.

68   Another related issue is the use of soft skills as equivalent of various umbrella terms, as

69   indicated by several authors: "The term ['employability skills'] is often used interchangeably with

70   'soft skills', 'transferable skills', 'key skills' and 'core skills'" (Goggin et al., 2019, p. 1; see also Suarta

71   et al., 2017); some publications even expose a larger set of equivalents (Cinque, 2016; Eurydice

72   European Unit, 2002; E. Smith & Comyn, 2003). However, others stress that this overlap is only

73   partial (Battelle for Kids, 2019; Goggin et al., 2019): Kechagias (2011, p. 33) emphasizes for instance

74   that soft skills are a subset of generic skills.

75   This dissonance in the soft skills literature shows how blurred are the boundaries of soft

76   skills, and how a great number of skills may be considered or not as soft skills, following authors'

77   choice and academic discipline. For example, 'mental flexibility' may be rejected, being a cognitive

78   skill, or it could be included, being transversal to a great number of situations. This emphasizes the

79   relativity of soft skills following the professional discipline and explains discrepancies in local or

80   domain-specific taxonomies of soft skills found within the literature (e.g. compare Abayadeera &

81   Watty, 2016, which comes from the accounting field; and Kiryakova-Dineva et al., 2019, from the

82   tourism industry).

83   This confusion is compounded by the fact that most existing taxonomies are not based on

84   older ones, but are created from scratch, via the automated analysis of job advertments (Calanca et

85   al., 2019; Fareri et al., 2021; Jia et al., 2017; Ward et al., 2017), expert surveys (Bell et al., 2003;

86   Robles, 2012), or a mix of both methods (Ahmed et al., 2012). This has already been observed by

87   several authors like Gilbert et al. (2004) or Matteson (2016), and resulted in local literature reviews,

88   comparing diverse taxonomies (e.g. Cukier et al., 2015). Unfortunately, in spite of their contribution,

89   these literature reviews are mostly non-systematic, or confined to a subset of the existing literature

90   (Cabral-Cardoso et al., 2006; Fjeld et al., 2018; van Laar et al., 2017).

91   Moreover, these reviews do not use positive, clear criteria to determine what soft skills are

92   and are not: consequently, they merge papers that does not share the same definition of soft skills,

93   mixing different constructs in the same taxonomy (Hyland & Johnson, 1998). Because of their unclear

94   definition and blurred boundaries, soft skills also run the risk of becoming vectors of normative

95   (standardized criteria of so-called expected socialization) or abusive expectations (commitment

96   regardless of work circumstances) of employers, by extending beyond the field of competencies

97   (Hurrell, 2016; Lafer, 2004).

98   In order to overcome these difficulties, a comprehensive systematic literature review of

99   taxonomies seems to be required, based on a clear definition of soft skills. We propose here to

100   define soft skills as skills, which means that they can be acquired and developed, and that they

101   contribute to performance regarding particular activities or tasks (as proposed by Kechagias, 2011).

102   In this sense, soft skills are may be distinguished from others constructs, such as personality traits

103   (which are not acquired and may not always contribute to performance) or motivation (Kantrowitz,

104   2005). Secondly, we here believe that "soft skills […] involve little or no interaction with machines

105   and [their] application on the job is quite generalized" (Whitmore, 1972). In other words, this second

106   criterion excludes hard skills. To summarize these criteria, our general cross-disciplinary definition of

107   soft skills would be "non-technical, transversal intra- and inter-personal competencies that are

108   essential to performance or excellence."

109   The critical and systematic literature review that we propose in this article seeks to provide a

110   consolidated taxonomy of soft skills. This in turn, as we argue below, will offer a better

111   understanding of the characteristic of soft skills, such as their link to adaptation or the way to train

112   them.

Establishing the Adaptive Value of Soft Skills

Soft skills take part in work performance, and their importance is strongly tied to their impact on adaptive capacities of individuals and organizations. The world of work is indeed understood to be an uncertain and constantly changing environment (Griffin & Hesketh, 2003), which has led to an increasing interest in the concept of adaptation. Adaptation is defined as the ability to adjust one's behavior to unusual, unexpected or complex situations (Baard et al., 2014; Pulakos et al., 2006). The adaptive value of soft skills is noted repeatedly in the literature, to the point that they are sometimes referred to as "adaptive skills" (Cukier et al., 2015; Kechagias, 2011; Olague-Caballero & Valles-Rosales, 2014). Their adaptive value is commonly linked to the consensual cross-functionality and transferability of soft skills. Nevertheless, there is no precise analysis of the link between soft skills and their value on adaptive performance whereas adaptive performance of individuals and organizations has been intensively explored since the 2000's. E. Pulakos' work (2000, 2002, 2006) constitutes a reference on this topic, and it is commonly shared that adaptive performance involves different dimensions (Charbonnier-Voirin & Roussel, 2012). Having a consolidated taxonomy of soft skills would allow to establish precisely the overlap between the skills considered as soft and the skills considered as taking part in the different dimensions of adaptive performance. This could be done literally by comparing the established taxonomy with the skills contained in the different dimensions of adaptive performance.

The Implicit Development and Implementation of Soft Skills

Wagner and Sternberg (1985) define tacit knowledge as knowledge that is not formally taught. This knowledge underpins skills that are acquired through daily experience (Evans et al., 2004), and contribute to individual and organizational performance (Evans et al., 2004; Hoe, 2006; Insch et al., 2008; Kong, 2020; Nonaka & Takeuchi, 1995; Wagner, 1987; Wagner & Sternberg, 1985) although they are executed without awareness (Ellis, 2009). Reber (1992) confirms the implicit acquisition of knowledge and skills without knowing what is happening or which skill has been acquired.

139   Soft skills are not always formally taught (see Haseeb et al., 2021) and are typically acquired

140   through by experience and social interaction (Chell & Athayde, 2011; Nitonde, 2014), and executed

141   without awareness (Mauléon et al., 2014) and are linked to performance (Ceschi et al., 2019;

142   Danielson et al., 2012; Ibrahim et al., 2017; Joseph et al., 2010). These similarities suggest strong

143   connections between soft skills and implicit skills.

144   This parallel between soft and tacit skills may be linked to the acquisition, the measurement

145   and the training of soft skills, that arise multiple difficulties in the literature (e.g. Henville, 2012; Laker

146   & Powell, 2011). Yet metacognition of implicit skills favors their effective operationalization and

147   development (Evans et al., 2004; Seger, 1994). Acknowledging the implicit aspect of soft skills could

148   therefore allow them to be developed by raising awareness about their existence and execution at

149   work, helping employees to self-monitor and progress in these domains (Joie-La Marle, Parmentier,

150   Weiss, Lubart, et al., in press; Mauléon et al., 2014), and favorizing the transfer toward future

151   situations (Seger, 1994).

152

153   To summarize, establishing a consolidated taxonomy of soft skills would allow to support

154   some properties of these skills, specifically their adaptive value and their implicit learning, which in

155   turn can lead to new research on this theme.

156   **Objectives**

157   This research follows therefore two main objectives:

158   1. The first objective consists of conducting a systematic literature review of soft skills taxonomies,

159   which also includes similar umbrella terms (e.g. "employability skills", "transversal skills", etc.).

160   This will allow us to:

161   1.a. Observe what, in the current literature, is considered to be a soft skill;

162   1.b. Observe the overlaps and the discrepancies between similar umbrella terms;

163   1.c. Develop a consolidated taxonomy of soft skills based on the definition of soft skills we

164   proposed earlier;

165   2. The second objective is to examine In detail the link between soft skills and two concepts:

166   adaptation at work and implicit learning. This will be addressed through a conceptual approach,

167   i.e. by analyzing the overlap between adaptive performance dimensions and the soft skills

168   taxonomy, as well as examining the literature concerning the implicit learning and the

169   implementation of soft skills.

170   **Method**

171   **Data gathering**

172   This systematic review was designed following the PRISMA guidelines for systematic reviews

173   (Gedda, 2015; Page et al., 2021). As its aim was to confront the existing taxonomies of soft skills in

174   the existing literature, we defined the following inclusion criteria for papers:

175   •   Language: English.

176   •   Publication: peer-reviewed journal, organizational report (state, NGO…) or academic work

177   (thesis, dissertation).

178   This latter criterion was designed given that many taxonomies emerged from governmental, non-

179   governmental and academic research on soft skills (e.g. European Commission. Directorate-General

180   for Employment, Social Affairs and Inclusion, 2011; Kantrowitz, 2005).

181   In order to find relevant articles, the Google Scholar Search Engine was used, as research

182   showed it is one of the most comprehensive existing search engines (Gusenbauer, 2019). Articles

183   were retrieved between the 4th and the 19th of March 2021.

184   The research strategy was based on the combination of two lists of keywords given in Table 1: each

185   keyword in the first column was combined to every word of the second one.

186   _____

187   Insert Table 1 about here

188   _____

189   Papers were selected by a single researcher, based on the information provided by Google Scholar

190   Search Engine, i.e. the title and extracts containing the provided keywords. Result pages (each

191   containing 10 results) were scanned until the searcher reached 10 pages without finding any relevant

192   result. Some other papers were added by the author, as the result of a previous informal literature

193   review. Finally, as planned by the PRISMA framework (Page et al., 2021), some relevant papers were

194   manually added to the review.

195   **Data extraction**

196   Data were extracted by two reviewers working independently, using the following process:

197   1. Each paper was manually screened, first reading the abstract, then visually and textually

198   scanning the text, in order to detect the presence of any soft skills classification.

199   2. If this was the case, the paper was pre-selected. In order to limit "resonance effects" due to

200   the citation of a same taxonomy in different papers, the name of the taxonomy source was

201   checked: if already selected papers cited the same taxonomy, the processed paper was

202   discarded. Otherwise, the paper was selected.

203   3. In the selected papers, the taxonomy of soft skills was extracted for further qualitative and

204   quantitative treatment.

205   4. In addition to these data, the umbrella term associated to the taxonomy (soft skills,

206   employability skills, life skills, non-technical skills, etc.) was recorded. Sometimes, the articles

207   contained several umbrella terms at once: we selected only the dominant one, which inflates

208   moderately the dissimilarity between umbrella terms. The professional area concerned by

209   the research was also noted.

210   **Data treatment**

211   Once gathered, the exploratory data were treated in several steps:

212   *1. Merging taxonomies*

213   All terms found in the selected articles were manually divided into categories, which were created to

214   reflect the underlying construct of each word. This work was done by two of the co-authors, and

215   reviewed by a third one. Due to the current state of the art regarding natural language processing

216   and semantic classification, we choose to treat the data by hand for this specific task. Indeed, the

217   lack of a pre-existing set of training data for our user case and the size of our dataset made

218   automatization suboptimal in our case. Consequently, all labels found in the taxonomies of the

219   selected articles were registered and grouped by semantic proximity. Semantic associations between

220   soft skills conveyed by the text of the articles were also documented, in order to support the co-

221   occurrence data and the detailed understanding of the soft skill content, as explained below. Based

222   on the categories constituted before, a synthetic label has been chosen to reflect the terminologies

223   grouped in each category.

224   A definition corresponding to each label was elaborated from all the terms and expressions grouped

225   in each category The construction of a definition for each item according to this methodology

226   enables a consolidated definition of each label associated with soft skills or the umbrella terms

227   associated with them.

228   This was completed by one of the co-authors, successively reviewed by two others and finalized by

229   the consensus of the three first authors to be strictly consolidated.

230   This process resulted in a text file organizing the terms into categories and specifying associations

231   between the categories .

232   ***2. Analyzing frequencies of occurrence***

233   This breakdown was used to count the number of times each category of skill was mentioned for

234   each umbrella term. A skill can be cited more than once in an article, which means that the number

235   of occurrences can be superior to the number of articles for a given umbrella term.

236   ***3. Detecting overlap between umbrella terms***

237   In order to detect overlaps and differences between different umbrella terms, a correlational matrix

238   between these terms was generated, based on the frequencies of apparition for each skill.

239   ***4. Calculating specificity***

240   To detail the previous findings, an algorithm was designed to compare the frequency of occurrence

241   of a given label across umbrella terms. This comparison was synthesized into an index called the

242   "specificity index", which consists in the ratio between (a) the frequency of occurrence of the given

243   label for a specific umbrella, and (b) the sum of frequency of occurrence for this label across all

244   umbrella terms.

245   ***5. Creating a new soft skills taxonomy***

246   The content of each label was compared to the conceptual criteria of the definition of soft skills to

247   determine to what extent this item may be legitimately integrated in the taxonomy of soft skills. As a

248   reminder, this definition, given in the Introduction, is two-fold:

249   1.   Soft skills are skills, which means:

250   1.a. They can be acquired, trained and developed – thus, they are not traits, behaviors or

251   motivation: "most [definitions] emphasize that all skills are learned, or are capable of

252   being learned and developed" (Kechagias, 2011, p. 31) ;

253   1.b. They are linked to performance (Kechagias, 2011; Koeppen et al., 2008; Matteson et al.,

254   2016);

255   2.   Soft skills are soft, which means:

256   2.a. They are non-technical skills, not linked to a non-intuitive use of a device: "soft skills [...]

257   involve little or no interaction with machines" (Whitmore, 1972);

258   2.b. They are transversal, i.e. cross-disciplinary: "soft skills' application on the job is quite

259   generalized" (Whitmore, 1972).

260   These two characteristics are widely accepted in the literature as definitional attributes

261   (Joyce, 2001; Kantrowitz, 2005; Matteson et al., 2016; Nasir et al., 2011).

262   The admission criteria were estimated by dimension. This evaluation, for difficult or ambiguous

263   terms, led to a brief exploration of the literature on these notions. On each of the criteria for

264   inclusion in the conceptual spectrum of soft skills, the different labels were considered as fully

265   meeting the criterion, not meeting the criterion, or "mixed".

266   In order to respect the consistency of the different criteria and to take into account the detailed

267   content of each category in an optimal way, some items were considered as "mixed" on one or

268   several criteria. Concerning the "skill" criteria, constructs are mixed when they combine different

269   types of constructs (motivation, trait, behavior, skill, etc.) at least one of which is a skill. Similarly,

270   constructs were considered as mixed according to the criterion of being soft when they include

271   technical and non-technical skills. We excluded labels that do not constitute, in themselves, modular

272   soft skills, but rather represent major categories of soft skills (e.g. emotional skills).

273   Adopting an integrative approach, labels considered to be at least mixed on the two criteria related

274   to the definition of soft skills have been integrated into our taxonomy, and reformulated to obtain a

275   final taxonomy, with only soft skills.

276   This step was completed by two of the authors and reviewed by a third one.

277   *6. Analyzing co-occurrences*

278   In order to observe the links between the different skills, our dataset was reworked in order to show

279   the number of times skills were cited together or in compound items (e.g., "deadline and target

280   oriented" can both designate the "Deadline meeting" and "Achievement orientation" skills). The

281   number of co-occurrences between terms was then reported in a matrix, using an automatic

282   method. The functional grouping of the terms contained in the soft skills taxonomies highlighted

283   semantic associations between soft skills that were also referenced. Some of these associations were

284   too subtle to be detected by the automatic processing of the terms. For instance, "convincing others

285   that you can see their point of view" is a co-occurrence between influence (convince) and empathy

286   (see a point of view), but was not detected by the algorithm. This is why the automatic analysis of

287   soft skills co-occurrences was completed by the results of a manual analysis of these semantic

288   associations. A final matrix was computed, combining these two methods, and was exploited visually

289   using the "chorddiag" R package. Additionally, in order to see how skills can be aggregated based on

290   this co-occurrence count, an exploratory factor analysis was conducted in Jamovi.

291   **Data availability**

292   Data were analyzed using R (v. 4.0.3) via RStudio (v. 1.4.1103) and Jamovi (v. 1.6.23).

293   All extracted data and data analysis documents are publicly available and editable at:

294   https://osf.io/w74uc/.

295   **Results**

296   **Observations From the Literature**

297   ***Description of the Reviewed Papers***

298   The systematic reviewing part of the study included 636 research papers that were identified

299   as relevant and filtered through the aforementioned criteria. As shown in the PRISMA flowchart

300   below, 237 documents were finally included in the review (Page et al., 2021). The list of selected

301   articles is detailed at Appendix 1, as well as some of their characteristics (year of publication, type of

302   document, method used, umbrella term for soft skills, professional area examined).

