SPOT, the 4IR soft skills strategy for South African interior design graduates: An integrative literature review

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Abstract

The 2020 South African Presidential Commission on the fourth industrial revolution (4IR) presented five development pillars for the South African 4IR strategy, with the People and Skills pillar emphasising the role of the education sector in South Africa's successful global participation in the 4IR. The report identifies a lack of soft skills such as creativity and problem solving in new graduates, adversely affecting their work-preparedness and employability. The World Economic Forum's 15 top skills for 2025 also placed soft skills as the top six future workplace skills. Tertiary educators have the opportunity and responsibility to prepare graduates for this shift to the 4IR-workplace by developing soft skills relevant to their discipline.

Soft skills literature is obscured by differences in terminology and definitions across disciplines and locations. The lack of consistency hampers educators in identifying soft skills relevant to their field and the appropriate pedagogy to teach them. This paper employs an integrative literature review to synthesise soft skill categories relevant to the current and 4IR-adapted interior design workplace while also identifying sources that include pedagogy to facilitate teaching these skills. Findings include two approaches to soft skills specific to interior design and interior architecture, namely an individual skills approach and a skills category approach.

The study's contribution includes an increased awareness of soft skills in the context of 4IR and interior design, but also design disciplines in general. The identified pedagogy-related sources can support educators in preparing South African interior design graduates for the current and 4IR-adapted workplace. This study proposes a conceptual 4IR-soft skills model that expands on the existing CORE model by Parlamis and Monnot. The strategy encompasses four integral relationships needed for 4IR soft skills development, specifically the individual-to-Self, individual-to-Organisation, individual-to-Person, and individual-to-Technology relationships, called the SPOT model. The study concludes with an application strategy for the model to assist educators in determining context-specific and discipline-specific soft skills that can be developed in the classroom.

Keywords: 4IR skills, design pedagogy, employability skills, interior architecture, interior design, soft skills, twenty-first-century skills

Introduction

In March 2020, the South African Presidential Commission on the fourth industrial revolution (PC4IR) presented five development pillars for South Africa's 4IR strategy: "Technology,

Invention and Innovation; People and Skills; Infrastructure, Resources, and Natural Environment; Economic Growth and Inclusivity; and Stakeholder Relations and Governance" (PC4IR, 2020, pp. 90-91). This report's *People and Skills* pillar emphasised the education sector's role in South Africa's successful global participation in the 4IR, specifically by nurturing technical, digital, and soft skills (PC4IR, 2020, pp 117). Xing, Marwala and Marwala (2018, p. 173) supports this by emphasising access to quality higher education as integral to adapting to a South African 4IR future. Educators have the opportunity to prepare South African interior design graduates for the shift to a 4IR-workplace by developing their technical, digital, and soft skills. This study prioritises the soft skills category in relation to 4IR by proposing a conceptual model and approach to a holistic 4IR education strategy.

Education and 4IR in South Africa

For South Africa to contribute to the global 4IR movement, we need to be mindful of our current educational challenges (Moloi & Mhlanga, 2021; Xing, Marwala & Marwala, 2018) and work towards the South African 4IR strategy by leveraging our current position. A study by Moloi and Mhlanga (2021, pp. 3-4, 17-18) demonstrates that despite increasing government budget allocations and enrollment numbers in basic education, student performance remains poor, and a lack of technical competency training and technical infrastructure is a significant challenge for educators. The lack of technical competency in basic education affects tertiary educators, who need to address the skills deficit. Further education challenges include country-wide access to higher education for all economic classes; quality education with regular intake of new academics; and funding (Xing, Marwala & Marwala, 2018, p. 179). This paper acknowledges the complexities of the existing education system briefly introduced here but agree with Oke and Fernandes (2020, p. 19) that incremental steps towards a holistic 4IR education strategy will help guide the efforts of educators.

