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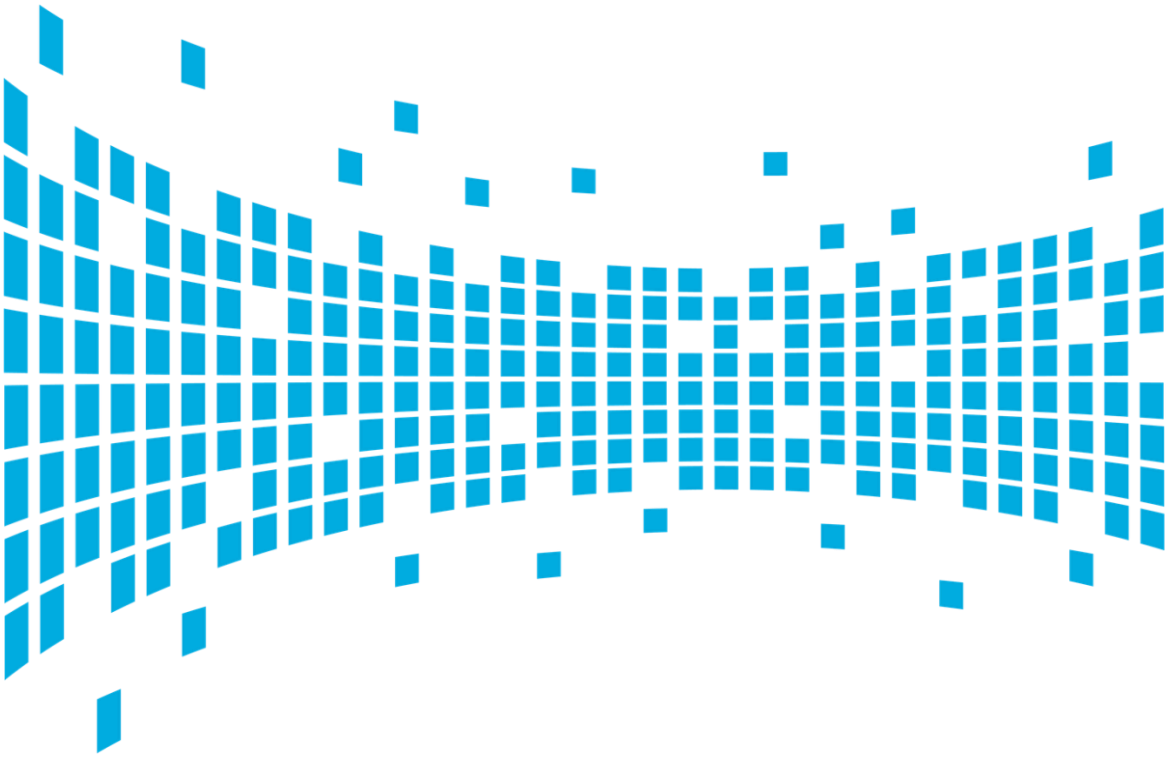

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# Review of Cindy Wigglesworth's book "SQ21: The Twenty-One Skills of Spiritual Intelligence"



**Amira Abougazia**

*University of Dundee, School of Business, Dundee, UK*

*a.abougazia@dundee.ac.uk*

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**Abstract**:

Cindy Wigglesworth's seminal work, "SQ21: The Twenty-One Skills of Spiritual Intelligence," introduces spiritual intelligence (SQ) as a measurable trait comparable to IQ and EQ. The review evaluates her transformative, inclusive framework for developing SQ through 21 skills applicable to personal growth and leadership roles. Wigglesworth's approach is inclusive and faith-friendly, appealing to atheists, religious individuals, and the spiritually inclined alike, which encourages shifting from ego-centric thinking to a more altruistic, peaceful self, fostering wisdom, compassion, and serenity in navigating life's complexities. The SQ21 model offers a practical tool with a self-assessment for tracking progress. Bridging spirituality and practicality, Wigglesworth's work is essential for individuals seeking personal development as well as empathetic, insightful leadership, making it an invaluable resource for personal and professional growth. SQ21: The Twenty-One Skills of Spiritual Intelligence" offers an progressive approach to management development through emphasizing the importance of cultivating one's internal self. The book's clear organization and inclusion of summaries and key takeaways make it a treasured resource for leaders seeking to enhance their religious intelligence and management skills. Overall, the book is a valuable resource for leaders seeking to enhance their spiritual intelligence. It provides practical tools and techniques that can be readily implemented, and offers a unique perspective on leadership that resonates with readers. The book is highly recommended for anyone interested in developing their leadership skills through the lens of spiritual intelligence.

**Keywords:**

Spiritual Intelligence (SQ), Leadership Development, Personal Growth, Self-Awareness, Practical Tools

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**Balancing Spirituality and Leadership in the Workplace**

When reading the title, the word "spiritual" could make you uncomfortable because it normally refers to religion, which is rarely discussed in the workplace because of its sensitive nature. "SQ21: The Twenty-One Skills of Spiritual Intelligence" by Cindy Wigglesworth is an insightful and well-written guide to developing spiritual intelligence in the context of leadership. The book provides a comprehensive overview of the topic with clear explanations of key concepts, practical tools, and techniques for developing spiritual intelligence. This book surprised me in a safe way: it struck a good balance between theory and practice. Cindy's story spoke to me: She holds a master's degree, spent two decades working in business in human resources management, and undoubtedly spent a significant amount of time self-learning during her life. She is obviously well-read and knowledgeable about her subject. A love-based, altruistic system of leadership spiritual intelligence is the focus of this book's discussion of how leaders might incorporate trust and confidence in the workplace. It presents several hypothesised relationships that explain how leadership spiritual intelligence positively impacts various desired employee engagements, including managerial and subordinate behaviour, job satisfaction, organizational commitment, and effective self-management and adaptation strategies. Guidelines for assessing spiritual intelligence and improving it will be helpful to readers.

This book covers a variety of subjects, not just the answer to the query, "What does the human spirit consist of? Is it feasible to measure spiritual development? Is it possible to develop one's spirit consciously? However, it also examined the development and evaluation of spiritual abilities. You may have just finished reading a book that outlines a daily, minute-by-minute spiritual journey. This is a path towards the development of human potential; there must be a chance that my own spiritual, evolutionary, and human advancement can benefit all humankind in some way. The triumph of love over hatred, or simply, the time it takes for humanity to reach the next turning point, may even be accelerated. Everyone who works in an organisation or needs to cooperate with others can benefit from the knowledge and opportunities for self-discovery presented in Cindy Wigglesworth's book, which would be all of us, would it not?

First, I did not think spirituality could be explained in terms of particular behaviours. However, as I learned more, I became more conscious of the fact that integrating the spiritual and scientific spheres requires exact distinction and measurement, which is

both possible and essential. In addition to bringing spiritual awareness and growth into the psychological sphere, this book reframes religious dogma that demands that a particular route must be followed to achieve spiritual progress (i.e., the principles of a certain religion). However, SQ21, a collection of 21 skills or abilities that Cindy refers to as "spiritual intelligence", is meant to support your development and help you live a more conscious, purposeful, wise, and compassionate life. They are meant to help you become fuller. This book addresses the traits of spiritually enlightened people from a variety of faiths, including how they think and perceive the world and how they interact with it, to achieve spiritual growth through a greater understanding of their practices.

The superiority of Wigglesworth's work is that she divides the subject of spiritual intelligence into twenty-one skill sets (each with five levels of development). Each book's twenty-one skills are briefly explained in chapters four through seven. In other words, this model proposes twenty-one sub-streams or tributaries under the notion of a separate stream of human intelligence known as spiritual intelligence. If different tributaries intersect or flow into one another (i.e., they do have an impact on one another), it is beneficial to understand that each one also has its own integrity.