303

304

| Identification of studies via databases and registers | Identification of studies via other methods |

Identification

Records identified from Google Scholar (n = 605) → Records removed *before screening*: Duplicate records removed (n = 3)

Records from:
Previous bibliographical search (n = 4)
Citation searching (n = 22)

Screening

Records screened (n = 602) → Records excluded (n = 242)

Records sought for retrieval (n = 360) → Records not retrieved (n = 18)

Records sought for retrieval (n = 26) → Records not retrieved (n = 4)

Records assessed for eligibility (n = 342) → Records excluded:
Uses the same frame of reference than another selected paper (n = 22)
Non-English language (n = 1)
Does not contain any relevant taxonomy (n = 101)
Not good type of document (n = 2)

Records assessed for eligibility (n = 22) → Records excluded (n = 6):
Does not contain any relevant taxonomy (n = 6)

Included

Studies included in review (n = 238)

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318   In order to describe the reviewed literature, we thereafter give some general information.

319   The year of publication of our sample ranges between 1971 and 2021 (one paper has no

320   date of publication). As shown in Figure 1, the majority of papers were published after 2008.

321   **Figure 1**

322   *Bar chart plotting the number of papers reviewed by the year of their publication*

323

Number of papers by year of publication
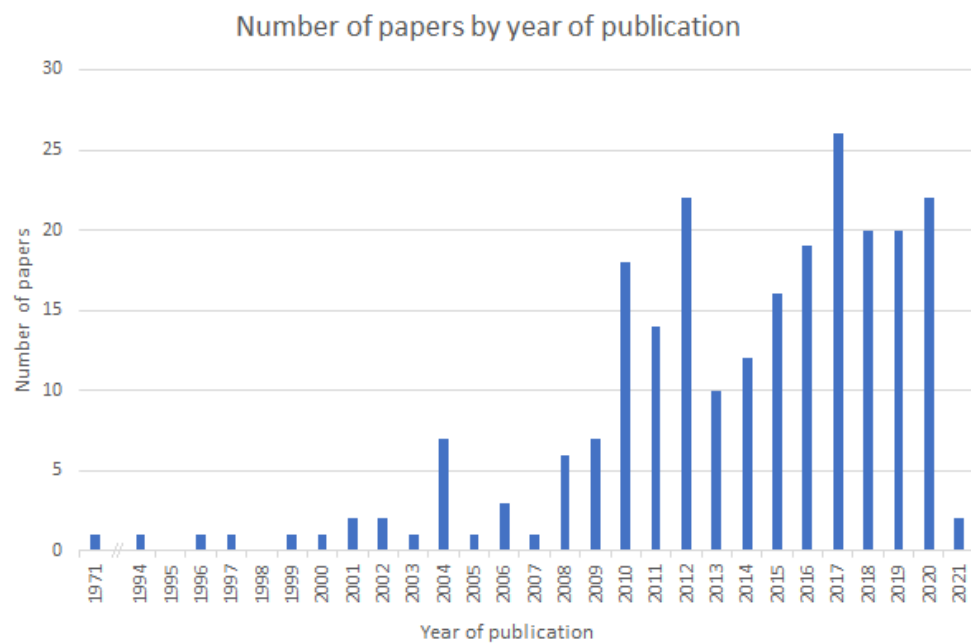
324   The repartition of papers by umbrella term used is also detailed in Table 2. It shows the

325   prevalence of the "soft skills" umbrella term, as well as "employability skills", whereas

326   "transversal skills" and "21st century skills" are rarer. Finally, it also points out that some

327   papers use several umbrella terms at once.

328   _____

329   Insert Table 2 about here

330   _____

331   Moreover, the professional area considered in the papers are listed in Table 3. The most

332   frequent professional categories, after the absence of professional area, are scientific and

333   technical fields (STEM) as well as the healthcare field.

334   _____

335   Insert Table 3 about here

336   _____

337   Finally, Table 4 shows the association between umbrella terms and professional areas

338   considered. It seems that a paper's professional background is related to its use of umbrella

339   terms. To confirm this observation, we performed a likelihood ratio test, that confirmed the

340   significant relationship between the use of umbrella term and professional domain, $\chi^2(135) =$

341   278, $p < .001$.

342   _____

343   Insert Table 4 about here

344   _____

345   ***Frequency Analysis***

346   *How frequently is each skill cited as a soft skill?*

347   First, the systematic review allowed us to detect 119 different labels, whose definition is

348   given in Appendix 2. Each skill was ranked based on the number of times it is mentioned in the soft

349   skills literature: the detailed results are available in Appendix 3. We notice that among 119 labels,

350   only six were not mentioned in literature related to soft skills, which reveals that the term "soft

351   skills" has a very wide use and meaning in the literature. The 10 most frequent skills for the "soft

352   skills" umbrella term appear to be: teamwork; communication; planning & organizing; responsibility;

353   leadership; creativity; commitment; the "interpersonal skills" label; adaptability; ethics. As a

354   comparison, across all umbrella terms, this top 10 appears to be a bit different (Appendix 4):

355   communication is the most mentioned skill; teamwork the second; the category gathering specific

356   technical skills appears at the 3rd place; then, planning & organizing, lifelong learning, leadership,

357   problem solving, technology use, creativity and ethics. The divergences between these two rankings

358   reveal differences of the general literature, comparatively to soft skills: two items linked to hard skills

359   enter the top 10 (technology use & the category gathering specific technical skills), the interpersonal

360   skills label disappears and team work gets the second place, which indicates a stronger importance of

361   group interaction in soft skills.

362   ***Comparing the Consistency of Umbrella Terms***

363   *Are soft skills, life skills and other umbrella terms synonyms?*

364   In order to complement this finding, we analyzed the differences between the eight umbrella

365   terms included in this review. This was done by calculating a Spearman correlation matrix between

366   the number of occurrences for each skill, across all umbrella terms: the result is shown in Table 5.

367   _____

368   Insert Table 5 about here

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370   This correlation heatmap first shows a good overlap between most of umbrella terms, but it

371   stresses the marginality of the "life skills" umbrella term, which appears little correlated with the

372   others, $\rho \in [.28-.46]$. It also shows that non-technical skills are somewhat different from the others, ρ

373    $\in [.36-.57]$, and soft skills are moderately correlated with other terms, $\rho \in [.46-.78]$. Concepts with

374   which soft skills are most closely related are employability and 21st century skills: it illustrates the

375   closeness between the concept of soft skills and the matters of entering in the labor market in a

376   globalizing context (Kechagias, 2011).

377   ***Specificity Analysis***

378   *What are the skills most specific to soft skills taxonomies?*

379   An R script was designed to compare an umbrella term with others, based on the relative

380   frequency of each skill label association to the different umbrella terms. This analysis yielded a

381   specificity index for each of 119 skill labels, varying between 0 and 1. A null value indicates that the

382   skill is never mentioned under the considered umbrella term; a specificity index 1 indicates that the

383   skill is only mentioned as part of the considered umbrella term. The normal expected value of this

384   index for every skill is 0.125 (1/8), as 8 umbrella terms are considered in this analysis and should

385   contribute equally to the frequency of occurrence of each skill. Consequently, the specificity index

386   deviating from this value shows a positive/negative link between the concerned skill and the

387   umbrella term. Given the particularity of the "life skills" umbrella term, we produced this specificity

388   analysis excluding life skills. This analysis was run on the "soft skills" umbrella term in Appendix 5.

389   The most specific skills of soft skills are related to different domains: emotions (emotional

390   expression, awareness, positivity, emotional skills), interaction and relationship (nonverbal

391   communication, influence, human management, conflict management), as well as some more

392   cognitive themes, such as quick learning, strategic thinking or detail awareness. In contrast, and

393   consistently, the skills least specific to soft skills are often technical (reading, language literacy,

394   numeracy, data literacy) or specialized (expertise in field, application of knowledge).

395   **A new Soft Skills Taxonomy and its Link with the Observed Literature**

396   ***Creating an Integrative Soft Skills Taxonomy***

397   *Which skills can be considered as soft skills?*

398   A conceptual analysis allows us to determine which labels can legitimately claim the status of soft

399   skills among those registered in the academic literature on soft skills and the various umbrella terms

400   considered synonymous with soft skills. All 119 labels were evaluated following the conceptual

401   criteria of the soft skills definition, as shown in Appendix 6. These criteria are specified in our

402   introduction and methodology.
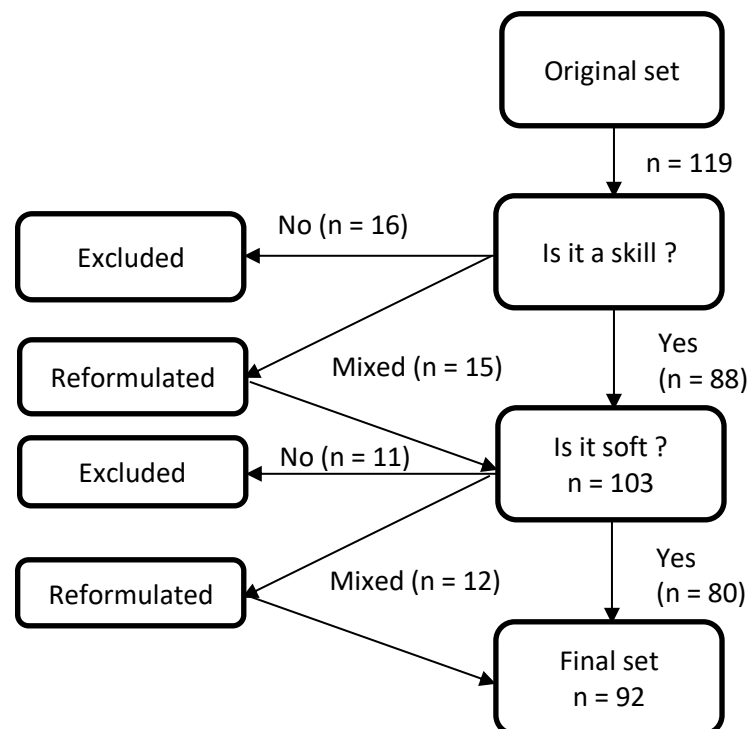
403   The flowchart above sums up our selection. It shows that 16 labels were excluded because they were

404   not skills. Among them appears "commitment", which is the seventh more cited construct in soft

405   skills papers, whereas it is a motivational construct, and may be a consequence of the environment

406   rather than a genuine skill (Naderi Anari, 2012). Fifteen other constructs were considered as mixed,

407   as they contained both skills and other constructs. This is the case of risk taking, which is both the

408   propensity to take risks (personality or motivational trait) and the ability to take them wisely (which

409   is a skill). Such mixed items were reformulated to keep only the skill part (here, "ability to take

410   appropriate risks").

411   Similarly, 11 labels were considered as hard skills, and 12 others were considered as mixed according

412   to the criterion of being soft, as they contained both soft and hard skills. This is the case of business

413   awareness, as it contains technical knowledge, but also requires an ability to relate organizational

414   elements to a local culture, which involves soft skills such as strategic thinking (Haines et al., 2012).

415   It results from this evaluation that 58.0% of these labels are strictly speaking soft skills (69

416   labels), and 23 of the 119 labels (19.3%) are mixed skills (containing both soft and hard skills) without

417   being one strictly speaking - e.g. professionalism, which mixes different constructs, including

418   motivation and soft skills (Swick, 2000; van Mook et al., 2009). This means that almost a fourth of the

419   labels are assimilated to soft skills in the analyzed literature without being soft skills. This stresses the

420   importance of a clear definition of what is called soft skills to maintain consistency in the literature.

421   Based on this sorting, we devised a final taxonomy of 92 soft skills, shown in Appendix 7, by

422   refining the definition of mixed skills. Changes from the original definition are shown in italics.

423   ***Co-Occurrences Between Soft Skills: A Preliminary Work for Future Research***

424   *What are the relationships between soft skills?*

425   Finally, as explained before, some last results can be analyzed. Our review found that, in

426   several articles, some soft skills were cited together (e.g. "Critical Thinking and Problem Solving",

427   Dagnino et al., 2012): these co-occurrences may have a value, pointing out functional or conceptual

428   associations between skills. The systematic counting of co-occurrences of soft skills led to the finding

429   of a densely connected network, shown in figure 2.

430   **Figure 2**

431   *Co-Occurrences Between Soft Skills*
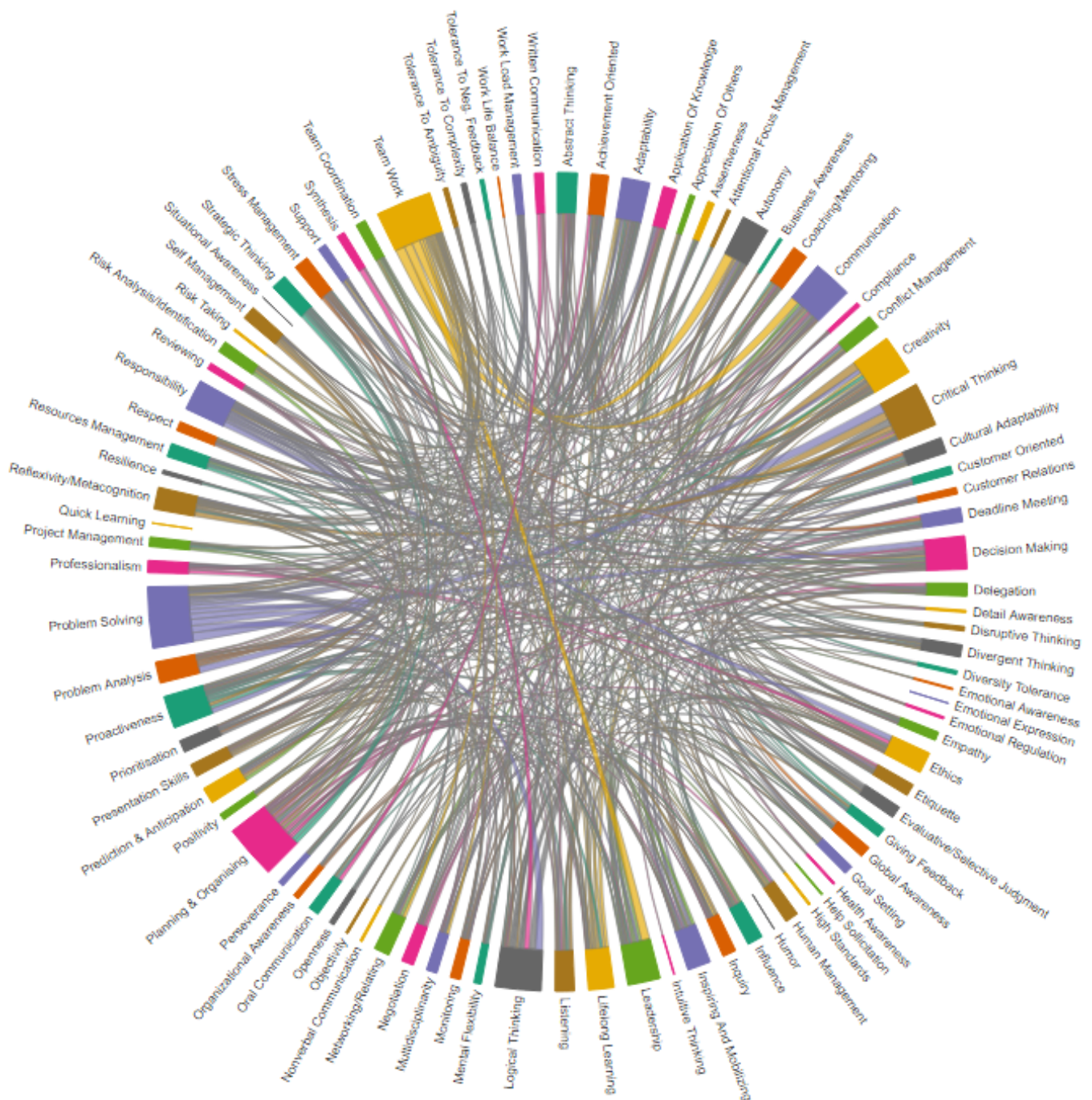
432   The width of the link between two soft skills is proportional to the number of co-occurrences

433   of these two soft skills within the articles. The width of the base of the features associated with a soft

434   skill is proportional to the number of times it is co-cited with another. These co-occurrence data can

435   contribute to draft a hierarchic taxonomy of soft skills: they can illustrate the links between soft skills

436   that can be viewed as complex ones and various skills that contribute to it. For example, figure 3

437   below shows that inspiring and mobilizing requires diverse cognitive, interpersonal and emotional

438   skills such as positivity, delegation and reflexivity.