A study of the perceptions of the South African education sector on 4IR highlights mixed sentiments of unpreparedness, excitement and fear of redundancy due to limited knowledge of 4IR's place in the classroom and future workplace (Oke & Fernandes, 2020, p. 21). This study points to educator 4IR literacy as a critical development point. The effects of 4IR on the future South African workplace are also integral to a holistic 4IR education strategy but are beyond this study's scope.

The South African 4IR strategy emphasises developing students' technical, digital and soft skills (PC4IR, 2020, p. 117). As technical- and digital access fall primarily under government and institutional policies and budgets, these are out of educators' sphere of influence. Therefore, this paper will investigate the skills development aspect of a 4IR educator's strategy and focus on soft skills. Joynes, Rossignoli and Amonoo-Kuofi (2019, p. 11) support this approach by demonstrating that industry-relevant soft skills development facilitates better student workplace integration. Tertiary education curriculum aims to develop industry-ready graduates with a predetermined set of hard and soft skills that meet industry expectations of competency (Gale, et al., 2017, p. 50). Hard skills are defined as being industry-specific technical skills (Gilyazova, Zamoshchansky & Vaganova, 2021, p. 242), in contrast to soft skills, which combine "cognitive and meta-cognitive skills, interpersonal, intellectual, and practical skills" (Gilyazova, Zamoshchansky & Vaganova, 2021, p. 243).

Methodology

This paper employs an integrative literature review that evaluates and integrates literature with the aim of synthesising a preliminary conceptual approach to a new topic (Snyder, 2019, pp. 335-336).

The search method used the Google Scholar platform with topic keywords. Keyword combinations formed sets, and the Boolean operator "AND" was used to ensure both keywords were included. The quotation marks search modifier was used to create compound keywords for exact search results. Data gathering was conducted using consecutive keyword sets summarised in Table 1. Duplicate results were only captured once in the set where they appeared in the search results the first time. The review included search dates from 2011 to the present, with the date selection being based on the first mention of the fourth industrial revolution or 'Industry 4.0' at the 2011 Hannover Fair in Germany (Schwab, 2016, p. 12). Results were sorted by relevance, not by date. The search results were reviewed at least up to page five of the Google search results or until 30 consecutive entries did not yield any results (approximately three result pages of a Google search set on ten results per page). Results that did not relate directly to interior design or interior architecture were omitted; for example, some positive matches were due to a reference entry with the term 'interior design' in it, i.e. Journal of Interior Design. Only literature with the abstract and main text in English was included – acknowledging the exclusion of a possibly relevant Russian study with an English abstract and Russian main text investigating the relationship between soft skills and educational programs (Tsalikova & Pakhotina, 2019).

The need for the study was tested using the above methodology, using the keyword set: "soft skills" AND "interior design" AND "South Africa". The test search resulted in only one source by Cilliers and Smit (2014), which compares the work-integrated-learning management models of South African and international universities (Table 1). This study's only reference to soft skills is in the literature study section and about the twenty-first-century skills graduates need, including "information, technical skills, and soft skills" (Cilliers & Smit, 2014, p. 14).

Preliminary reading and the data gathering process highlighted several terminology variants related to the term soft skills, identifiable in each text's keyword section or title. Variants include 'employability skills', 'pervasive skills', 'life skills' (Joynes, Rossignoli & Amonoo-Kuofi, 2019, pp 15), 'non-cognitive skills' (Goodspeed, 2016, p. 2), 'interpersonal skills', 'people skills', 'twenty-first-century skills', and '4IR skills'. Touloumakos (2020, p. 4) and Alrifai and Raji (2019a) confirmed these observations, who found that literature sources use different terms and definitions to describe the same soft skills and that terminology use differs between locations and study fields. The terminology variants were evaluated to determine if they warranted inclusion in subsequent search sets. 'Interpersonal skills' and 'people skills' are types, or categories, of soft skills and not a soft skill synonym, so they were excluded from future keyword searches. Terminology such as 'pervasive skills', 'life skills' and 'non-cognitive skills' is not commonly used in South Africa and was therefore excluded. Due to the study's focus on 4IR industry-ready graduates, 'employability skills', 'twenty-first -century skills', and '4IR skills' terminology variants were added to the subsequent keyword set searches. The final data set included 25 sources, with the results from each search set summarised in Table 1 and organised by source type.