The primary focus of the first part of the book is to explore the notion of spiritual intelligence together with Wigglesworth's evaluation methodology. Using psychological models to establish concepts that need to be assessed, precise item development, and statistical analysis of the evaluation, Wigglesworth created a reliable, consistent, and scientifically rigorous instrument. In Part 1, Wigglesworth briefly discusses the appeal to attain complete humanity. Furthermore, Cindy establishes a connection between SQ and other familiar intelligences, such as emotional intelligence, linguistic, mathematical, and kinaesthetic intelligence. SQ is the "master intelligence" because it improves physical intelligence (PQ), IQ, and EQ. She categorises each skill into four groups. The first category emphasises self-awareness, which includes discovering one's identity in the world. Questions such as "Am I driven by my ego or my higher self?" and "What are my principles?" are a part of self-awareness. Wigglesworth integrates the idea of building awareness between one's ego and the higher self in the first quadrant, followed by global awareness in the second quadrant, which describes increasing awareness across all cultures, the interdependence of life, the limits of human perception, and the consciousness of transcendence. Wigglesworth transitions from awareness to practical skills in the third and fourth quadrants, where self-mastery is the focus of the third quadrant and social comprehension, and spiritual presence are the themes of the fourth quadrant. The author discusses 21 skills, including maintaining one's religion, living according to one's purpose and values, and making compassionate decisions. If Wigglesworth ended, the first two sections of the book would have made valuable contributions to the literature.

Self-mystery is positioned after self-awareness in the SQ21 model, because we are incapable of dominating what we are unable to perceive. In the self-awareness section, the book discussed acquiring the ability to recognise one's ego and higher self, as well as clarifying one's personal mission and values. This third quadrant progresses from those proficiencies, instructing you on how to transfer the ego from the driver's seat to enabling your higher self to take charge. Since leadership is driven by values that function as important guides to the organisation, it trains you on how to exist according to the mission and values you have opted for and how to remain centred and serene, even during challenging times. When implementing these mastery abilities, you will discover that they reflect on your awareness abilities (quadrants 1 and 2), deepening your comprehension of who you are, your values, and the world around you.

**Enhancing Spiritual Intelligence: Practical Steps for Development**

The sustained enhancement of SQ is supported in Part 3, which proposes concepts for promoting spiritual intelligence. In the process of human development, individuals begin with ego. As ego is focused solely on survival and immediate gratification, returning to ego energy is uncomplicated. Nevertheless, it is feasible to surpass ego and link it with the superior self. The superior self is more concerned about survival. They are also concerned about others. Recognising when the ego is in control and striving to shift energy and consciousness toward the superior self are vital steps in the process of development. In the third section of SQ21, Cindy presents ideas for fostering spiritual intelligence. These ideas can help individuals develop spiritual intelligence and become effective leaders and contributors to society. The ideas are as follows:

1. Cultivating Self-Awareness: This involves developing an understanding of one's values, beliefs, and biases. Exercises for cultivating self-awareness may include journaling, introspection, and reflecting on past experiences. This awareness helps individuals better understand themselves and their places in the world. The SQ21 book also provides a self-assessment tool for individuals to identify their strengths and areas of growth in spiritual intelligence.

2. Mindfulness involves being fully present in the moment and observing thoughts, feelings, and sensations without judgement. This practice can help individuals to develop a greater sense of calmness and clarity. Exercises for practising mindfulness may include meditation, deep breathing exercises, and mindful movement practices, such as yoga or tai chi.

3. Developing Compassion: Compassion involves showing kindness, empathy, and understanding towards oneself and others. This practice can help individuals to develop deeper connections with others and a greater sense of purpose. Exercises for developing compassion may include practising loving-kindness meditation, cultivating gratitude, and engaging in acts of service or volunteering.