439   **Figure 3.**

440   Co-Occurrences Between "Inspiring & Mobilizing" and other Soft Skills
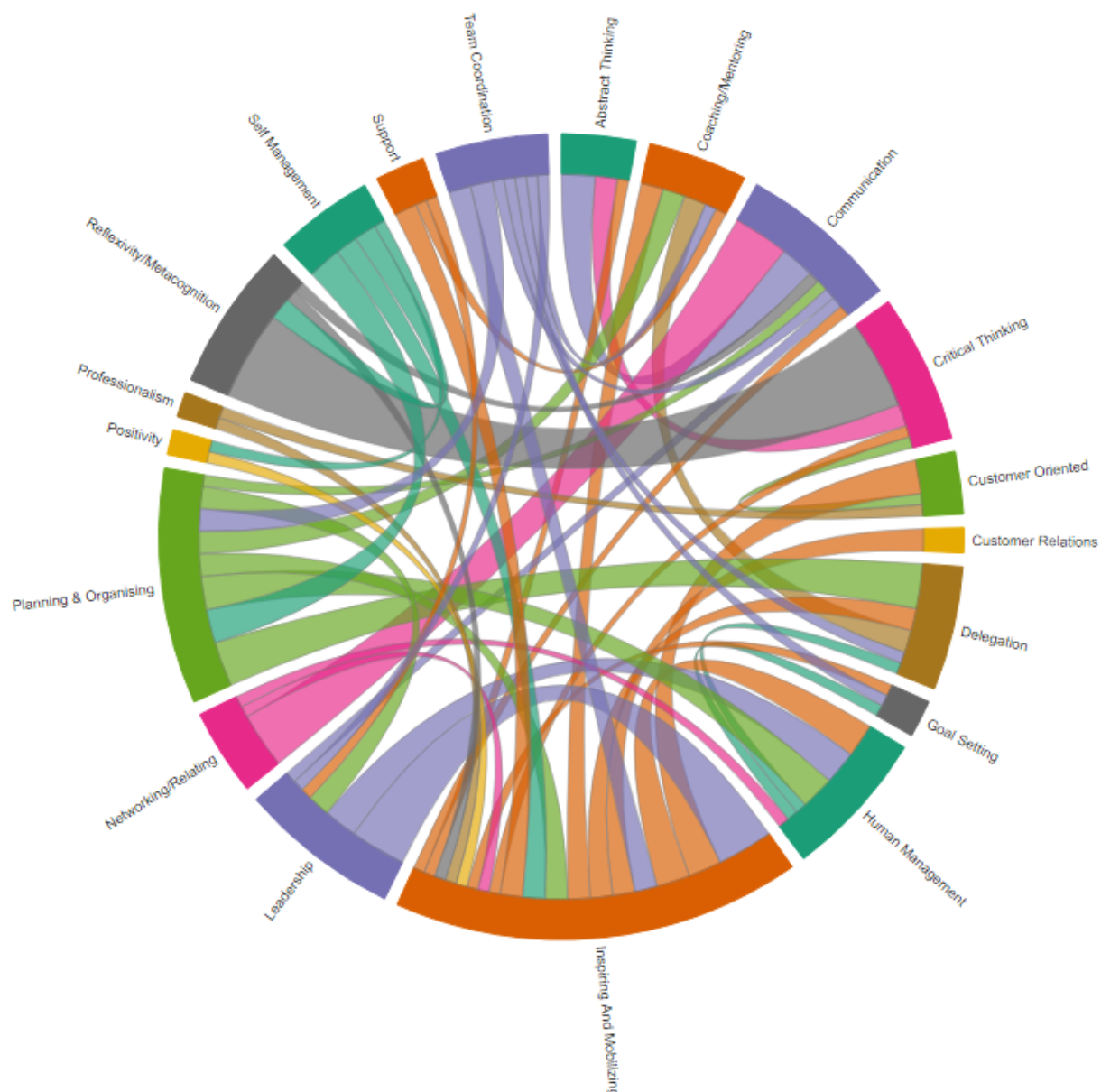
441   A subsequent exploratory factor analysis, using co-occurrences data is detailed in Appendix

442   8. It showed that this network is in fact structured in 12 factors. For example, factor 6 gathers

443   communication skills (non-verbal, written, oral, empathy, listening, etc.); factor 7 lists together

444   ethics, compliance, responsibility, professionalism and other skills linked to ethical and reliable

445   behavior. This shows that, far from being disorganized, the ecosystem we observed in Figure 2 has an

446   internal structure of conceptual or functional inter-dependency. This new way of envisioning soft

447   skills can lead to a better understanding of their nature. Indeed, it triggers a shift in the

448   representation of what an effective taxonomy of soft skills should be, jumping from a simple list of

449   isolated items to a hierarchical visualization of interconnected skills. Consequently, a hierarchical

450   taxonomy based on ours, in the continuity of previous efforts (European Commission. Directorate-

451   General for Employment, Social Affairs and Inclusion, 2011), would be insightful to understand the

452   interrelations between soft skills. However, the present review cannot claim to build a complete soft

453   skills hierarchy based on the collected data, because co-occurrences data are partial. Indeed, for

454   instance, emotional skills such as emotional awareness, expression or regulation are rarely linked to

455   other skills whereas the scientific literature frequently stresses on their links with of skills such as

456   decision making, teamwork, collaboration, etc. (Bechara et al., 1997; Dolan, 2002). Moreover, as

457   shown in Figure 4 below, co-occurrence links are ambiguous: it is hard to establish whether

458   delegation contributes to planning and organizing, or the opposite? The same question can

459   be raised for deadline meeting or decision making.

460   **Figure 4.**

461   Co-Occurrences Between "Planning & Organizing" and other Soft Skills

462

463

464   **Discussion**

465   **Observations From the Literature**

466   First, the features of the analyzed literature reveal several characteristics of research on this matter.

467   The increase over time of papers containing a relevant taxonomy shows the value of such questions

468   in contemporary settings, explaining the use of the expression "21st century skills". It is also

469   noteworthy that the reviewed papers are frequently set in technical professional backgrounds

470   (maritime, STEM, accounting), which gives a hint for the complementarity of hard and soft skills

471   (Kantrowitz, 2005). Additionally, the diversity of professional domains originating in such papers

472   (food industry, education, real estate, etc.) shows the relevance of the "transversal skills" and

473   "generic skills" umbrella term. However, data also provides evidence for the prevalence of the "soft

474   skills" umbrella term in the analyzed literature, suggesting its importance in the current literature.

475   Finally, our likelihood ratio test points out the heterogeneity of umbrella term use across

476   professional domains: it may suggest a relative compartmentalization of these diverse theoretical

477   fields until now.

478   Second, the umbrella term analysis yielded several interesting results. First, all Spearman correlations

479   are positive and superior to .28. Although it shows discrepancies between umbrella terms, it also

480   constitutes strong evidence for a common matter underlying these different domains of the

481   literature, explaining why these terms are commonly used as quasi-synonyms. Second, the

482   discrepancies between umbrella terms do not seem to originate in purely semantic differences, as

483   non-technical skills appear as little correlated to soft skills, whereas the non-technical aspect is a core

484   criterion of soft skills definition, as advocated before. The professional background of these

485   respective areas can be an alternative explanation for such a discrepancy, due to the strong

486   prevalence of STEM and medical papers in the non-technical skills literature, shown in Table 4.

487   Finally, the "soft skills" umbrella term has a specific place in this correlation matrix, as it has the

488   biggest average correlation with all other umbrella terms: it may be a hint that the content of the

489   soft skills literature quite adequately captures the underlying communality.

490   The specificity analysis complements the latter results, showing which skills are more specific to the

491   "soft skills" umbrella term, in contrast to others. It gives relevant polarities in the definition of soft

492   skills: more human that technical; more generic than specialized; notably spanning emotion,

493   interaction and cognition. However, these data should be considered with caution, as the definition

494   of soft skills is not consistent in the analyzed literature and required sorting.

Conceptual Properties of the Resulting Soft Skills Taxonomy

The taxonomy resulting from this literature review allows to better analyze the links between

soft skills and several constructs. In line with our interests in the literature, we shall focus on two

elements: the link between soft skills and adaptive performance and the implicit dimension of soft

skills.

Soft Skills & Adaptive Performance

Previously, adaptive performance has rarely been connected with the theme of soft skills.

Our review allows to find connections between the soft skills taxonomy and the 8 dimensions of

adaptive performance, as described by Pulakos et al. (2000). As shown in Table 6, each description of

adaptive performance dimension evokes at least 7 relevant soft skills, except for the physical

adaptation dimensions, which is less clearly related. This conceptual analysis could be fruitfully

completed by transformation experts' interviews.

_____

Insert Table 6 about here

_____

Implicit part of Soft Skills

This part draws on the obtained taxonomy, to advocate and confirm the implicit aspect of

soft skills. To do so, we here subdivide soft skills in two main categories: cognitive and socio-

emotional soft skills.

Implicit Part of Cognitive Soft Skills. Diverse skills related to cognitive processes identified in

this taxonomy are documented as implicit in the literature. For instance, abstract and logical

thinking, referring *inter alia* to categorization, inferential reasoning and modeling, involve implicit

processes during their learning and execution (Gelman, 1991; Karmiloff-Smith & Inhelder, 1974).

Similarly, anticipation and prediction rely significantly on implicit processes (Leonard & Sensiper,

519   1998; Reber, 1989). Creative problem solving is as well considered to engage different skills, such as

520   creativity, tolerance of ambiguity or complexity (Hélie & Sun, 2013), that themselves imply, partly or

521   completely, implicit processes (Evans et al., 2004; Leonard & Sensiper, 1998; Litman & Reber, 2005).

522   Similarly, decision making, notably implicating evaluative judgement and intuitive thinking, can occur

523   without awareness and can yield better results than conscious processes, especially in complex,

524   uncertain and fast-paced environments (Dane & Pratt, 2007; Ellis, 2009; Mikels et al., 2011; Reber,

525   1992; Seger, 1994). These observations of the scientific literature plead for considering the implicit

526   aspect of soft skills linked to cognition and thinking.

527   **Implicit Part of Socio-Emotional Soft Skills.** Several soft skills, identifiable as emotional skills,

528   are also documented in the literature as implicit in their development and/or their execution (Evans

529   et al., 2004). This is the case of emotional awareness and tolerance of negative emotions, whose

530   implicit basis is linked to their early development (R. A. Thompson, 1991). Emotional regulation

531   solicits both implicit and explicit processes: the former are often preferred, due to their low cognitive

532   cost (Gyurak et al., 2011).

533   Similarly, cognitive empathy, i.e. the capacity to infer mental states to others, involves

534   intuitive implicit mechanisms, that in turn are confirmed by slower explicit processes (Van Overwalle

535   & Vandekerckhove, 2013). This is not an isolated case in socio-emotional skills, that allow people to

536   understand and react to social stimuli: they are mostly learnt and treated tacitly (Lewicki & Hill,

537   1987). This led Frith and Frith (2007) to state that "much of the processing of social signals occurs

538   automatically and without the need of awareness" (p. R724): this is particularly the case for learning

539   cultural and social rules, but also for collaboration and respect (Frith & Frith, 2007; Li, 2017). Finally,

540   Gist and Stevens (1998) explain how efficient decision-making in an interpersonal context relies on

541   cognitive treatments of uncertain, ambiguous and emotional stimuli, which treatment are implicit, as

542   mentioned earlier.

543   We can conclude from all these observations of the literature that (a) a notable part of soft

544   skills, both cognitive and socio-emotional, relies on implicit and contextualized ecological learning,

545   and that (b) their execution is notably linked to implicit processes.

546   **Limitations**

547   This article presents several limitations. Concerning the literature review, although our

548   systematic review was conducted with the greatest care and quality standards, due to the sheer

549   amount of data to be treated, the results would benefit from replication. Second, the semantic

550   classification of all labels found in the reviewed article, although performed by three different

551   experts, can be debated thanks to public availability of our data files. The third issue of this review is

552   linked to language: a certain amount of the authors present in the systematic review aren't native

553   English speakers; neither are the authors having performed the semantic analysis. This must be

554   added to the fact that very few papers provided a clear definition of the terms used to describe skills,

555   forcing us to determine it by ourselves, based on the context. Though such cases were furtherly

556   discussed, this situation might still be a source of approximations.

557   Furthermore, this study used Pulakos' model to investigate the links between soft skills and

558   adaptation. However, Pulakos' taxonomy of adaptive performance is not the only existing model of

559   the performing capacity to cope with change at work. Other aspects/operationalizations of

560   adaptability could be a good lead to explore in future studies. This could be done by comparing the

561   present taxonomy of soft skills with the skills often listed as indicator of adaptability in a broader

562   context, following the same methodology as used in this article.

563   **Implications**

564   *Implications for the Research*

565   **Methodological Guidelines for the Research on Soft Skills.** Being based on a large literature

566   review, this paper has several implications for research. First, our observations on the relationship

567   between diverse umbrella terms show a confused situation in the literature: though revolving around

568   some identical skills, these umbrella terms do differ. This underlines the importance of defining the

569   extent of each umbrella term, in order to ensure consistency across the literature. For instance, in

570   the present work, we proposed precise criteria to identify soft skills. Likewise, in a taxonomy, skills

571   should be defined, so that their content is precisely known: indeed, many articles of this review share

572   the same words ("leadership", "flexibility") without being totally clear on their meaning.

573   **Directions for Future Research.** Various elements, identified during this review, can be used

574   as indications for future research. First, the literature on soft skills is extremely rich, and the results

575   of our review can be exploited following other perspectives (chronologic evolution of each umbrella

576   term popularity, cultural influence on the use of each umbrella terms, relationship between diverse

577   papers, etc.). Notably, research should explore in detail the hierarchical relationships between soft

578   skills, as explained before.

579   Second, during this review, we observed that taxonomies deriving from different specialized

580   field did not share the same skills. For instance, both Jia et al. (2017) and Robles (2012) list soft skills,

581   but the latter does it in relation to the business world, whereas the former focus on mobile

582   applications developers: this produces important discrepancies, e.g. the lack of the labels "courtesy",

583   "professionalism", "problem solving", or "stress management" in one or another taxonomy. The

584   relativity of soft skills consistency depending on the professional field may be interesting to

585   investigate, given the theoretical transversal status of soft skills. On the other hand, the disaffection

586   of physical adaptability by the transformation experts of our survey, dimension of adaptive

587   performance in Pulakos' work (2000), shows the interest to analyze the variability of adaptability

588   definition, based on the professional context.

589   Third, our work shows that soft skills are linked to numerous constructs of the literature, and

590   these links have not much been considered and detailed. This is particularly the case, for example,

591   for the relationships between soft skills and executive functioning, following the insight of Kechagias

592   (2011), concerning developing executive functions and soft skills in primary Education & Sport. An

593   educative program integrating both of these matters may display interesting results. Similarly, the

594   differences and convergences between soft skills and emotional intelligence could be detailed with

595   our new taxonomy, as initiated by Daff, de Lange and Jackling (2012) for generic skills.

596   Furthermore, regarding the implicit aspects of soft skills, this article shows that at least some

597   part of their acquisition and application is implicit. The implicit nature of soft skills can be further

598   explored. As shown in another article (Joie-La Marle, Parmentier, Weiss, Lubart, et al., in press), there

599   is an advantage to the explicitation of soft skills among employees.

600   ***Concrete Implications for the World of Work and Beyond***

601   The tight conceptual links between soft skills and adaptive performance should be further

602   explored through a survey of transformation experts in professional contexts. This could

603   operationally confirm the adaptive value of soft skills, in order to cope with uncertain, unpredictable

604   or stressful situations in the world of work. It would corroborate the added value of soft skills to

605   empower employees in a changing environment. Second, the implicit aspect of soft skills stresses the

606   importance of naming and recognizing them in order to develop them (Joie-La Marle, Parmentier,

607   Weiss, Borteyrou, et al., in press). Finally, the notable, though partial, overlap between the soft skills

608   and the life skills literatures tends to show that soft skills may also have a positive impact on

609   individuals' personal life, well-being and success: in this sense, soft skills are transversal, as they

610   touch every domain of life.