Table 1: Data gathering keyword sets and results

Sequence and keyword sets	Search results* by source type
1. "soft skills" AND "interior design" AND "South Africa"	One article (Cilliers & Smit, 2014)
2. "soft skills" AND "interior architecture" AND "South Africa"	None *(even with an unlimited date range)*
3. "soft skills" AND "interior design"	Nine articles (Alrifai & Raji, 2019c; Cho, et al., 2015; Gale, et al., 2017; Galford, Hawkins & Hertweck, 2015; Huber, 2018; Omar, Bakar & Rashid, 2012; Weng, 2017); two master's dissertations (Chappelear 2019; Guevera, 2019)
4. "soft skills" AND "interior architecture"	Three articles (Kahn, Brinner & Gibson, 2018; Limwongse & Chattarakul, 2012; Venter & Van Der Wath, 2014); One master's dissertation (Johnson, 2018)
5. "employability skills" AND "interior design"	Five articles (Alrifai & Raji, 2019a; Alrifai & Raji, 2019b; Billau & Stirling, 2016; Huber & Waxman, 2019; Manoj, 2020); two master's dissertations (Hedrich, 2011; Ntinyari, 2014); one book (Bridgstock & Tippet, 2019)
6. "employability skills" AND "interior architecture"	One article (Teczan, et al., 2020)
7. "twenty-first-century skills" AND "interior design"	Two articles (Jewpairojkit, Rattanolarn & Ekwuttiwongsa 2019; Tansiri, et al., 2018)
8. "twenty-first-century skills" AND "interior architecture"	No new sources
9. "4IR skills" AND "interior design"	None *(even with an unlimited date range)*
10. "4IR skills" AND "interior architecture"	None *(even with an unlimited date range)*
11. "fourth industrial revolution skills" AND "interior design"	None *(even with an unlimited date range)*
12. "fourth industrial revolution skills" AND "interior architecture"	None *(even with an unlimited date range)*
TOTAL	25 SOURCES

Findings

Single skill approach vs category approach

The majority of the identified sources compile lists of different soft skills relevant to interior design or interior architecture in the location of the study (Table 2). Studies are based on previous literature and primary research such as surveys and interviews (Alrifai & Raji 2019a; Alrifai & Raji 2019b; Alrifai & Raji 2019c; Billau & Stirling, 2016; Chappelear, 2019; Cho, et al., 2015; Gale, et al., 2017; Guevera, 2019; Hedrich, 2011; Huber, 2018; Johnson, 2018; Kahn, Brinner & Gibson, 2018; Limwongse & Chattarakul, 2012; Manoj, 2020; Ntinyari, 2014; Omar, Bakar & Rashid, 2012; Tansiri, et al., 2018; Venter & Van Der Wath, 2014; Weng, 2017).

Fewer studies follow a category-based approach (Table 2), which groups the individual skills into themes or categories (Gale, et al., 2017; Huber & Waxman, 2019; Jewpairojkit, Rattanolarn & Ekwuttiwongsa, 2019; Ntinyari, 2014; Omar, Bakar & Rashid, 2012; Teczan, et

al., 2020). The category approach is similar to the WEF report's reference to the O*NET Content Model (2020, pp. 155-156).