4. Embracing Creativity: Creativity involves using imagination and intuition to generate new ideas and solutions. This practice can help individuals to develop a greater sense of purpose and meaning in their lives. Exercises to embrace creativity include free writing or drawing, brainstorming sessions, and engaging in creative hobbies or projects.
5. Connecting with Nature: Nature provides a sense of awe and wonder that can help individuals feel more connected to the world around them and develop a greater sense of spirituality. Exercises for connecting with nature may include spending time in natural environments, practising outdoor meditation, and engaging in nature-based activities such as hiking or camping.

**The 21 Spiritual Intelligence Skills**

| | |
|---|---|
| **Higher Self/Ego self Awareness**<br>Awareness of own worldview<br>Awareness of life purpose (mission)<br>Awareness of values hierarchy<br>Complexity of inner thought<br>Awareness of Ego self / Higher Self | **Higher Self/Ego self Mastery**<br>Commitment to spiritual growth<br>Keeping Higher Self in charge<br>Living your purpose and values<br>Sustaining your faith<br>Seeking guidance from Spirit |
| **Universal Awareness**<br>Awareness of interconnectedness of all life<br>Awareness of worldviews of others<br>Breadth of time / space perception<br>Awareness of limitations/power of human perception<br>Awareness of Spiritual laws<br>Experience of transcendent oneness | **Social Mastery / Spiritual Presence**<br>A wise and effective spiritual teacher/ mentor<br>A wise and effective change agent<br>Makes compassionate and wise decisions<br>A calming, healing presence<br>Being aligned with the ebb and flow of life |

Figure 1, The 21 Spiritual Intelligence Skills

Figure 1 illustrates the four quadrants of the SQ21 Model, each representing a distinct set of twenty-one skills. Each quadrant comprised a group of related skills based on these categories. The quadrant on the top left denotes self-knowledge, whereas the quadrant on the top right indicates the awareness of others. The lower left quadrant (3) represents self-control and is mirrored by the lower right quadrant (4), which signifies comprehension of social or spiritual contexts.

Wigglesworth developed classifications based on Richard Boyatzis and Daniel Goleman's groundwork in emotional intelligence. The quadrants organise correlated skills in a beneficial manner and exhibit an optimal sequence for engaging with them. The initial focus was on Quadrants 1 and 2 (self-awareness and others' awareness). The individual then moved on to Quadrant 3 (self-control), followed by Quadrant 4

(comprehension of social dynamics and spiritual presence). This aligns with the Integral Learning Cycle, which encourages involvement in exercises that enhance awareness, integrates this newfound knowledge through analysis and interactions, and ultimately leads to modified social behaviour.

From my perspective, the sequence of inquiries (Q 1+2->Q 3->Q 4) is highly advantageous. The flow followed a wise approach. Initially, an individual gains awareness and comprehends oneself and others better, which may not always be effortless, but liberating. Afterwards, the person incorporates skills from Quadrant 3: Self-Mastery. These skills, including #16, "Consulting the Higher Self for Guidance", and #15, "Maintaining Confidence in Tough Times", laid the foundation for resources. It is not necessary for the individual to shift immediately from developing new awareness skills (Quadrants 1 and 2) to the social leadership setting (Quadrant 4) to fully utilise newly acquired awareness skills. Quadrant three serves as a bridge between awareness and action. In more conventional theological terms, "resource development", "empowerment", or "grace-filled" are used to describe this process. The individual receives grace first (empowerment and resource development) and then ventures into the world to live a new reality and contribute positively. Recognising that comprehending a broader perspective does not require expertise in any domain is crucial. Wigglesworth asserted that, while contemplating these four intelligences and engaging in personal development, it is crucial to bear in mind that there is no obligatory or conclusive level of intelligence. To fulfil your requirements and strive for growth, you must attain the requisite stages of advancement in your physical, cognitive, emotional, and spiritual intelligence.