611   **Conclusion**

612   When the notion of soft skills appeared in 1972 at the soft skills training conference of US

613   Army Air Defense School, one of the main conclusions was that soft skills are essential skills

614   insufficiently observed, known and assessed (Whitmore, 1972 chapter II. 7). Fifty years later the

615   extensive literature about soft skills still converges on the fact that there is little agreement on soft

616   skills definition and taxonomies, besides their cross-functionality and their opposition to hard skills.

617 Our work sought to get beyond this point of agreement through a systematic review, coupled with

618 conceptual analyses. It results in a taxonomy of 92 soft skills, which emphasizes the adaptive and

619 implicit characteristics of these skills. These observations can provide new insights about soft skills,

620 and new directions for the research.

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1601

1602 **Tables**

1603 **Table 1**

1604 *List of keywords used in the systematic review. Each item of list 1 was combined to the items of list 2.*

Keyword list #1	Keyword list #2
soft skill(s) …	… taxonomy
employability skill(s) …	… classification
future work skill(s) …	… typology
21st century skill(s) …	… list
transferable skill(s) …	… inventory

| generic skill(s) … |
| portable skill(s) … |
| domain-independent skill(s) … |
| non-domain specific skill(s) … |
| life skill(s) … |
| non-technical skill(s) … |
| transversal skill(s) … |

1605

1606 **Table 2**

1607 *Number of papers included in the review by umbrella term.*

Umbrella term	Number of papers
Soft skills	51
Employability skills	44
Non-technical skills	42
Generic skills	38
Transferable skills	19
Life skills	17
21st century skills	13
Transversal skills	11
Soft skills + transferable skills	2
Generic skills + transferable skills	1

1608

1609 **Table 3**

1610 *Number of papers included in the review by professional area.*

Professional area	Number of papers
None	93
STEM	52
Medical	31
Accounting	11
Education & Sport	11
Business & Management	10
Leisure & Tourism	5
Research	4
Maritime	4
Construction industry	4
Food industry	3
EFL	2
Music	2
Librarianship	2
Real estate	2
Others	2

1611 **Table 4**

1612 *Number and row frequency of papers, by umbrella term and professional area*

Professional area		21st century skills	Employ ability skills	Generic skills	Generic + transferable skills	Life skills	Non-technical skills	Soft + transferable skills	Soft skills	Transfe rable skills	Transv ersal skills	Total
Accounting	Observed	0	0	8	0	0	1	0	2	0	0	11
	% within column	0.0 %	0.0 %	21.1 %	0.0 %	0.0 %	2.4 %	0.0 %	3.9 %	0.0 %	0.0 %	4.6 %
Business & Management	Observed	1	2	1	0	0	1	0	3	2	0	10
	% within column	7.7 %	4.5 %	2.6 %	0.0 %	0.0 %	2.4 %	0.0 %	5.9 %	10.5 %	0.0 %	4.2 %
Construction industry	Observed	0	0	1	0	0	0	0	3	0	0	4
	% within column	0.0 %	0.0 %	2.6 %	0.0 %	0.0 %	0.0 %	0.0 %	5.9 %	0.0 %	0.0 %	1.7 %
EFL	Observed	1	0	0	0	1	0	0	0	0	0	2
	% within column	7.7 %	0.0 %	0.0 %	0.0 %	5.9 %	0.0 %	0.0 %	0.0 %	0.0 %	0.0 %	0.8 %
Education & Sport	Observed	1	0	2	0	8	0	0	0	0	0	11
	% within column	7.7 %	0.0 %	5.3 %	0.0 %	47.1 %	0.0 %	0.0 %	0.0 %	0.0 %	0.0 %	4.6 %
Food industry	Observed	0	1	1	0	1	0	0	0	0	0	3
	% within column	0.0 %	2.3 %	2.6 %	0.0 %	5.9 %	0.0 %	0.0 %	0.0 %	0.0 %	0.0 %	1.3 %
Leisure & Tourism	Observed	0	1	1	0	0	0	0	3	0	0	5
	% within column	0.0 %	2.3 %	2.6 %	0.0 %	0.0 %	0.0 %	0.0 %	5.9 %	0.0 %	0.0 %	2.1 %
Librarianship	Observed	0	0	0	0	0	0	0	1	1	0	2
	% within column	0.0 %	0.0 %	0.0 %	0.0 %	0.0 %	0.0 %	0.0 %	2.0 %	5.3 %	0.0 %	0.8 %
Maritime	Observed	0	0	0	0	0	4	0	0	0	0	4
	% within column	0.0 %	0.0 %	0.0 %	0.0 %	0.0 %	9.5 %	0.0 %	0.0 %	0.0 %	0.0 %	1.7 %
Medical	Observed	0	1	0	0	0	28	0	1	1	0	31
	% within column	0.0 %	2.3 %	0.0 %	0.0 %	0.0 %	66.7 %	0.0 %	2.0 %	5.3 %	0.0 %	13.0 %
Music	Observed	0	0	0	0	0	0	0	0	2	0	2
	% within column	0.0 %	0.0 %	0.0 %	0.0 %	0.0 %	0.0 %	0.0 %	0.0 %	10.5 %	0.0 %	0.8 %
None	Observed	9	24	14	1	7	2	1	24	6	5	93
	% within column	69.2 %	54.5 %	36.8 %	100.0 %	41.2 %	4.8 %	50.0 %	47.1 %	31.6 %	45.5 %	39.1 %
Others	Observed	0	0	0	0	0	0	0	1	1	0	2
	% within column	0.0 %	0.0 %	0.0 %	0.0 %	0.0 %	0.0 %	0.0 %	2.0 %	5.3 %	0.0 %	0.8 %
Real estate	Observed	0	2	0	0	0	0	0	0	0	0	2
	% within column	0.0 %	4.5 %	0.0 %	0.0 %	0.0 %	0.0 %	0.0 %	0.0 %	0.0 %	0.0 %	0.8 %
Research	Observed	0	0	1	0	0	0	1	0	2	0	4
	% within column	0.0 %	0.0 %	2.6 %	0.0 %	0.0 %	0.0 %	50.0 %	0.0 %	10.5 %	0.0 %	1.7 %
STEM	Observed	1	13	9	0	0	6	0	13	4	6	52

	% within column	7.7 %	29.5 %	23.7 %	0.0 %	0.0 %	14.3 %	0.0 %	25.5 %	21.1 %	54.5 %	21.8 %
Total	Observed	13	44	38	1	17	42	2	51	19	11	238
	% within column	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %

1613

1614 **Table 5**

1615 *Spearman Correlation Matrix of Umbrella Terms Based on the Skills Count.*

Umbrella term	1	2	3	4	5	6	7
1. Soft skills	—						
2. 21st century skills	.78	—					
3. Transversal skills	.64	.72	—				
4. Transferable skills	.69	.72	.67	—			
5. Generic skills	.64	.71	.71	.73	—		
6. Employability skills	.71	.70	.76	.77	.80	—	
7. Non-technical skills	.57	.45	.36	.49	.45	.50	—
8. Life skills	.46	.44	.28	.29	.30	.34	.28

1616 **Table 6**

1617 *Parallels Between the Dimensions of Adaptive Performance and the Reviewed Taxonomy of Soft Skills.*

Adaptive performance dimension	Adaptive performance definition (Pulakos et al., 2000)	Related skills
Handling emergencies or crisis situations	Reacting with appropriate and proper urgency in life threatening, dangerous, or emergency situations; quickly analyzing options for dealing with danger or crises and their implications; making split-second decisions based on clear and focused thinking; maintaining emotional control and objectivity while keeping focused on the situation at hand; stepping up to take action and handle danger or emergencies as necessary and appropriate.	Stress management, intuitive thinking, divergent thinking, option generation, attentional focus management, emotional regulation, objectivity, situational awareness, decision making.
Handling work stress	Remaining composed and cool when faced with difficult circumstances or a highly demanding	Stress management, emotional regulation,

	workload or schedule; not overreacting to unexpected news or situations; managing frustration well by directing effort to constructive solutions rather than blaming others; demonstrating resilience and the highest levels of professionalism in stressful circumstances; acting as a calming and settling influence to whom others look for guidance.	tolerance to frustration, positivity, resilience, professionalism, inspiring & mobilizing, leadership.
Solving problems creatively	Employing unique types of analyses and generating new, innovative ideas in complex areas; turning problems upside-down and inside-out to find fresh, new approaches; integrating seemingly unrelated information and developing creative solutions; entertaining wide-ranging possibilities others may miss, thinking outside the given parameters to see if there is a more effective approach; developing innovative methods of obtaining or using resources when insufficient resources are available to do the job.	Creativity, divergent thinking, disruptive thinking, mental flexibility, openness, resources management, inquiry, problem solving.
Dealing with uncertain and unpredictable work situations	Taking effective action when necessary without having to know the total picture or have all the facts at hand; readily and easily changing gears in response to unpredictable or unexpected events and circumstances; effectively adjusting plans, goals, actions, or priorities to deal with changing situations; imposing structure for self and others that provide as much focus as possible in dynamic situations; not needing things to be black and white; refusing to be paralyzed by uncertainty or ambiguity.	Tolerance to ambiguity, reviewing, proactivity, risk-taking, adaptability, situational awareness, mental flexibility.
Learning work tasks, technologies, and procedures	Demonstrating enthusiasm for learning new approaches and technologies for conducting work; doing what is necessary to keep knowledge and skills current; quickly and proficiently learning new methods or how to perform previously unlearned tasks; adjusting to new work processes and procedures; anticipating changes in the work demands and searching for and participating in assignments or training that will prepare self for these changes; taking action to improve work performance deficiencies.	Lifelong-learning, quick learning, monitoring, compliance, predicting & anticipating, proactivity, self-management.
Demonstrating interpersonal adaptability	Being flexible and open-minded when dealing with others; listening to and considering others' viewpoints and opinions and altering own opinion when it is appropriate to do so; being open and accepting of negative or developmental feedback regarding work; working well and developing effective relationships with highly diverse personalities; demonstrating keen insight of others' behavior and tailoring own behavior to persuade, influence, or work more effectively with them.	Adaptability, open-minded, listening, diversity tolerance, tolerance to negative feedback, team work, networking/relating, empathy, influence.

Demonstrating cultural adaptability	Taking action to learn about and understand the climate, orientation, needs, and values of other groups, organizations, or cultures; integrating well into and being comfortable with different values, customs, and cultures; willingly adjusting behavior or appearance as necessary to comply with or show respect for others' values and customs; understanding the implications of one's actions and adjusting approach to maintain positive relationships with other groups, organizations, or cultures.	Cultural adaptability, diversity tolerance, empathy, ethics, openness, adaptability, respect, networking/relating, appreciation of others
Demonstrating physically oriented adaptability	Adjusting to challenging environmental states such as extreme heat, humidity, cold, or dirtiness; frequently pushing self physically to complete strenuous or demanding tasks; adjusting weight and muscular strength or becoming proficient in performing physical tasks as necessary for the job.	-

1618   **Appendices**

1619   **Appendix 1: List of Papers Included in the Review**

Authors	Year of pub.	Type of document	Origin of taxonomy	Umbrella term used	Professional area
Abadayadeera & Watty	(2016)	Article	Job advertisement analysis & local literature review	Generic skills	Accounting
Abdelhalim	(2015)	Article	Local literature review	Life skills	EFL
Ahmed et al.	(2012)	Article	Local literature review	Soft skills	STEM
Akyeampong	(2014)	Article	Quotation	Life skills	None
Alajmi	(2019)	Article	Quotation	Life skills	None

Authors	Year of pub.	Type of document	Origin of taxonomy	Umbrella term used	Professional area
Al Mallak	(2020)	Graduate thesis	Local literature review	Generic skills	Accounting
Alpay & Walsh	(2008)	Article	Unidentified	Transferable skills	Research
Ananiadou & Claro	(2009)	Report	Unidentified	21st century skills	None
Ansell et al.	(2004)	Report	Quotation	Life skills	Education & Sport
Ariffin, Idriss & Ishak	(2010)	Article	Quotation	Generic skills	None
Arnedillo-Sánchez, de Almada & Tseloudi	(2018)	Article	Local literature review	Employability skills	None
Ashtiani et al.	(2018)	Article	Literature review, observation, interview	Life skills	None
ATS2020	(2020)	Document	Unidentified	Transversal Skills	None

Authors	Year of pub.	Type of document	Origin of taxonomy	Umbrella term used	Professional area
Bahl, Murphy & Strachan	(2010)	Article	Observation, interview	Non-technical skills	Medical
Balderas et al.	(2018)	Article	Quotation	Generic skills	None
Balki et al.	(2017)	Article	Systematic Delphi process	Non-technical skills	Medical
Barbosa, Freire & Santos	(2017)	Article	Quotation	Transferable skills	Business & Management
Barnett et al.	(2006)	Document	Quotation	Non-technical skills	Maritime
Bassett	(2013)	Graduate thesis	Quotation	Transferable skills	Music
Bedwell, Fiore & Salas	(2014)	Article	Quotation	Soft skills	Business & Management
Begum & Newman	(2009)	Conference paper	Unidentified	Transferable skills	STEM
Bell et al.	(2003)	Article	Unidentified	Generic skills	Leisure & Tourism
Bennett	(2002)	Article	Job advertisement analysis	Transferable skills	None

Authors	Year of pub.	Type of document	Origin of taxonomy	Umbrella term used	Professional area
Binkley et al.	(2010)	Report	Unidentified	21st century skills	None
Blades, Fauth & Gibb	(2012)	Report	Literature review	Employability skills	None
Blom & Saeki	(2011)	Article	Quotation	Employability skills	STEM
Boet et al.	(2018)	Article	Systematic literature review	Non-technical skills	Medical
Bowman	(2010)	Report	Quotation	Generic skills	None
Calanca et al.	(2019)	Article	Job advertisement analysis	Soft skills	None
Camarinha-Matos et al.	(2020)	Article	Unidentified	Soft and transferable skills	Research
Canelas, Hill & Novicki	(2017)	Article	Unidentified	Transferable skills	STEM
Carey	(1971)	Report	Quotation	Employability skills	None

Authors	Year of pub.	Type of document	Origin of taxonomy	Umbrella term used	Professional area
Ceschi et al.	(2019)	Article	Systematic literature review, interviews	Non-technical skills	Medical
Chalkiadaki	(2018)	Article	Systematic review	21st century skills	None
Chamorro-Premuzic	(2010)	Article	Local literature review	Soft skills	None
Chan, Zhao & Luk	(2017)	Article	Literature review	Generic skills	STEM
Cheng, Lee & Chan	(2018)	Article	Systematic literature review	Generic skills	None
Chow et al.	(2009)	Article	Unidentified	Generic skills	None
Chow, Tse & Armatas	(2020)	Article	Quotation	Generic skills	Education & Sport
Cimatti	(2016)	Article	Quotation	Soft skills	None
Cinque	(2016)	Article	Local review of literature	Soft skills	None
Cobo	(2013)	Article	Quotation	Soft skills	None

Authors	Year of pub.	Type of document	Origin of taxonomy	Umbrella term used	Professional area
Coll, Zegwaard & Hodges	(2002)	Article	Quotation	Soft skills	STEM
da Conceição et al.	(2017)	Article	Local literature review	Non-technical skills	Maritime
The Conference Board of Canada	(n.d.)	Document	Unidentified	Employability skills	None
Cooper, Endacott & Cant	(2010)	Article	Systematic literature review	Non-technical skills	Medical
Cotet et al.	(2017)	Article	Local literature review	Soft skills	STEM
Crawford, Helliar & Monk	(2011)	Article	Local literature review, personal experience	Generic skills	Accounting
Crawford & Dalton	(2016)	Article	Quotation	Soft skills	None
Cukier, Hodson & Omar	(2015)	Report	Systematic literature review	Soft skills	None
Currie et al.	(2012)	Article	Quotation	Life skills	None