Pedagogy

Initially, a second data-gathering phase was planned to identify appropriate pedagogy related to the keyword sets, i.e. soft skills, employability skills, twenty-first-century skills, and 4IR skills. Surprisingly, the initial data-gathering phase contained a significant number of sources specific to pedagogy and teaching practice (Billau & Stirling, 2016; Bridgstock & Tippet, 2019; Chappelear, 2019; Cho, et al., 2015; Cilliers & Smit, 2014; Galford, Hawkins & Hertweck, 2015; Hedrich, 2011; Huber, 2018; Johnson, 2018; Kahn, Brinner & Gibson, 2018; Limwongse & Chattarakul, 2012; Manoj, 2020; Ntinyari 2014 Venter & Van Der Wath, 2014). The results meant the second data-gathering phase was unnecessary (Table 2).

Table 2: Summary of topic keywords and approach in relation to sources

Topic keyword	Sources with a single skill approach	Sources with a skill category approach	Pedagogy-related sources
Soft skills	Chappelear, 2019; Cho, et al., 2015; Gale, et al., 2017; Guevera, 2019; Huber, 2018; Johnson, 2018; Limwongse and Chattarakul, 2012; Venter and Van Der Wath, 2014; Weng, 2017	Gale, et al., 2017; Huber and Waxman, 2019	Chappelear, 2019; Cho, et al., 2015; Cilliers and Smit, 2014; Huber, 2018; Johnson, 2018; Limwongse and Chattarakul, 2012; Venter & Van Der Wath, 2014
Employability skills	Alrifai & Raji, 2019a; Alrifai & Raji, 2019b; Alrifai & Raji, 2019c; Billau & Stirling, 2016; Hedrich, 2011; Kahn, Brinner & Gibson, 2018; Manoj, 2020; Ntinyari, 2014; Omar, Bakar & Rashid, 2012; Weng, 2017	Huber & Waxman, 2019; Ntinyari, 2014; Omar, Bakar & Rashid, 2012; Teczan, et al., 2020	Billau & Stirling, 2016; Bridgstock & Tippet, 2019; Galford, Hawkins & Hertweck, 2015; Hedrich, 2011; Huber, 2018; Kahn, Brinner & Gibson, 2018; Manoj, 2020; Ntinyari, 2014; Teczan, et al., 2020
Twenty-first - century Skills	Limwongse & Chattarakul, 2012; Tansiri, et al., 2018	Jewpairojkit, Rattanolarn & Ekwuttiwongsa, 2019; Joynes, Rossignoli & Amonoo-Kuofi, 2019	Limwongse & Chattarakul, 2012
4IR skills	None relating to the interior design or interior architecture discipline		

In summary, the study's main findings include two approaches to classifying and representing soft skills and the terminology variants specific to interior design and interior architecture, namely an individual skills approach and a skills category approach, and identifying sources detailing the pedagogy supporting soft skill development.

Although some studies focus on industry perceptions (Gale, et al., 2017; Huber, 2018), none have been done in South Africa. There are currently no studies on student perceptions of soft skills. Future studies should address these gaps and could also elaborate on more specific pedagogic strategies.

Discussion

Inconsistent approaches to soft skills

A critical starting point for this study was a semi-systematic literature review by Touloumakos (2020), who reviewed soft skill-related texts up to 202. The study demonstrated how the meaning of the term 'soft skills' has evolved from knowing how to perform an action to include cognitive processes, employee descriptions, and work activities. The literature study culminated in the identification of nine soft skill categories: "qualities and values, attitudes, problem-solving and creativity, leadership and self-management, interpersonal skills, communication skills (interpersonal communication and communication of work), emotional labour (self-regulation), professional appearance, and cognitive abilities and planning" (Touloumakos, 2020, pp. 3-4). Both Touloumakos (2020, p. 4) and Chalkiadaki (2018, p. 3) critiqued the use of inconsistent definitions and characteristics, combinations of single skills and categories, and decontextualising of skills where studies did not elaborate on successful skill demonstration, which in turn impedes its effective integration into curriculum design.