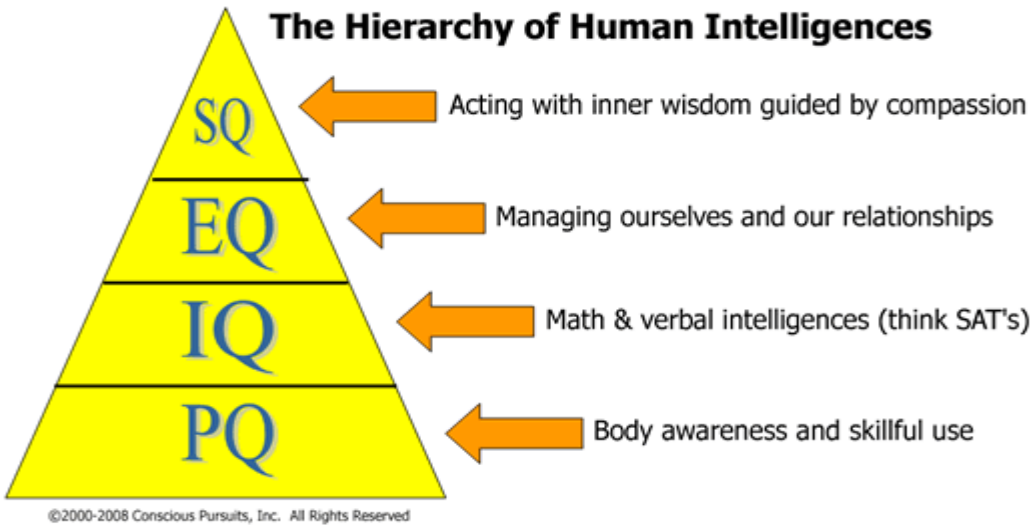


**Figure** 2

**Tracking Spiritual Growth: The SQ21 Inventory and Its Impact**



Wigglesworth devised an inventory to monitor an individual's progress in the twenty-one talents. The guidance I received from her emphasises the concept of spiritual intelligence as well as how to interpret the data from the inventory and effectively use this tool in the context of spiritual counselling or guidance. Appendix 1 in the book explains the statistical methodology that supports the validity and verifiability of the inventory. Essentially, it is a potent instrument. As Wigglesworth puts it, " is an examination designed to initiate a discussion and learning journey. It is not without flaws. However, it serves as an excellent launching pad for one of the most productive conversations you could have with a coach or with yourself" (p. 194). An inventory rather than a book enables one to put ideas into practice. This book provides a useful overview of the topic. In my experience using the inventory, both personally and with others, I have focused on Wigglesworth's approach. It is not perfect but provides an excellent starting point for insightful conversations and is effective in outlining a path for spiritual development. The ratings for each skill range from 0 to 5. Achieving a score of five does not mean that an individual has mastered that talent. According to this model, it simply indicates a certain level of development was achieved. Regardless of the circumstances, there is always room for improvement in terms of wisdom, compassion, and internal and external harmony. No one becomes a saint, like Teresa of Avila, the moment they reach the fifth level in any skill. This brings me to the point I wish to make, which is to contextualise the book and its argument rather than criticise it (as I understand it). What is this state of consciousness?

Wigglesworth delineated various aspects of an integral map using integral theory. These include:

1. The growth lines (or streams) with a particular focus on spiritual intelligence
2.Quadrants.
3. Development levels (or structures)

The SQ21 Model also encompasses states of consciousness, which are crucial components of integral maps. For example, Skill 11 deals with a feeling of profound unity. As we move up the skill ladder, other capabilities exhibit enhanced abilities for the spiritual state (e.g., 16: Seeking Guidance from the Higher Self; 20: Being a Calming, Healing Presence; and 6: Awareness of the Interconnectedness of Life). The model does not exhibit any partiality towards any specific religion, but it does not delve into the finer details of the various elevated states of consciousness and enlightenment. The text does not provide any maps of gross, subtle, causal, or non-dual experience. Instead, it offers a general overview of these truths and a basic assessment of the associated competencies, encouraging readers to explore their religious traditions and contemporary spiritual teachers. The model emphasises the distinction between the ego

and the higher self, which is commonly referred to as the soul (refer to Afterwards for more information). A significant number of the twenty-one skills in the book highlight this distinction, such as Knowledge of the Ego and Higher Self (5), Keeping the Higher Self in Control (13), Being a Smart and Effective Leader or Change Agent (18), and Making Compassionate and Intelligent Choices (19). In the third section of the book, various techniques are discussed to transform habitual egoic reactions into responses that align with the Higher Self's wisdom and compassion while still acknowledging and valuing the ego from the Higher Self's greater compassionate wisdom.