Authors	Year of pub.	Type of document	Origin of taxonomy	Umbrella term used	Professional area
Curtis & McKenzie	(2001)	Report	Literature review	Employability skills	STEM
Daff, de Lange & Jackling	(2012)	Article	Quotation	Generic skills	Accounting
Dagnino, Earp & Ott	(2012)	Conference paper	Quotation	21st century skills	None
Daneva et al.	(2019)	Conference paper	Local literature review	Soft skills	STEM
Danielson et al.	(2012)	Article	Local literature review ?	Non-technical skills	None
Dedy et al.	(2015)	Article	Local literature review	Non-technical skills	Medical
Direito, Pereira & Duarte	(2012)	Article	Local literature review	Soft skills	STEM
Dobrydina et al.	(2019)	Conference paper	Unidentified	Transversal skills	STEM
Dogara et al.	(2019)	Article	Unidentified	Generic skills	STEM
Dolce et al.	(2020)	Article	Quotation	Soft skills	Accounting

Authors	Year of pub.	Type of document	Origin of taxonomy	Umbrella term used	Professional area
Donnellan & Mathews	(2020)	Article	Interviews	Life skills	Education & Sport
Duerden et al.	(2012)	Article	Quotation	Life skills	Education & Sport
Duffy & Bowe	(2010)	Conference paper	Local literature review	Transferable skills	STEM
Easton & Djumalieva	(2018)	Document	Job advertising analysis	Transferable skills	None
Ersoy	(2010)	Graduate thesis	Quotation	Employability skills	Leisure & Tourism
European Commission	(2011)	Report appendix	Local review, interviews	Soft skills, transferable skills	None
Feldt, Höst & Lüders	(2009)	Conference paper	Local literature review	Generic skills	STEM
Fjeld, Tvedt & Oltedal	(2018)	Article	Systematic literature review	Non-technical skills	Maritime
Fong, Sidhu & Fook	(2014)	Conference paper	Unidentified	21st century skills	None

Authors	Year of pub.	Type of document	Origin of taxonomy	Umbrella term used	Professional area
Fung & Ma	(2014)	Article	Quotation	Generic skills	None
Gale et al.	(2010)	Article	Expert interview	Non-technical skills	Medical
Gammie, Cargill & Hamilton	(2010)	Report	Local literature review	Non-technical skills	Accounting
Garcia-Esteban & Jahnke	(2020)	Article	Systematic literature review	Employability skills	None
Ghombavani et al.	(2012)	Article	Quotation	Life skills	None
Gilbert et al.	(2004)	Article	Local literature review	Generic skills	Research
Goggin et al.	(2013)	Article	Quotation	Transversal skills	None
Gordon et al.	(2015)	Article	Systematic Delphi study	Non-technical skills	Medical
Goteti & Kadavakollu	(2013)	Article	Unidentified	Employability skills	STEM

Authors	Year of pub.	Type of document	Origin of taxonomy	Umbrella term used	Professional area
Guise et al.	(2008)	Article	Quotation	Non-technical skills	Medical
Gundrosen, Solligård & Aadahl	(2014)	Article	Quotation	Non-technical skills	Medical
Hagemann et al.	(2017)	Article	Quotation	Non-technical skills	Medical
Haigh & Kilmartin	(1999)	Article	Quotation	Transferable skills	None
Hall & Rao	(2020)	Conference paper	Local review	Non-technical skills	STEM
Hameed	(2016)	Article	Quotation	Employability skills	STEM
Hamid, Islam, Hazilah	(2014)	Article	Local literature review	Employability skills	None
Harun et al.	(2017)	Article	Quotation	Employability skills	STEM
Haseeb et al.	(2021)	Article	Local literature review	Soft skills	Medical

Authors	Year of pub.	Type of document	Origin of taxonomy	Umbrella term used	Professional area
Haviz, Lufri & Maris	(2020)	Article	Quotation	21st century skills	Education & Sport
Hitchins et al.	(2018)	Article	Systematic review of literature	Non-technical skills	Medical
Hodge et al.	(2017)	Article	Unidentified	Life skills	Education & Sport
Hussein	(2017)	Article	Local literature review	Generic skills	Accounting
Jackson	(2012)	Article	Quotation	Employability skills	Business & Management
Jardim et al.	(2020)	Article	Students' survey	Soft skills	None
Jayawardana	(2018)	Graduate thesis	Quotation	Soft skills	Accounting
Jewels & Ford	(2006)	Article	Students' survey	Soft skills	STEM
Jia, Chen & Du	(2017)	Conference paper	Job advertisement analysis	Soft skills	STEM
John	(2009)	Article	Unidentified	Soft skills	Business & Management

Authors	Year of pub.	Type of document	Origin of taxonomy	Umbrella term used	Professional area
Johnson	(2015)	Article	Literature review	Non-technical skills	STEM
Jones	(2013)	Article	Literature review	Transferable skills	None
Kantrowitz	(2005)	Graduate thesis	Expert interview	Soft skills	None
Kaushal	(2016)	Article	Local literature review	Employability skills	STEM
Kechagias	(2011)	Document	Unidentified	Soft skills	None
Kelly	(2001)	Article	Local literature review	Generic, transferable skills	None
Kendellen et al.	(2017)	Article	Quotation	Life skills	Education & Sport
Keneley & Jackling	(2011)	Article	Unidentified	Generic skills	Accounting
Kennedy et al.	(2014)	Article	Quotation	Life skills	Education & Sport

Authors	Year of pub.	Type of document	Origin of taxonomy	Umbrella term used	Professional area
Khaouja et al.	(2019)	Article	Job advertisement analysis	Soft skills	None
Khasanzyanova	(2017)	Article	Local literature review	Soft skills	Others
Kim et al.	(2009)	Article	Literature review	Non-technical skills	Medical
Kim et al.	(2011)	Article	Quotation	Soft skills	Leisure & Tourism
Kiryakova-Dineva, Kyurova & Chankova	(2019)	Article	Local review of literature	Soft skills	Leisure & Tourism
Klaas et al.	(2020)	Article	Literature review	Non-technical skills	Medical
Krassadaki & Matsatsinis	(2012)	Article	Literature review	Generic skills	STEM
Kulkarni et al.	(2017)	Article	Local literature review	Employability skills	STEM
Kwok	(2004)	Conference paper	Local literature review	Employability skills	None

Authors	Year of pub.	Type of document	Origin of taxonomy	Umbrella term used	Professional area
Kyllonen	(2012)	Conference paper	Quotation	21st century skills	None
Lacher et al.	(2015)	Conference paper	Systematic literature review	Non-technical skills	STEM
Laguna-Sánchez et al.	(2020)	Article	Literature review	Employability skills	None
Lamb, Jackson & Rumberger	(2015)	Document	Literature review	21st century skills	None
Lamri	(2019)	Thesis	Literature review, and quotation	21st century skills	Business & Management
Leckey & McGuigan	(1997)	Article	Literature review	Generic skills	None
Leggett et al.	(2004)	Article	Expert interview	Generic skills	STEM
Lent & Pinkowska	(2012)	Article	Quotation	Soft skills	STEM
Lim et al.	(2019)	Article	Expert interview	Generic skills	Accounting
Ling, Ofori & Pheng Low	(2000)	Article	Quotation	Soft skills	Construction industry

Authors	Year of pub.	Type of document	Origin of taxonomy	Umbrella term used	Professional area
Lintzeris & Karalis	(2020)	Article	Local literature review	Generic skills	None
Lippman et al.	(2015)	Document	Literature review	Soft skills	None
Liptak & Shatkin	(2011)	Document	Unidentified	Transferable skills	None
López et al.	(2007)	Conference paper	Quotation	Non-technical skills	STEM
López-Fernández, Alarcón & Tovar	(2016)	Conference paper	Quotation	Transversal skills	STEM
Lyk-Jensen et al.	(2016)	Article	Quotation	Non-technical skills	Medical
Madar	(2015)	Article	Unidentified	Generic skills	None
Mahasneh & Tabet	(2016)	Article	Systematic literature review	Soft skills	Construction industry
Maina & Salihu	(2016)	Article	Local literature review	Generic skills	Construction industry
Majid et al.	(2012)	Article	Literature review	Soft skills	None

Authors	Year of pub.	Type of document	Origin of taxonomy	Umbrella term used	Professional area
Makasiranondh et al.	(2011)	Article	Local literature review	Non-technical skills	STEM
Mansour & Dean	(2016)	Article	Local literature review	Employability skills	Business & Management
Mark et al.	(2018)	Conference paper	Local literature review	Generic skills	STEM
Martzoukou & Elliott	(2016)	Article	Literature review	Transferable skills	Librarianship
Matters & Curtis	(2008)	Report	Quotation	Employability skills	None
Matteson, Anderson & Boyden	(2016)	Article	Quotation	Soft skills	Librarianship
Matturro, Raschetti & Fontán	(2019)	Article	Systematic literature review	Soft skills	STEM
Maxwell et al.	(2010)	Article	Local literature review	Employability skills	None
McGunagle & Zizka	(2020)	Article	Quotation	Employability skills	STEM

Authors	Year of pub.	Type of document	Origin of taxonomy	Umbrella term used	Professional area
McLean, Shaban & Murdoch-Eaton	(2011)	Article	Quotation	Transferable skills	Medical
Mendoza et al.	(2020)	Conference paper	Quotation	Transversal skills	STEM
Miralles et al.	(2017)	Article	Local literature review	Transversal skills	STEM
Mishra	(2014)	Article	Local literature review	Employability skills	None
Mohabuth	(2015)	Article	Quotation	Transferable skills	None
Mohamad et al.	(2018)	Article	Local literature review	Employability skills	None
Moliner et al.	(2015)	Article	Unidentified	Transversal skills	STEM
Motallebzadeh, Fatemeh & Hosseinia	(2018)	Article	Quotation	21st century skills	EFL
Mottershead & Suggitt	(1996)	Article	Quotation	Transferable skills	Others

Authors	Year of pub.	Type of document	Origin of taxonomy	Umbrella term used	Professional area
Mudd	(2012)	Article	Quotation	Transferable skills	Music
Myers et al.	(2016)	Article	Expert survey, literature review, field testing data	Non-technical skills	Medical
Nasir et al.	(2011)	Conference paper	Quotation	Non-technical skills	None
Nguyen	(2019)	Graduate thesis	Literature review	Transversal skills	None
Nicolaides et al.	(2018)	Article	Systematic literature review	Non-technical skills	Medical
Nikitina & Furuoka	(2012)	Article	Literature review	Soft skills	None
Nusrat & Sultana	(2019)	Article	Local literature review	Soft skills	Business & Management
Orji	(2013)	Article	Unidentified	Employability skills	STEM
Ornellas	(2018)	Article	Literature review	Employability skills	None

Authors	Year of pub.	Type of document	Origin of taxonomy	Umbrella term used	Professional area
Pecheanu et al.	(2020)	Conference paper	Unidentified	Transversal skills	STEM
Pereira Barros	(2019)	Graduate thesis	Quotation	Transversal skills	None
Pheko et Molefhe	(2017)	Article	Quotation	Employability skills	None
Pillai et al.	(2012)	Article	Local literature review	Employability skills	None
Pita et al.	(2015)	Article	Unidentified	Generic skills	Food industry
Poon	(2012)	Article	Quotation	Employability skills	Real estate
Poon	(2014)	Article	Literature review	Employability skills	Real estate
Prajapati, Sharma & Sharma	(2017)	Article	Quotation	Life skills	None
Pukelis & Pileičikienė	(2010)	Article	Unidentified	Generic skills	None

Authors	Year of pub.	Type of document	Origin of taxonomy	Umbrella term used	Professional area
Rahman, Mokhtar & Hamzah	(2011)	Article	Local literature review	Generic skills	STEM
Rahmat, Rahman Ayub & Buntat	(2016)	Article	Local literature review, experts survey	Employability skills	STEM
Raison et al.	(2017)	Article	Literature review, modified Delphi process	Non-technical skills	Medical
Rashidi, Zaihan & Samat	(2018)	Article	Quotation	Soft skills	None
Robertson et al.	(2014)	Article	Quotation, observation, Delphi process	Non-technical skills	Medical
Robinson & Garton	(2008)	Article	Quotation	Employability skills	Food industry
Robles	(2012)	Article	Experts survey	Soft skills	None
Roepen	(2017)	Article	Quotation	Non-technical skills	Business & Management

Authors	Year of pub.	Type of document	Origin of taxonomy	Umbrella term used	Professional area
Roskosa & Stukalina	(2017)	Conference paper	Quotation, students interview	Transferable skills	Business & Management
Royo	(2019)	Article	Literature review	Soft skills	None
Ruokonen & Sepp	(2020)	Conference paper	Unidentified	Generic skills	Education & Sport
Saeed	(2015)	Graduate thesis	Literature review	Non-technical skills	Maritime
Sarkar et al.	(2020)	Article	Quotation	Generic skills	STEM
Saunders & Zuzel	(2010)	Article	Literature review	Employability skills	None
Sayfullina, Malmi & Kannala	(2018)	Article	Job advertisements analysis	Soft skills	None
Schraagen et al.	(2010)	Article	Observation, local literature review	Non-technical skills	Medical
Scott et al.	(2016)	Article	Systematic literature review	Non-technical skills	Medical

Authors	Year of pub.	Type of document	Origin of taxonomy	Umbrella term used	Professional area
Seevers, Dormody & Classon	(1994)	Conference paper	Quotation	Life skills	Food industry
Seok et al.	(2020)	Article	Local literature review	Soft skills	None
Shafie & Nayan	(2010)	Article	Quotation	Employability skills	None
Shukla & Kumar	(2017)	Article	Literature review	Soft skills	None
Sinche et al.	(2017)	Article	Quotation	Transferable skills	Research
Singla et al.	(2020)	Article	Systematic literature review	Life skills	Education & Sport
Sirevåg et al.	(2021)	Article	Quotation	Non-technical skills	Medical
Sisodia & Agrawal	(2019)	Article	Literature review	Employability skills	Medical
Smith & Comyn	(2004)	Article	Quotation	Employability skills	None

Authors	Year of pub.	Type of document	Origin of taxonomy	Umbrella term used	Professional area
Smith & Krüger	(2008)	Article	Local literature review	Generic skills	Business & Management
Snape	(2017)	Article	Quotation	Soft skills	STEM
Stal & Paliwoda-Pękosz	(2019)	Article	Local literature review	Soft skills	STEM
Suarta et al.	(2017)	Article	Literature review	Employability skills	None
Subasree & Radhakrishnan Nair	(2014)	Article	Quotation	Life skills	None
Succi	(2019)	Article	Quotation	Soft skills	None
Suleman	(2018)	Article	Literature review	Employability skills	None
Sumsion & Goodfellow	(2004)	Article	Quotation	Generic skills	None
Sung et al.	(2013)	Article	Unidentified	Employability skills	None
Sutling et al.	(2015)	Article	Literature review	Soft skills	STEM

Authors	Year of pub.	Type of document	Origin of taxonomy	Umbrella term used	Professional area
Suto	(2013)	Article	Local literature review	21st century skills	None
Sutton	(2011)	Article	Literature review, experts survey, field observation	Non-technical skills	Medical
Tang	(2019)	Article	Quotation	Soft skills	None
Taylor	(2016)	Article	Literature review	Soft skills	STEM
Tejaswani & Madhuri	(2015)	Article	Unidentified	Transferable skills	STEM
Terol Pastor	(2020)	Graduate thesis	Literature review	Transversal skills	None
Thistlethwaite et al.	(2016)	Article	Literature review, Delphi process	Non-technical skills	Medical
Thomas, Sexton & Helmreich	(2004)	Article	Experts survey, field observation	Non-technical skills	Medical
Thompson	(2019)	Article	Literature review and conceptual analysis	Soft skills	None

Authors	Year of pub.	Type of document	Origin of taxonomy	Umbrella term used	Professional area
Van Laar et al.	(2017)	Article	Systematic literature review	21st century skills	STEM
Villarreal et al.	(2018)	Article	Quotation	Employability skills	None
Vista	(2020)	Article	Quotation	21st century skills	None
Walker et al.	(2011)	Article	Local literature review	Non-technical skills	Medical
Ward, Baruah & Gbadebo	(2017)	Conference paper	Job advertisements analysis	Generic skills	None
Webb & Chaffer	(2016)	Article	Local literature review	Generic skills	Accounting
Weber et al.	(2013)	Article	Literature review	Soft skills	Leisure & Tourism
Williams	(2015)	Graduate thesis	Systematic literature review	Soft skills	None
Wong	(2009)	Graduate thesis	Quotation	Generic skills	STEM

Authors	Year of pub.	Type of document	Origin of taxonomy	Umbrella term used	Professional area
Wright et al.	(2013)	Article	Unidentified	Non-technical skills	Medical
Yankey & Biswas	(2012)	Article	Quotation	Life skills	Education & Sport
Yassin et al.	(2008)	Conference paper	Quotation	Generic skills	None
Youngson	(2011)	Article	Quotation	Non-technical skills	Medical
Yusof et al.	(2012)	Conference paper	Local literature review	Employability skills	STEM
Yusoff et al.	(2010)	Article	Quotation	Employability skills	STEM
Zaharim et al.	(2010b)	Conference paper	Local literature review	Employability skills	STEM
Zaharim et al.	(2010a)	Conference paper	Quotation	Employability skills	None
Zainal, Hassan & Alias	(2012)	Conference paper	Unidentified	Generic skills	None

Authors	Year of pub.	Type of document	Origin of taxonomy	Umbrella term used	Professional area
Zakaria, Yatim & Ismail	(2014)	Conference paper	Local literature review	Employability skills	None
Zubaidah et al.	(2006)	Document	Unidentified	Non-technical skills	STEM
Zuo et al.	(2018)	Article	Local literature review	Soft skills	Construction industry

1620 **Appendix 2: Skills Taxonomy Resulting from the Literature Review**

1621 • Abstract thinking: Ability to translate concrete information into more abstract but meaningful

1622 ideas

1623 • Academic ability: Ability to study in an academic context

1624 • Achievement oriented: Focused on what is to do to attain a set goal

1625 • Adaptability: Ability to manage and appreciate change

1626 • Application of knowledge: Put into practice theoretical knowledge

1627 • Appreciation of others: Ability to appreciate and recognize colleagues' abilities, work, etc.