Touloumakos' critique on lack of uniformity in approach is evident when comparing the South African 4IR strategy (PC4IR, 2020) with two of its primary sources, the World Economic Forum's 2020 Future Jobs report (WEF, 2020) and the McKinsey Global Institute's (MGI) Skill Shift discussion paper (MGI, 2018). Firstly, the South African 4IR strategy proposes 12 critical soft skills, but has no accompanying skill categories (PC4IR, 2020, p. 118).

The 2020 Future Jobs report (WEF, 2020, pp. 36) lists the survey results of the top 15 skills for 2025 and the changes in the perceived importance of eight skill groups over time. The WEF 2020 Future Jobs report uses the government's [USA] Occupational Information Network (O*NET) content model to classify skills into competency bundles and synthesise them into four competency types, namely 'Skills and Knowledge', 'Attitude', 'Abilities', and 'Cognitive'. The competency types include subcategories (WEF, 2020, pp. 155-156), tiered relationships between skills and skill groups, and skill definitions. The four competency types do not align with the survey's eight skill groups, except for the cognitive competency, which points to a possible disconnect between industry needs and institutional definitions of occupational competency. There are five exact terminology overlaps between the WEF top 15 skills and the SA 4IR strategy's 12 critical soft skills, namely Complex Problem-solving, Critical thinking, Creativity, Emotional intelligence, and Negotiation (WEF, 2020, p. 36; PC4IR, 2020, p. 118).

The McKinsey Global Institute's Skill Shift discussion paper identifies 25 workforce skills which include hard and soft skills, categorised under five categories, i.e. 'Physical and manual skills', 'Basic Cognitive Skills', 'Higher Cognitive Skills', 'Social and Emotional Skills' and 'Technological Skills' (MGI, 2018, p. 5). There are six exact terminology overlaps between the MGI 25 workforce skills and the South African 4IR strategy's 12 critical soft skills, namely Critical thinking; Creativity; People management; Empathy; Communication, and Negotiation (MGI, 2018, p. 5; PC4IR, 2020, p. 118).

Comparing these overlaps shows only three soft skills present in all three reports: Critical Thinking, Creativity, and Negotiation. This comparison confirms and demonstrates the previous critique on approach inconsistencies (Chalkiadaki, 2018, pp. 3; Toulamakos, 2020, pp. 4). The single skill approach provides specific skills but cannot accommodate regional or interdisciplinary terminology differences.

Existing conceptual models for soft skills

The 21st-Century Skills report identified several existing models for general soft skills categories, namely the 4Cs model [critical thinking, communication, collaboration, and creativity]; the *3Rs* model [Rigour, Relevance and Respect]; the Other 3Rs model [reasoning, resilience and responsibility]; and the 3Ps model [passion, problem-solving, and producing] (Joynes, Rossignoli and Amonoo-Kuofi, 2019, pp. 12-13). This source was not identified during this study's data-gathering phase but provided an introductory overview of different soft skill category models. The terminology used to describe the model categories provides flexibility and the opportunity for regional or interdisciplinary interpretations, but the exact terminology and model goals do not match up.

Parlamis and Monnot (2019, pp. 226-227) suggest a substitution for the term 'soft' skills, with the acronym 'CORE' or **c**ompetence in **o**rganisational and **r**elational **e**ffectiveness. The CORE acronym embodies two skill categories integral to being a successful participant in the work environment, the relationship between the individual and the organisation, i.e. *organisational effectiveness*, and the relationship between the individual and the people linked to the organisation, i.e. *relational effectiveness*. Examples of organisational effectiveness are proposed as the "ability to influence others, read and manage others' emotions, manage conflict, negotiate, coach and mentor, understand organisational contexts, and develop meaningful networks" (Parlamis and Monnot, 2019, p. 227). Examples of relational effectiveness include "positive attitude, trustworthiness, effective communication, leadership ability, cooperativeness, responsibility, initiative, ability to manage emotions, team and self-awareness" (Parlamis and Monnot, 2019, p. 227). This study is unrelated to interior design and focuses on Management Studies, but the approach holds value for a holistic 4IR education strategy due to its category approach, supported by examples of specific skills linked to the graduate profile description of being a successful participant in the work environment. Simplifying the soft skills topic from individual skills to skill categories is necessary to allow flexibility and complexity within a conceptual framework.