In her book "SQ 21: The Twenty-One Skills of Spiritual Intelligence," Cindy compares the process of developing spiritual intelligence to weightlifting, where the weightlifting analogy provides a useful framework for understanding the process of developing spiritual intelligence and the importance of consistent effort and perseverance in this journey. She proposed phases for transforming the ego self, which is driven by fear, to the superior self, which is more enlightened. Just as lifting weights can strengthen and tone our muscles, cultivating spiritual intelligence can strengthen and tone our inner resources such as self-awareness, compassion, and creativity. The more we engage in spiritual practices such as mindfulness, gratitude, and connection with nature, the more we can develop these skills and integrate them into our daily lives. Wigglesworth notes that like weightlifting, the process of developing spiritual intelligence may be challenging and requires discipline and consistency. However, these benefits can be profound, leading to greater emotional resilience, a deeper sense of purpose, and improved relationships. The weightlifting analogy emphasises the importance of incremental progress and persistence. Just as we cannot expect to lift heavy weights immediately without building them gradually, we cannot expect to develop spiritual intelligence overnight. Instead, consistent efforts and practices are needed to achieve significant growth and transformation.

SQ 21: The Twenty-One Skills of spiritual intelligence are unique additions to the leadership literature. The book breaks down difficult ideas into manageable pieces so that they can be applied, and it is packed with examples to clarify its concepts to the reader. This is easily understood by all and strikingly apparent, making it simpler to understand why and how partnerships can be enhanced and more productive as a result. Furthermore, Wigglesworth considered the psychology of intelligence's emergence as a model for her approach, noting that emotional intelligence, while more complex than cognitive intelligence, stems from the study of cognitive intelligence. Although spiritual intelligence is more intricate than emotional intelligence, it can provide a framework for assessing transcendent abilities.

Wigglesworth acknowledges that other books can help readers understand and grow spiritually. While it is not, it has taken bold moves to create a vocabulary of spiritual

talent, evaluate these skills, and provide suggestions on how to develop them. SQ 21 will be a tremendously engaging book for anyone interested in spiritual growth. This book provides an in-depth examination of spiritual intelligence, which will allow readers to think and open their eyes. The route and goal of spiritual intelligence are well covered by Cindy. In addition, it emphasises the theoretical foundations of spiritual development and its how-to parts.

What then is spiritual intelligence? Cindy has stated that “My definition of spiritual intelligence, which I carefully thought out, is: “spiritual intelligence is the ability to behave with wisdom and compassion while maintaining inner and outer peace, regardless of the situation." (p.27). Cindy described "spiritual intelligence" as an individual's innate understanding of themselves, other people, circumstances, and strategies for achieving specific goals. Therefore, the soul of all intelligence can be said to exist within it. By reshaping people's hearts so that their ambitions and aspirations are aligned in a single direction, spiritual intelligence can increase their ability to inspire others. Reasons and intellect have no power over the soul. In fact, this is a source of intellect and thought. Since the soul is a small representation of the universe, one who understands the soul also understands the cosmos. According to the author, SQ possesses the most fundamental intellect, and is found only in humans. SQ helps us grow in terms of capacity, desire, and the ability to see, envision, and appreciate things. Therefore, we can aspire to dream. It serves as the foundation for the ideas we hold dear, as well as the significance of our values and beliefs in guiding our behaviour and defining our way of life. This book demonstrates how brain changes occur over the course of a person's life in response to intellectual stimulation, physical activity, exposure to diverse cultural contexts, learning opportunities, and obstacles. The book also describes the continuum between the body and soul and offers doable strategies for moving past the physical body and into the realms of the senses, mind, and intellect.