1628 • Assertiveness: Appropriate use of firmness/authority/aggressiveness in expression to end

1629 uncertainty

1630 • Attentional focus management: Ability to maintain attention without being distracted

1631 • Autonomy: Ability to complete tasks in a self-directed manner with low/no supervision

1632 • Business awareness: Ability to manage business/commercial aspects of an activity

1633 • Career and curriculum management: Set of motivations, knowledges and techniques relevant

1634 to keep current job or acquire a new one

1635 • Coaching/mentoring: Ability to coach, counsel and teach others

1636   • Cognitive ability: Label for skills related to cognitive process

1637   • Commitment: Motivation and ability to make efforts at work

1638   • Communication: Ability to obtain and share relevant information

1639   • Compliance: Ability and motivation to follow plans, orders, procedures

1640   • Conative skills: Label linked with moving to action

1641   • Conflict management: Ability to detect and manage conflict

1642   • Creativity: Ability to create new ideas/products/solutions

1643   • Critical thinking: Ability to step back with presented information, by questioning, evaluating

1644   and verifying

1645   • Cultural adaptability: Knowledge, appreciation, sensitivity and adaptation to other cultural

1646   frames

1647   • Curiosity: Motivation to learn and understand new elements

1648   • Customer orientation: Ability and motivation to pay attention to the needs and wishes of

1649   existing and potential customers

1650   • Customer relations: Ability to relate positively with customers

1651   • Daily life skills: Skills involved in everyday life (e.g. driving a car, apply a stamp, etc.)

1652   • Data literacy: Ability to analyze, interpret and visualize data

1653   • Deadline meeting: Ability to complete tasks on time

1654   • Decision making: Ability to make appropriate decisions in light of available information

1655   • Delegation: Ability to delegate tasks to colleagues

1656   • Detail awareness: Ability to pay attention to details

1657   • Dexterity: Ability for motor operations (moving hands, arms, etc.)

1658   • Disruptive thinking: Ability to conceptualize situation and devise ideas out the ordinary

1659   framework

1660   • Divergent thinking: Ability to generate a set of alternative options/ideas

1661 • Diversity tolerance: Appreciation and ability to respect for ethnic, cultural, gender, religious

1662   diversity

1663 • Efficiency: Ability, motivation and behaviors linked to achieving goals

1664 • Emotional awareness: Being aware on intern processes (emotions, thoughts) and their

1665   influence on behavior

1666 • Emotional expression: Ability to express one's emotions

1667 • Emotional regulation: Ability to regulate one's emotions (e.g. aggressivity)

1668 • Emotional skills: Label for skills linked with emotions

1669 • Empathy: Ability to infer mental states, moods, needs and feelings of others

1670 • Entrepreneurship: Ability to design and kick off a business

1671 • Ethics: Awareness, knowledge, motivation and behavior in conformity with ethic guidelines

1672   and values

1673 • Etiquette: Knowledge, motivation and ability to comply with good manners

1674 • Evaluative/selective judgment: Ability to evaluate and select appropriate option in a set of

1675   possibilities

1676 • Expertise in field: Good knowledge of one's field of activity

1677 • General knowledge: Label for knowledge

1678 • Generic skills label: Label for generic/basic/etc. skills in general

1679 • Giving feedback: Ability to give helpful and non-threatening feedback to others

1680 • Global awareness: Ability to have a global understanding of the political, social, cultural,

1681   environmental, legal and other global issues at stake

1682 • Goal setting: Ability to set appropriate and realistic goals

1683 • Health awareness: Awareness of mental and physical health issues & practices

1684 • Help solicitation: Ability to ask for help appropriately when needed

1685 • High standards: Concern for order, excellence, quality, precision

1686   •   Human management: Ability to build, organize and maintain a team in order to achieve

1687   productivity

1688   •   Humor: Ability to appropriately use humor

1689   •   Influence: Ability to influence, convince, persuade, in order to impact the behavior or beliefs

1690   of others

1691   •   Inquiry: Ability to obtain or refine relevant information by asking appropriate questions

1692   •   Inspiring and mobilizing: Ability to motive, inspire, uplift people toward a common goal

1693   •   Interpersonal skills: Label for skills linked with interpersonal relationships

1694   •   Intrapersonal skills: Label for skills linked with the management of internal processes

1695   •   Intuitive thinking: Ability to recognize and understand a situation, based on previous

1696   experience, empirical criteria or common sense

1697   •   Language: Knowledge and competency in specific language(s)

1698   •   Leadership: Ability to lead a team toward aims

1699   •   Lifelong-learning: Motivation & ability to continuously acquire new knowledge on one's own

1700   •   Listening: Ability to actively listen to others in an available manner

1701   •   Logical thinking: Ability to use logical thinking in order to reason, deduce and argument

1702   •   Mental flexibility: Ability to perform several tasks in parallel

1703   •   Monitoring: Ability to evaluate and reduce the gap between a practice and a standard

1704   •   Multidisciplinarity: Ability to work with people and knowledge from multiple disciplinary

1705   backgrounds

1706   •   Negotiation: Ability to find solutions reconciliating different demands, opinions or values

1707   •   Networking/relating: Short and long-term ability to relate pleasantly to other people

1708   •   Non-verbal communication: Awareness, knowledge and ability to detect, understand and use

1709   non-verbal communication (gesture, eye contact, facial expression)

1710   •   Numeracy: Ability to use numbers and statistics

1711   •   Objectivity: Ability to rely on facts, evidence, concrete observations

1712   • Openness: Motivation and ability to be receptive and embrace new ideas, approaches,

1713   experience, etc.

1714   • Oral communication: Ability to efficiently share information in a verbal way

1715   • Organizational awareness: Ability to understand and use organizational structures, roles,

1716   culture and hierarchy

1717   • Perseverance: Ability to keep going despite obstacles

1718   • Planning and organizing: Ability to schedule tasks and project in time

1719   • Positivity: Ability to have a positive attitude, optimism and to maintain a such state of mind

1720   • Prediction & anticipation: Ability to identify future issues (problems, needs, opportunities,

1721   etc.)

1722   • Presentation skills: Ability to deliver a presentation of ideas/projects/etc. to a public

1723   • Prioritization: Ability to assign priorities to tasks and sort them by priority

1724   • Proactivity: Ability to initiate unprompted actions

1725   • Problem analysis: Ability to recognize, diagnose and characterize problems

1726   • Problem solving: Ability to understand, process encountered problems in order to design a

1727   solution

1728   • Professionalism: Ability to behave and think in an appropriate way for business and work

1729   • Project management: Ability to lead and manage projects

1730   • Quick learning: Ability and motivation to learn in a short time, by extracting relevant

1731   information from the environment

1732   • Reading: Ability to read and understand technical and non-technical documents

1733   • Reflexivity/Metacognition: Ability to reflect on oneself, entailing self-knowledge (strengths,

1734   weaknesses, etc.)

1735   • Resilience: Ability to face and overcome adversity, obstacles and loss

1736   • Resources management: Ability to allocate optimal amount of critical resources (time, money,

1737   materials, space…) in order to achieve a goal

1738   •   Respect: Ability to respect others, showing tact

1739   •   Responsibility: Reliability, accountability for own actions

1740   •   Reviewing: Ability to re-assess goals, decisions and situations stepping back

1741   •   Risk analysis/identification: Ability to identify and quantify risks

1742   •   Risk taking: Ability/tendency/motivation to take appropriate risk

1743   •   Self-efficacy: Confidence in one's ability to deal with daily challenges

1744   •   Self-esteem: Positive views of oneself

1745   •   Self-management: Ability to orient, motivate, monitor and improve one's performance

1746   •   Situational awareness: Ability to perceive and gather relevant information from the context

1747   and the environment

1748   •   Skills: Label related to skills

1749   •   Specific (technical) skills: Various skills related to technical or specific fields

1750   •   Spiritual awareness: Knowledge of spiritual field

1751   •   Strategic thinking: Ability to understand situations and make decisions, by focusing on relevant

1752   factors and keeping context in mind

1753   •   Stress management: Ability to keep calm and efficient under pressure and stress

1754   •   Support: Ability to provide help, support, assistance to others

1755   •   Synthesize: Ability to combine and synthesize information

1756   •   Team coordination: Ability to co-ordinate activities of team members

1757   •   Team work: Ability to work effectively as part of a team

1758   •   Technology use: Knowledge and ability to use digital devices

1759   •   Tolerance to ambiguity: Ability to deal with contradictory, uncertain or changing information

1760   •   Tolerance to complexity: Ability to deal with complex problems by understanding them as a

1761   system

1762   •   Tolerance to negative feedbacks: Ability to accept criticism in a constructive way

1763   • Work-life balance: Ability to keep a good balance between work and home life in order to

1764   ensure well-being

1765   • Workload management: Ability to determine appropriate amount of work

1766   • Written communication: Ability to exchange information through formal and informal written

1767   documents

1768   • Others: Unsorted and/or ambiguous labels

1769   **Appendix 3: Occurrences of Each Label in the Soft Skills Literature**

SKILLS	NUMBER OF OCCURRENCES AS A SOFT SKILL
TEAM WORK	82
COMMUNICATION	65
PLANNING & ORGANISING	52
RESPONSIBILITY	46
LEADERSHIP	44
CREATIVITY	41
COMMITMENT	41
INTERPERSONAL SKILLS	39
ADAPTABILITY	38
ETHICS	36
PROBLEM SOLVING	35
LIFELONG LEARNING	34
NETWORKING RELATING	34
SPECIFIC TECHNICAL SKILLS	29
HUMAN MANAGEMENT	29
PROACTIVITY	27
PROFESSIONALISM	27
CONFLICT MANAGEMENT	27
INFLUENCE	27
LOGICAL THINKING	26
DECISION MAKING	24
COACHING MENTORING	24
STRESS MANAGEMENT	23
NEGOTIATION	22
INSPIRING AND MOBILIZING	22
POSITIVITY	22
LISTENING	21
ETIQUETTE	21
CRITICAL THINKING	20
WRITTEN COMMUNICATION	20
TECHNOLOGY USE	18
CULTURAL ADAPTABILITY	18

ACHIEVEMENT ORIENTED	18
EFFICIENCY	18
SELF EFFICACY/SELF CONFIDENCE	17
SELF MANAGEMENT	16
ORAL COMMUNICATION	16
PRESENTATION SKILLS	16
RESOURCES MANAGEMENT	15
EMPATHY	15
PROJECT MANAGEMENT	15
PERSEVERANCE	15
GLOBAL AWARENESS	14
CUSTOMER ORIENTED	14
ASSERTIVENESS	13
COMPLIANCE	13
AUTONOMY	12
ENTREPRENEURSHIP	12
EMOTIONAL REGULATION	12
RESPECT	12
INQUIRY	11
ABSTRACT THINKING	11
SUPPORT	11
DIVERSITY TOLERANCE	11
OTHERS	11
GOAL SETTING	11
COGNITIVE ABILITY	10
HIGH STANDARDS	10
REFLEXIVITY METACOGNITION	9
CAREER AND CURRICULUM MANAGEMENT	8
SELF ESTEEM	8
GIVING FEEDBACK	8
APPRECIATION OF OTHERS	8
TOLERANCE TO NEGATIVE FEEDBACKS	8
STRATEGIC THINKING	8
DETAIL AWARENESS	8
PREDICTION AND ANTICIPATION	7
OPENNESS	7
DELEGATION	7
DEADLINE MEETING	7
RESILIENCE	7
EVALUATIVE/SELECTIVE JUDGMENT	6
MONITORING	6
TEAM COORDINATION	6
INTRAPERSONAL SKILLS	6
MULTIDISCIPLINARITY	6
TOLERANCE TO COMPLEXITY	6
CURIOSITY	6

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RISK TAKING	6
QUICK LEARNING	6
REVIEWING	5
INTUITIVE THINKING	5
EMOTIONAL SKILLS	5
APPLICATION OF KNOWLEDGE	4
SITUATIONAL AWARENESS	4
NUMERACY	4
LANGUAGE LITERACY	4
PROBLEM ANALYSIS	4
ORGANIZATIONAL AWARENESS	4
SYNTHESIS	4
CUSTOMER RELATIONS	4
NONVERBAL COMMUNICATION	4
BUSINESS AWARENESS	3
DIVERGENT THINKING	3
DAILY LIFE SKILLS	3
RISK ANALYSIS & IDENTIFICATION	3
GENERIC SKILLS LABEL	3
MENTAL FLEXIBILITY	3
ACADEMIC ABILITY	2
TOLERANCE TO AMBIGUITY	2
SKILLS	2
HELP SOLLICITATION	2
ATTENTIONAL FOCUS MANAGEMENT	2
DISRUPTIVE THINKING	2
EMOTIONAL EXPRESSION	2
DATA LITERACY	1
PRIORITISATION	1
READING	1
WORK LIFE BALANCE	1
EMOTIONAL AWARENESS	1
OBJECTIVITY	1
SPIRITUAL AWARENESS	1
HUMOR	1
HEALTH AWARENESS	0
CONATIVE SKILLS	0
EXPERTISE IN FIELD	0
WORK LOAD MANAGEMENT	0
GENERAL KNOWLEDGE	0
DEXTERITY & PHYSICO MOTOR SKILLS	0

1770 **Appendix 4: Occurrences of Each Label in the Analyzed Literature**

SKILL	TOTAL NUMBER OF OCCURRENCES
COMMUNICATION	340
TEAM WORK	327
	112

SPECIFIC TECHNICAL SKILLS		281
PLANNING & ORGANISING		222
LIFELONG LEARNING		217
LEADERSHIP		197
PROBLEM SOLVING		195
TECHNOLOGY USE		186
CREATIVITY		181
ETHICS		169
CAREER AND CURRICULUM MANAGEMENT		167
RESPONSIBILITY		151
ADAPTABILITY		151
CRITICAL THINKING		148
DECISION MAKING		141
INTERPERSONAL SKILLS		131
LOGICAL THINKING		129
NETWORKING RELATING		108
PROACTIVITY		105
GLOBAL AWARENESS		102
COMMITMENT		98
WRITTEN COMMUNICATION		91
PROFESSIONALISM		86
STRESS MANAGEMENT		85
SELF MANAGEMENT		82
CONFLICT MANAGEMENT		81
CULTURAL ADAPTABILITY		80
LISTENING		75
REFLEXIVITY/METACOGNITION		73
RESOURCES MANAGEMENT		72
NEGOTIATION		71
ORAL COMMUNICATION		69
AUTONOMY		69
HUMAN MANAGEMENT		68
INQUIRY		68
ASSERTIVENESS		63
APPLICATION OF KNOWLEDGE		61
INFLUENCE		59
INSPIRING AND MOBILIZING		58
COACHING MENTORING		58
SELF EFFICACY/SELF CONFIDENCE		54
POSITIVITY		54
PRESENTATION SKILLS		52
EMPATHY		52
PROJECT MANAGEMENT		51
ENTREPRENEURSHIP		51
SITUATIONAL AWARENESS		50
EMOTIONAL REGULATION		50