Proposed conceptual model for 4IR soft skills development in South Africa: The SPOT model

The proposed conceptual model blends a learner-centred approach with the principle of interconnected relationships inherent in the "internet of things" (IoT) (Schwab, 2016, p. 22). The model places the learner at the core and describes the four relationships, or skills categories, integral to 4IR soft skill development.

The CORE model's (Parlamis and Monnot, 2019, p. 227) emphasis on relationships supports the importance of the human aspect in a 4IR future (Schwab, 2016, p. 95). These CORE relationships between the individual and the organisation, and the individual and other people (within or related to the organisation) form the proposed model's foundation. To address the South African 4IR strategy's (PC4IR, 2020, p. 69) pedagogic aims of creating lifelong learners, an essential addition to the above CORE model categories include the relationship between the individual and the self. The relationship between the self and technology enables the conceptual model to address the South African 4IR strategy (PC4IR, 2020).

The model aims to provide a contextually appropriate framework for soft skills development using the four integral relationship categories of individual-to-Self, individual-to-Organisation, individual-to-Person, and individual-to-Technology – summarised with the acronym, SPOT.

Where to next?

The incremental steps proposed by Oke and Fernandes (2020, p. 19) provide a practical strategy to approach the development. Suggestions for researchers and educators include:

1. Use a methodology similar to Gale, et al. (2017) and Huber (2018) to conduct a study in your area to determine the industry expectations of:
   a. the local vernacular and commonly used terminology for soft and hard skills specific to interior design or interior architecture (or other fields),
      i. descriptions of successful skill demonstration (Touloumakos, 2020);
   b. perceived strengths and weaknesses in graduates that have recently engaged with the organisation,
      i. the willingness and preferences of the organisation to hire graduates in relation to the identified soft and hard skills, and strengths and weaknesses
   c. categorise the local terminology variants of soft skills into the four relationship categories of the SPOT model: individual-to-Self, individual-to-Organisation, individual-to-Person, and individual-to-Technology, to identify regional industry strengths and weaknesses in terms of 4IR-readiness
2. Conduct an institution-specific study using the categorised terminology and definitions:
   a. determine the strengths and weaknesses of soft skills and hard skills in current or recent graduates of the specific institution
      i. cross-reference the current skill strengths and weaknesses against the SPOT model's relationship categories to identify institutional and curriculum strengths and weaknesses in terms of 4IR-readiness
3. Research the appropriate teaching framework, approaches and tools to develop these skills parallel to the existing curriculum.

Study limitations and strengths

Study limitations include the narrow search parameters of focusing solely on the interior design and interior architecture disciplines. Many sources are available on the topic, and due to the intended transferability of soft skills between disciplines, the parameters were likely too exclusive.

The study strengths are within the proposed conceptual model and incremental approach to identifying contextually relevant soft skills.

Conclusion

As educators, we have the opportunity to prepare South African interior design graduates and graduates of other disciplines for the shift to a 4IR workplace by developing their soft skills. 4IR literacy in educators and a thorough understanding of the effects of 4IR on the future South African workplace will help prepare educators for this opportunity.

The literature showcased two approaches to soft skills: a single skill approach that provides specific goals and a category approach that provides a development framework. Based on these findings, the study proposes a conceptual soft skill development model of four relationships, or categories, integral to 4IR. The four relationships include individual-to-Self, individual-to-Organisation, individual-to-Person, and individual-to-Technology relationships that form the proposed SPOT model. The study further proposes a practical strategy for

educators on how to approach soft skills identification and development within a specific industry, institution, and context using the SPOT model.

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