In contrast to spirituality and religion, spiritual intelligence refers to a set of abilities that we hone over time via practice. It can grow both within and outside of a particular belief or tradition. It is important to note that this needs to be developed. I really believe that while we are all born spiritual, we are not all born spiritually intelligent. Working and developing spiritual intelligence is a process. Similarly, a youngster may have natural musical talent, but unless she learns how to play an instrument and continuously develops her craft, she will not become an adult brilliant musician.

SQ21: The Twenty-One Skills of Spiritual Intelligence make spiritual intelligence a crucial and previously largely underappreciated aspect of becoming fully human. The main claim of the book is that, in accordance with Howard Gardner's theory of multiple intelligences, spiritual intelligence is one of many legitimate streams of human intelligence and that it is possible to identify and develop the abilities or skills that fall

under this stream of spiritual intelligence. In other words, learning to act with greater wisdom and compassion while preserving inner and outer serenity regardless of the scenario can help someone determine the abilities they would like to develop. The SQ21 paradigm is characterised by Wigglesworth as inclusive of all faiths and non-religiosity. In other words, this methodology can still be advantageous for someone who follows a traditional religious system (this is faith-friendly). That believer would provide the many questions and concepts, including "higher self", his or her own interpretation based on their respective traditions. A person who describes themselves as "spiritual but not religious", an atheist, or an agnostic will, on the other hand, discovers that the terminology in the skill sets does not necessitate adherence to any particular religious tradition (this is the faith-neutral part). Wigglesworth is aware that the latter is crucial in the corporate world. Since it is not a Trojan Horse for any one particular religious belief system, while still enabling people to truly investigate their higher purpose and growth, this model has the ability to penetrate business, health care and education, economics, and other environments in a non-threatening manner.

There are several streams of human intelligence in addition to spiritual intelligence. SQ is connected to emotional intelligence (EQ), cognitive intelligence (IQ), and PQ, as Wigglesworth explains in this article (and elaborated in Chapter 2 of the book) (physical intelligence). SQ is referred to as a "capstone intellect" by the author because it depends on, builds upon, and supports other intelligences. When the four intelligences work together, "deep change occurs", as Wigglesworth referred to.

**Considerations for the twenty-one competencies of spiritual intelligence**

The Wigglesworth chart is a reconstruction of an original collection. Through significant research on this subject, she provides a broad overview. However, the scope and practicality of any implementation must be balanced. Although additional skills may have been integrated into the SQ21 system, this may have reduced its effectiveness. While there may be countless abilities to develop in a profound and vast field such as spiritual intelligence, their usefulness may be limited at present. Those who completed the SQ21 skills inventory were more likely to experience the same. The self-evaluation validity determined the results of the survey. However, other factors may also be at play, such as misinterpreting questions or having a challenging day. Inventory captures only one moment in time. As someone who has completed the SQ leadership coaching program, I appreciate Wigglesworth's emphasis on using evaluation morality when collaborating with individuals. She emphasised that evaluation is just a starting point for discussion. Every piece of information must be verified by the participant, and they should seek honest feedback from their trusted friends. However, the results were not definitive or clear. The assessment examined 21 abilities related to spiritual intelligence in real-time. This provided a fair assessment of a person's skill set.

However, it is up to the individual to find resources that will guide them in the right direction and to engage in activities that support the development of the competencies they want to acquire. It is apparent that understanding the model and taking the inventory will not increase spiritual intelligence. It only establishes a baseline and provides feedback.