ETIQUETTE		50
NUMERACY		50
RESPECT		48
ACHIEVEMENT ORIENTED		47
BUSINESS AWARENESS		47
ABSTRACT THINKING		47
EVALUATIVE/SELECTIVE JUDGMENT		46
COGNITIVE ABILITY		46
EFFICIENCY		46
LANGUAGE LITERACY		44
DIVERGENT THINKING		43
PREDICTION AND ANTICIPATION		41
CUSTOMER ORIENTED		41
PERSEVERANCE		41
COMPLIANCE		41
SUPPORT		41
DIVERSITY TOLERANCE		40
MONITORING		40
REVIEWING		39
TEAM COORDINATION		37
OTHERS		37
GOAL SETTING		36
SELF ESTEEM		35
INTRAPERSONAL SKILLS		34
PROBLEM ANALYSIS		34
MULTIDISCIPLINARITY		32
OPENNESS		32
ACADEMIC ABILITY		31
TOLERANCE TO COMPLEXITY		30
DATA LITERACY		29
DAILY LIFE SKILLS		28
GIVING FEEDBACK		28
HIGH STANDARDS		28
PRIORITISATION		28
RISK ANALYSIS & IDENTIFICATION		26
ORGANIZATIONAL AWARENESS		26
APPRECIATION OF OTHERS		25
HEALTH AWARENESS		25
DELEGATION		24
CURIOSITY		24
TOLERANCE TO NEGATIVE FEEDBACKS		23
DEADLINE MEETING		21
CONATIVE SKILLS		20
RISK TAKING		20
SYNTHESIS		20
STRATEGIC THINKING		19

GENERIC SKILLS LABEL	18
RESILIENCE	18
INTUITIVE THINKING	15
DETAIL AWARENESS	14
READING	14
TOLERANCE TO AMBIGUITY	13
WORK LIFE BALANCE	13
EMOTIONAL SKILLS	12
CUSTOMER RELATIONS	11
MENTAL FLEXIBILITY	11
SKILLS	11
EMOTIONAL AWARENESS	10
EXPERTISE IN FIELD	10
HELP SOLLICITATION	10
NONVERBAL COMMUNICATION	9
OBJECTIVITY	9
ATTENTIONAL FOCUS MANAGEMENT	8
WORK LOAD MANAGEMENT	8
GENERAL KNOWLEDGE	8
QUICK LEARNING	8
DISRUPTIVE THINKING	7
EMOTIONAL EXPRESSION	6
SPIRITUAL AWARENESS	6
HUMOR	6
DEXTERITY & PHYSICO MOTOR SKILLS	2

1771 **Appendix 5: Specificity Index for the "Soft Skills" Umbrella Term**

SKILL	SPECIFICITY
EMOTIONAL EXPRESSION	1
NON-VERBAL COMMUNICATION	.72
EMOTIONAL AWARENESS	.49
SPIRITUAL AWARENESS	.49
ETIQUETTE	.47
QUICK LEARNING	.37
DETAIL AWARENESS	.37
EMOTIONAL SKILLS	.36
POSITIVITY	.34
HUMAN MANAGEMENT	.29
CONFLICT MANAGEMENT	.27
RESILIENCE	.27
STRATEGIC THINKING	.27
INFLUENCE	.26
SELF-ESTEEM	.25
NETWORKING/RELATING	.25
EMOTIONAL REGULATION	.25
COACHING/MENTORING	.25
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RESPECT		.25
COMPLIANCE		.24
GOAL SETTING		.24
PROFESSIONALISM		.24
GIVING FEEDBACK		.24
EFFICIENCY		.24
COMMITMENT		.23
ACHIEVEMENT ORIENTED		.23
RESPONSIBILITY		.23
DEADLINE MEETING		.22
PERSEVERANCE		.22
CUSTOMER ORIENTATION		.22
TOLERANCE TO NEGATIVE FEEDBACKS		.22
SELF-EFFICACY/SELF-CONFIDENCE		.21
CUSTOMER RELATIONS		.21
APPRECIATION OF OTHERS		.21
INSPIRING AND MOBILIZING		.21
STRESS MANAGEMENT		.20
LISTENING		.20
NEGOTIATION		.20
OTHERS		.20
INTERPERSONAL SKILLS		.19
EMPATHY		.19
HELP SOLLICITATION		.19
SUPPORT		.19
HIGH STANDARDS		.18
DIVERSITY TOLERANCE		.18
PRESENTATION SKILLS		.17
PROJECT MANAGEMENT		.17
INTUITIVE THINKING		.17
DAILY LIFE SKILLS		.17
DELEGATION		.17
COGNITIVE ABILITY		.16
ORAL COMMUNICATION		.16
ETHICS		.15
RISK TAKING		.15
TEAM WORK		.15
ADAPTABILITY		.15
SKILLS		.15
MENTAL FLEXIBILITY		.15
PROACTIVITY		.15
PLANNING & ORGANISING		.14
ASSERTIVENESS		.14
RESOURCES MANAGEMENT		.14
WRITTEN COMMUNICATION		.14
MULTIDISCIPLINARITY		.14

ENTREPRENEURSHIP	.14
LEADERSHIP	.14
ABSTRACT THINKING	.13
GENERIC SKILLS LABEL	.13
CREATIVITY	.13
DECISION MAKING	.13
OPENNESS	.13
COMMUNICATION	.12
CURIOSITY	.12
DISRUPTIVE THINKING	.12
LOGICAL THINKING	.12
CULTURAL ADAPTABILITY	.12
SELF MANAGEMENT	.12
PROBLEM SOLVING	.12
ATTENTIONAL FOCUS MANAGEMENT	.12
TOLERANCE TO AMBIGUITY	.11
INQUIRY	.11
HUMOR	.11
INTRAPERSONAL SKILLS	.11
PREDICTION AND ANTICIPATION	.11
MONITORING	.10
TEAM COORDINATION	.10
AUTONOMY	.10
ORGANIZATIONAL AWARENESS	.10
LIFELONG LEARNING	.09
TOLERANCE TO COMPLEXITY	.09
SYNTHESIS	.09
REVIEWING	.09
CRITICAL THINKING	.08
EVALUATIVE SELECTIVE JUDGMENT	.08
GLOBAL AWARENESS	.08
RISK ANALYSIS & IDENTIFICATION	.08
WORK LIFE BALANCE	.08
CAREER AND CURRICULUM MANAGEMENT	.08
REFLEXIVITY/METACOGNITION	.07
ACADEMIC ABILITY	.07
PROBLEM ANALYSIS	.07
OBJECTIVITY	.06
SPECIFIC TECHNICAL SKILLS	.06
TECHNOLOGY USE	.06
READING	.05
SITUATIONAL AWARENESS	.05
LANGUAGE LITERACY	.05
BUSINESS AWARENESS	.05
NUMERACY	.04
DIVERGENT THINKING	.04

APPLICATION OF KNOWLEDGE	.04
PRIORITISATION	.02
DATA LITERACY	.02
HEALTH AWARENESS	0
DEXTERITY & PHYSICO MOTOR SKILLS	0
CONATIVE SKILLS	0
WORK LOAD MANAGEMENT	0
EXPERTISE IN FIELD	0
GENERAL KNOWLEDGE	0

1772   **Appendix 6: Sorting of the Soft Skills Taxonomy Obtained by the Review**

ELEMENT	IS IT A SKILL?	IS IT SOFT?	COMPONENTS/RELATED SKILLS	JUSTIFICATION
ABSTRACT THINKING	YES	Soft		
ACADEMIC ABILITY	YES	Hard		
ACHIEVEMENT-ORIENTED	MIXED	Soft	Attentional focus, strategic thinking	
ADAPTABILITY	YES	Soft		
APPLICATION OF KNOWLEDGE	MIXED	Mixed	Reflexivity, abstract thinking, openness, etc.	The motivation to apply knowledge does not seem to be a skill, but the application of theoretical knowledge may involve the detection of relevant cues in the environment, the analysis of the situation, and other soft skills (Perkins & Salomon, 1992)
APPRECIATION OF OTHERS	YES	Soft	Interpersonal skills, communication, leadership, positivity	
ASSERTIVENESS	YES	Soft	Communication, interpersonal skills, negotiation	
ATTENTIONAL FOCUS MANAGEMENT	YES	Soft		
AUTONOMY	YES	Soft	Self-management	
BUSINESS AWARENESS	Yes	Mixed		(Haines et al., 2012)
CAREER AND CURRICULUM MANAGEMENT	MIXED	Hard	Self-management, planning and organizing, prediction and anticipation	
COACHING/MENTORING	YES	Soft	Leadership, management	
COGNITIVE ABILITY	NO	-		

COMMITMENT	NO	-		Commitment is a motivational construct (Naderi Anari, 2012)
COMMUNICATION	YES	Soft		
COMPLIANCE	MIXED	Soft		The commitment to stick with standards is not a skill, but the ability to follow procedure is.
CONATIVE SKILLS	NO	-		It is a non-informative label
CONFLICT MANAGEMENT	YES	Soft		
CREATIVITY	YES	Soft		
CRITICAL THINKING	YES	Soft		
CULTURAL ADAPTABILITY	YES	Soft	Flexibility, diversity tolerance, openness	
CURIOSITY	NO	-	Inquiry	Curiosity is a motivational construct and/or a trait (Loewenstein, 1994)
CUSTOMER ORIENTATION	MIXED	Soft		
CUSTOMER RELATIONS	YES	Mixed	Interpersonal skills	
DAILY LIFE SKILLS	YES	Hard		It is hard as this category gathers concrete, specific skills, such as driving a car (see definition).
DATA LITERACY	YES	Hard		
DEADLINE MEETING	YES	Soft	Depend on planning and organizing, self-management	
DECISION MAKING	YES	Soft		
DELEGATION	YES	Soft	Interpersonal skills, support, coaching/mentoring, project management, leadership	
DETAIL AWARENESS	YES	Soft	Attentional focus management	
DEXTERITY	YES	Hard		Motor skills are strongly related with specialized technical skills, like surgery or sport (Rogers, 2006), which is corroborated by the fact that this label is never cited as a soft or non-technical skill in the literature.
DISRUPTIVE THINKING	YES	Soft		
DIVERGENT THINKING	YES	Soft		

DIVERSITY TOLERANCE	MIXED	Soft		
EFFICIENCY	NO	-		
EMOTIONAL AWARENESS	YES	Soft		
EMOTIONAL EXPRESSION	YES	Soft		
EMOTIONAL REGULATION	YES	Soft		
EMOTIONAL SKILLS	NO	-		Non informative label
EMPATHY	YES	Soft	Interpersonal skills	
ENTREPRENEURSHIP	YES	Hard		
ETHICS	MIXED	Mixed	Critical thinking, reflexivity, emotional awareness, abstract thinking, empathy, adaptability, cultural adaptability, inquiry, assertiveness	(Churchill, 2020; Weiss Roberts et al., 2002)
ETIQUETTE	MIXED	Mixed	Cultural adaptability; adaptability to change; interpersonal skills; networking/relating	
EVALUATIVE/SELECTIVE JUDGMENT	YES	Soft		
EXPERTISE IN FIELD	NO	-		
GENERAL KNOWLEDGE	NO	-		
GENERIC SKILLS LABEL	NO	-		It is a non-informative label
GIVING FEEDBACK	YES	Soft	Appreciation of others, empathy, communication, assertiveness	
GLOBAL AWARENESS	YES	Mixed	Strategic thinking, cultural adaptation, tolerance to complexity, to ambiguity	Global awareness involves technical knowledge and skills, but also requires an ability to link local elements to a global context, which is linked to soft skills, like strategic thinking (Burnouf, 2004; Gibson et al., 2008)
GOAL SETTING	YES	Soft	Management, project management, strategic thinking	
HEALTH AWARENESS	YES	Mixed		
HELP SOLLICITATION	YES	Soft	Interpersonal skills, assertiveness, reflexivity	
HIGH STANDARDS	YES	Mixed		
HUMAN MANAGEMENT	YES	Soft		
HUMOR	YES	Soft	Positivity, stress management	

INFLUENCE	YES	Soft	Communication	
INQUIRY	YES	Soft		
INSPIRING AND MOBILIZING	YES	Soft	Management, leadership	
INTERPERSONAL SKILLS	NO	-		It is a non-informative label
INTRAPERSONAL SKILLS	NO	-		It is a non-informative label
INTUITIVE THINKING	YES	Soft		
LANGUAGE	YES	Hard		
LEADERSHIP	YES	Soft		
LIFELONG-LEARNING	MIXED	Soft	Curiosity, communication, goal setting, team work, networking/relating, literacy, numeracy, inquiry, planning & organizing, adaptability, positivity, self-confidence, self-awareness	(Adams, 2007)
LISTENING	YES	Soft	Communication, interpersonal skills	
LOGICAL THINKING	YES	Soft		
MENTAL FLEXIBILITY	YES	Soft		
MONITORING	YES	Soft		
MULTIDISCIPLINARITY	YES	Soft	Teamwork, diversity tolerance, openness	
NEGOTIATION	YES	Soft		
NETWORKING/RELATING	YES	Soft	Interpersonal skills	
NON-VERBAL COMMUNICATION	YES	Soft		
NUMERACY	YES	Hard		
OBJECTIVITY	YES	Soft	Logical thinking	
OPENNESS	MIXED	Soft		
ORAL COMMUNICATION	YES	Soft		
ORGANIZATIONAL AWARENESS	YES	Mixed		
PERSEVERANCE	YES	Soft		
PLANNING AND ORGANISING	YES	Soft		
POSITIVITY	YES	Soft		
PREDICTION & ANTICIPATION	YES	Soft		
PRESENTATION SKILLS	YES	Mixed		
PRIORITISATION	YES	Soft		
PROACTIVITY	YES	Soft		
PROBLEM ANALYSIS	YES	Soft	Problem solving, logical thinking	
PROBLEM SOLVING	YES	Soft		

PROFESSIONALISM	MIXED	Soft	Ethics, reflexivity, lifelong learning, tolerance to ambiguity	(Swick, 2000; van Mook et al., 2009)
PROJECT MANAGEMENT	YES	Mixed		
QUICK LEARNING	MIXED	Soft	Cognitive ability, intuitive thinking, curiosity	
READING	YES	Hard		
REFLEXIVITY/METACOGNITION	YES	Soft		
RESILIENCE	YES	Soft		
RESOURCES MANAGEMENT	YES	Soft		
RESPECT	YES	Soft	Interpersonal skill, inhibition, empathy	
RESPONSIBILITY	MIXED	Soft	Self-regulation, interpersonal skills	Responsibility is defined both as the ability to regulate one's behaviors, feelings and thoughts, as well as the motivation to stick with social norms (Mergler et al., 2007). The first component is thus a skill, but not the second one.
REVIEWING	YES	Soft		
RISK ANALYSIS/IDENTIFICATION	YES	Soft		
RISK TAKING	MIXED	Soft		
SELF-EFFICACY	NO	-		
SELF-ESTEEM	NO	-		
SELF-MANAGEMENT	YES	Soft		
SITUATIONAL AWARENESS	YES	Soft		(Stanton et al., 2001)
SKILLS	NO	-		It is a non-informative label
SPECIFIC (TECHNICAL) SKILLS	YES	Hard		
SPIRITUAL AWARENESS	NO	-		
STRATEGIC THINKING	YES	Soft		
STRESS MANAGEMENT	YES	Soft	Emotional skills	
SUPPORT	YES	Soft	Empathy	
SYNTHESIZE	YES	Soft		
TEAM COORDINATION	YES	Soft		
TEAMWORK	YES	Soft		
TECHNOLOGY USE	YES	Hard		
TOLERANCE TO AMBIGUITY	YES	Soft		
TOLERANCE TO COMPLEXITY	YES	Soft	Strategic thinking, logical thinking	
TOLERANCE TO NEGATIVE FEEDBACKS	YES	Soft		

WORK-LIFE BALANCE	MIXED	Soft		This element is both defined as a behavior and an ability (Kalliath & Brough, 2008)
WORKLOAD MANAGEMENT	YES	Soft	Resources management	
WRITTEN COMMUNICATION	YES	Mixed		Contains both hard technical skills (formatting specific documents) and soft skills (synthesis ability, etc.)
OTHERS	NO	-		

1773 **Appendix 7: Final Soft Skills Taxonomy Based on the Review**

LABEL	DEFINITION
ABSTRACT THINKING	Ability to translate concrete information into more abstract but meaningful ideas
ACHIEVEMENT-ORIENTED	*Ability to* be focused on what is to do to attain a set goal
ADAPTABILITY	Ability to manage and appreciate change
APPLICATION OF KNOWLEDGE	*Ability to* put into practice theoretical knowledge
APPRECIATION OF OTHERS	Ability to appreciate and recognize colleagues' abilities, work, etc.
ASSERTIVENESS	Appropriate use of firmness or authority in expression to end uncertainty
ATTENTIONAL FOCUS MANAGEMENT	Ability to maintain attention without being distracted
AUTONOMY	Ability to complete tasks in a self-directed manner with low/no supervision
BUSINESS AWARENESS	Non-technical ability to manage business/commercial aspects of an activity
COACHING/MENTORING	Ability to coach, counsel and teach others
COMMUNICATION	Ability to obtain and share relevant information
COMPLIANCE	*Ability to* follow plans, orders, procedures
CONFLICT MANAGEMENT	Ability to detect and manage conflict
CREATIVITY	Ability to create new ideas/products/solutions
CRITICAL THINKING	Ability to step back with presented information, by questioning, evaluating and verifying
CULTURAL ADAPTABILITY	Ability to appreciate, be sensitive and adapt to other cultural frames
CUSTOMER ORIENTATION	*Ability to* pay attention to the needs and wishes of existing and potential customers
CUSTOMER RELATIONS	Non-technical ability to create and maintain constructive relationships with customers
DEADLINE MEETING	Ability to complete tasks on time
DECISION MAKING	Ability to make appropriate decisions in light of available information
DELEGATION	Ability to delegate tasks to colleagues
DETAIL AWARENESS	Ability to pay attention to details
DISRUPTIVE THINKING	Ability to conceptualize situation and devise ideas out the ordinary framework
DIVERGENT THINKING	Ability to generate a set of alternative options/ideas
DIVERSITY TOLERANCE	*Ability to* show respect for ethnic, cultural, gender, religious diversity
EMOTIONAL AWARENESS	Ability to be aware of intern processes (emotions, thoughts) and their influence on behavior
EMOTIONAL EXPRESSION	Ability to express one's emotions

EMOTIONAL REGULATION	Ability to regulate one's emotions (e.g. aggressivity)
EMPATHY	Ability to infer mental states, moods, needs and feelings of others
ETHICS	*Ability to act and perform* in conformity with ethic guidelines and values
ETIQUETTE	*Ability to* identify and comply with good manners
EVALUATIVE/SELECTIVE JUDGMENT	Ability to evaluate and select appropriate option in a set of possibilities
GIVING FEEDBACK	Ability to give helpful and non-hurtful feedback to others
GLOBAL AWARENESS	*Ability to* have a global understanding of the political, social, cultural, environmental, legal and other *contexts*
GOAL SETTING	Ability to set appropriate and realistic goals
HEALTH AWARENESS	Non-technical ability to understand apply basic preventive physical and mental health measures
HELP SOLLICITATION	Ability to ask for help appropriately when needed
HIGH STANDARDS	Ability to strive for excellence
HUMAN MANAGEMENT	Ability to build, organize and maintain a team in order to achieve productivity
HUMOR	Ability to appropriately use humor
INFLUENCE	Ability to influence, convince, persuade - impact the behavior or beliefs of others
INQUIRY	Ability to obtain or refine relevant information by asking appropriate questions
INSPIRING AND MOBILIZING	Ability to motive, inspire, uplift people toward a common goal
INTUITIVE THINKING	Ability to recognize and understand a situation, based on previous experience, empirical criteria or and common sense
LEADERSHIP	Ability to lead a team toward aims
LIFELONG-LEARNING	*Ability to* continuously acquire new knowledge on one's own
LISTENING	Ability to actively listen to others in an available manner
LOGICAL THINKING	Ability to use logical thinking in order to reason, deduce and argument
MENTAL FLEXIBILITY	Ability to perform several tasks in parallel *and adopt different points on view of the same subject*
MONITORING	Ability to evaluate and reduce the gap between a practice and a standard
MULTIDISCIPLINARITY	Ability to work with people and knowledge from multiple disciplinary backgrounds
NEGOTIATION	Ability to find solutions reconciliating different demands, opinions or values
NETWORKING/RELATING	Short and long-term ability to relate pleasantly to other people
NON-VERBAL COMMUNICATION	Ability to detect, understand and use non-verbal communication (gesture, eye contact, facial expression)
OBJECTIVITY	Ability to rely on facts, evidence, concrete observations
OPENNESS	*Ability to* be receptive to and embrace new ideas, approaches, experience, etc.
ORAL COMMUNICATION	Ability to efficiently share information in a verbal way
ORGANIZATIONAL AWARENESS	Ability to understand and use organizational structures, roles, culture and hierarchy
PERSEVERANCE	Ability to keep going despite obstacles
PLANNING AND ORGANISING	Ability to schedule tasks and project in time
POSITIVITY	Ability to have a positive attitude, optimism and to maintain a such state of mind
PREDICTION & ANTICIPATION	Ability to identify future issues (problems, needs, opportunities etc.)
PRESENTATION SKILLS	Ability to deliver a presentation of ideas/projects/etc. to a public *(excepting technical skills)*
PRIORITISATION	Ability to assign priorities to tasks and sort them by priority

PROACTIVITY	Ability to initiate unprompted actions
PROBLEM ANALYSIS	Ability to recognize, diagnose and characterize problems
PROBLEM SOLVING	Ability to understand, process encountered problems in order to design a solution
PROFESSIONALISM	*Ability to* behave and think in an appropriate way for business and work
PROJECT MANAGEMENT	Ability to lead and manage projects *(excepting technical skills)*
QUICK LEARNING	Ability to learn in a short time, by extracting relevant information from the environment
REFLEXIVITY/METACOGNITION	Ability to reflect on oneself, entailing self-knowledge (strengths, weaknesses, etc.)
RESILIENCE	Ability to face and overcome-adversity, obstacles and loss
RESOURCES MANAGEMENT	Ability to allocate optimal amount of critical resources (time, money, materials, space…) in order to achieve a goal
RESPECT	Ability to respect others, showing tact
RESPONSIBILITY	*Ability to show* reliability, accountability for own actions
REVIEWING	Ability to re-assess goals, decisions and situations stepping back
RISK ANALYSIS/IDENTIFICATION	Ability to identify and quantify risks
RISK TAKING	*Ability to* take appropriate risk
SELF-MANAGEMENT	Ability to orient, motivate, monitor and improve one's performance
SITUATIONAL AWARENESS	Ability to perceive and gather relevant? information from the context and the environment
STRATEGIC THINKING	Ability to understand situations and make decisions, by focusing on relevant factors and keeping context in mind
STRESS MANAGEMENT	Ability to keep calm and efficient under pressure and stress
SUPPORT	Ability to provide help, support, assistance to others
SYNTHESIZE	Ability to combine and synthesize information
TEAM COORDINATION	Ability to co-ordinate activities of team members
TEAMWORK	Ability to work effectively as part of a team
TOLERANCE TO AMBIGUITY	Ability to deal with contradictory, uncertain or changing information
TOLERANCE TO COMPLEXITY	Ability to deal with complex problems by understanding them as a system
TOLERANCE TO NEGATIVE FEEDBACKS	Ability to accept criticism in a constructive way
WORK-LIFE BALANCE	*Ability to* keep a good balance between work and home life in order to ensure well-being
WORKLOAD MANAGEMENT	Ability to determine appropriate amount of work
WRITTEN COMMUNICATION	*Ability to exchange information clearly and appropriately in writing*

1774   **Appendix 8: Exploratory Factor Analysis on Co-Occurrence Data**

1775   Extraction method: Minimum residuals

1776   Rotation method: Promax

1777   Explained variance: 47.85%

1778   Fit and validity indexes:

1779   • $\chi^2(3828) = 7789$;

1780   •   RMSEA = .084;

1781   •   Overall MSA = .065.

Skill	1	2	3	4	5	6	7	8	9	10	11	12	Uniqu.
Prioritisation	0.880												0.218
Resources Management	0.760												0.385
Delegation	0.732												0.336
Strategic Thinking	0.726												0.417
Achievement Oriented	0.717												0.345
Etiquette	0.659					0.629							0.235
Deadline Meeting	0.653							0.317			0.430		0.316
Project Management	0.638												0.473
Reviewing	0.493												0.626
Self Management	0.464												0.615
Work Load Management	0.434												0.644
Stress Management	0.430												0.654
Human Management	0.371	0.365							0.318				0.471
Coaching/Mentoring	0.312												0.725
Intuitive Thinking													0.989
Leadership		0.920											0.128
Communication		0.907											0.221
Autonomy		0.885											0.199
Multidisciplinarity		0.729											0.384
Positivity		0.620											0.468
Networking/Relating		0.617		0.374									0.291
Support		0.529											0.462
Team Coordination	0.461	0.467											0.336
Risk Analysis/Identification													0.899
Problem Analysis			0.882										0.203
Help Sollicitation			0.832										0.306
Decision Making			0.758	0.304									0.231
Critical Thinking			0.717							0.347			0.160
Proactiveness			0.620										0.383
Conflict Management		0.358	0.588										0.582
Logical Thinking			0.579	0.545									0.377
Application Of Knowledge			0.526	0.429									0.252
Tolerance To Ambiguity			0.427										0.687
Adaptability			0.381										0.529
Reflexivity/Metacognition				0.877							0.356		0.304
Problem Solving				0.795									0.235
Creativity				0.783									0.320
Health Awareness				0.763									0.426

Skill	1	2	3	4	5	6	7	8	9	10	11	12	Uniqu.
Abstract Thinking				0.452	0.385								0.461
Synthesis					0.867								0.269
Objectivity					0.817								0.375
Presentation Skills					0.681	0.449							0.229
Evaluative/Selective Judgment				0.441	0.508						−0.314		0.378
Inquiry					0.501	0.327							0.508
Giving Feedback													0.800
Nonverbal Communication						0.891			0.332				0.174
Written Communication						0.494							0.748
Oral Communication						0.459							0.777
Empathy						0.455							0.611
Listening						0.389							0.740
Cultural Adaptability						0.369							0.641
Negotiation						0.341							0.772
Goal Setting													0.825
Ethics							0.652				0.361		0.494
Compliance	0.495						0.561						0.438
Responsibility							0.538						0.460
Professionalism							0.535						0.692
Respect							0.530						0.536
Global Awareness							0.478						0.707
Diversity Tolerance							0.436						0.768
Perseverance								0.777			0.319		0.486
Resilience								0.504					0.774
Tolerance To Complexity			0.407					0.417					0.617
Attentional Focus Management								0.394					0.830
Planning & Organising								0.392	0.359				0.561
Monitoring								0.343					0.630
Mental Flexibility													0.704
Assertiveness				0.312		0.333			0.679				0.435
Team Work						0.317			0.679				0.469
Inspiring And Mobilizing									0.528				0.674
Influence									0.450				0.704
High Standards									0.443				0.702
Organizational Awareness													0.719
Business Awareness										0.713			0.430
Lifelong Learning										0.709			0.307
Detail Awareness										0.620			0.635
Disruptive Thinking										0.565			0.622
Openness								0.410		0.426			0.502
Divergent Thinking													0.573
Emotional Regulation											0.703		0.565
Tolerance To Neg. Feedback				0.422							0.585		0.600

Skill	1	2	3	4	5	6	7	8	9	10	11	12	Uniqu.
Emotional Awareness								0.340			0.562		0.698
Appreciation Of Others													0.899
Customer Relations						0.334						0.648	0.481
Customer Oriented												0.584	0.638
Prediction & Anticipation												−0.312	0.557
Risk Taking													0.864
Work Life Balance													0.978

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FACTOR NO.	NAME PROPOSITION
1	Managing a team work
2	Interpersonal relationships
3	Dealing with problematic situations
4	Key cognitive abilities
5	Gathering, treating and restituting information
6	Communication
7	Ethical and reliable behavior
8	Monitoring internal resources
9	Moving up collective projects
10	Aware, learning and flexible
11	Emotional capacities
12	Receptivity

1784   **Appendix 9: Parallels Between the Dimensions of Adaptive Performance and the Reviewed**

1785   **Taxonomy of Soft Skills**

Adaptive performance dimension	Adaptive performance definition (Pulakos et al., 2000)	Related skills
Handling emergencies or crisis situations	Reacting with appropriate and proper urgency in life threatening, dangerous, or emergency situations; quickly analyzing options for dealing with danger or crises and their implications; making split-second decisions based on clear and focused thinking; maintaining emotional control and objectivity while keeping focused on the situation at hand; stepping up to take action and handle danger or emergencies as necessary and appropriate.	Stress management, intuitive thinking, divergent thinking, option generation, attentional focus management, emotional regulation, objectivity, situational awareness, decision making.
Handling work stress	Remaining composed and cool when faced with difficult circumstances or a highly demanding workload or schedule; not overreacting to unexpected news or situations; managing frustration well by directing effort to constructive solutions rather than blaming others; demonstrating resilience and the highest levels of professionalism in stressful circumstances; acting	Stress management, emotional regulation, tolerance to frustration, positivity, resilience, professionalism, inspiring & mobilizing, leadership.

as a calming and settling influence to whom others look for guidance.

Solving problems creatively	Employing unique types of analyses and generating new, innovative ideas in complex areas; turning problems upside-down and inside-out to find fresh, new approaches; integrating seemingly unrelated information and developing creative solutions; entertaining wide-ranging possibilities others may miss, thinking outside the given parameters to see if there is a more effective approach; developing innovative methods of obtaining or using resources when insufficient resources are available to do the job.	Creativity, divergent thinking, disruptive thinking, mental flexibility, openness, resources management, inquiry, problem solving.
Dealing with uncertain and unpredictable work situations	Taking effective action when necessary without having to know the total picture or have all the facts at hand; readily and easily changing gears in response to unpredictable or unexpected events and circumstances; effectively adjusting plans, goals, actions, or priorities to deal with changing situations; imposing structure for self and others that provide as much focus as possible in dynamic situations; not needing things to be black and white; refusing to be paralyzed by uncertainty or ambiguity.	Tolerance to ambiguity, reviewing, proactivity, risk-taking, adaptability, situational awareness, mental flexibility.

Learning work tasks, technologies, and procedures	Demonstrating enthusiasm for learning new approaches and technologies for conducting work; doing what is necessary to keep knowledge and skills current; quickly and proficiently learning new methods or how to perform previously unlearned tasks; adjusting to new work processes and procedures; anticipating changes in the work demands and searching for and participating in assignments or training that will prepare self for these changes; taking action to improve work performance deficiencies.	Lifelong-learning, quick learning, monitoring, compliance, predicting & anticipating, proactivity, self-management.
Demonstrating interpersonal adaptability	Being flexible and open-minded when dealing with others; listening to and considering others' viewpoints and opinions and altering own opinion when it is appropriate to do so; being open and accepting of negative or developmental feedback regarding work; working well and developing effective relationships with highly diverse personalities; demonstrating keen insight of others' behavior and tailoring own behavior to persuade, influence, or work more effectively with them.	Adaptability, open-minded, listening, diversity tolerance, tolerance to negative feedback, team work, networking/relating, empathy, influence.
Demonstrating cultural adaptability	Taking action to learn about and understand the climate, orientation, needs, and values of other groups, organizations, or cultures; integrating well into and being comfortable with different values,	Cultural adaptability, diversity tolerance, empathy, ethics, openness, adaptability,

	customs, and cultures; willingly adjusting behavior or appearance as necessary to comply with or show respect for others' values and customs; understanding the implications of one's actions and adjusting approach to maintain positive relationships with other groups, organizations, or cultures.	respect, networking/relating, appreciation of others
Demonstrating physically oriented adaptability	Adjusting to challenging environmental states such as extreme heat, humidity, cold, or dirtiness; frequently pushing self physically to complete strenuous or demanding tasks; adjusting weight and muscular strength or becoming proficient in performing physical tasks as necessary for the job.	-

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