**Final Thoughts: The Higher Self**

The fundamental principle of spiritual intelligence is straightforward: it involves transitioning from the ego to the higher self, despite the complex and multifaceted nature of the process (SQ21, p. 125). The degree to which one understands this transition has a significant effect on spiritual growth. The spiritual journey can be best understood as a movement from the ego to the unconscious spirit and then from the spirit to the higher self, which intervenes in our daily lives. However, I believe that SQ21 places too much emphasis on the ego and higher self, as stated previously. Although Wigglesworth advocates for enlightenment and the inclusion of paradigms, allowing the ego to have relative truth value rather than suppressing or eliminating it, I do not think it is appropriate to focus solely on moving from the ego to a higher self. To comprehend the Absolute Realm, we must first descend into it, where we recognize that everything, including the ego, is a manifestation of the One Spirit. This is the spiritual path, the path of gratitude, selfless love, and appreciation. The true meaning of having an open mind involves exploring whether our higher selves are distinct, genuine, or a combination of both, only after realizing the unity of all beings. This point has some nuances. I do not suggest that Wigglesworth's techniques for transitioning from the ego to the higher self are ineffective. However, placing too much emphasis on this transition can oversimplify the notion of unconditionality. Maintaining faith, skill number 15, involves questioning one's belief in a transcendent being or an intelligent, compassionate environment (i.e., God or the Supreme Reality). Keeping an open mind means recognizing that all beings, including God, share a common characteristic or essence. However, realizing this unity is not merely a matter of trust or belief; it is a journey towards enlightenment. Realizing this unity is what enlightenment implies. Therefore, I would argue that each of us appears as a light from that sun (i.e., a higher self from a higher power or a soul from God) because of that unity.

**Conclusion**

The concept of spiritual intelligence as a distinct path of personal development was redefined in Wigglesworth’s book. Her work has set a new standard by providing a practical diagnostic tool that enables individuals to determine the most effective way to work independently toward spiritual growth. The book strikes a delicate balance, addressing the Western spiritual scene's overemphasis on higher-state technologies, while underscoring the importance of discipline and ethics. In the absence of an

objective evaluation, individuals may rely on their own limited experience or the opinions of other spiritual teachers, whose assessments may be biased by their traditions' emphasis on different state perceptions. However, SQ21 offers a fresh approach to spiritual growth that is accessible to individuals who may not be inclined towards intense spiritual practices. The skill sets outlined in the book may also benefit experienced spiritual workers by enabling them to focus on aspects of their practice that they may have overlooked. The diagnostic tool is well designed and offers an inspiring vision of the positive effects of developing spiritual intelligence on all aspects of human growth.

The book's writing style is a notable strength as it is both clear and concise. Wigglesworth employs accessible language that can be easily understood by a broad audience, avoiding technical terms and jargon, whenever possible. She also included a multitude of examples and anecdotes to illustrate key concepts, making the book both interesting and comprehensible. The book's innovative approach to leadership development is another strength. Wigglesworth draws on the emerging field of spiritual intelligence to offer a distinct perspective on leadership, emphasizing the importance of cultivating one's inner self to be an effective leader. This approach is particularly relevant in today's complex and rapidly evolving business climate, in which traditional leadership models may be less effective. Furthermore, the book is well-organized, with clear sections and chapter headings that facilitate easy navigation and information retrieval. Wigglesworth includes chapter summaries and key-takeaways, enabling readers to retain and apply the information presented. Overall, "SQ21: The Twenty-One Skills of Spiritual Intelligence are a valuable resource for leaders seeking to enhance their spiritual intelligence. The book provides practical tools and techniques that can be readily implemented and offers a unique perspective on leadership that resonates with readers. This is highly recommended for anyone interested in developing leadership skills.

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# Adopting WFM E Standards; Case Study of Saudi Arabia

**Fatemah Al Mogaty**

*Head of the Quality and Excellence Unit, Military Hospital in Riyadh, Riyadh KSA*

*F.Almogati@gmail.com*

**Abstract**

The Kingdom of Saudi Arabia has witnessed a full-size boom in the number of scientific colleges over the past a long time, driven by using the growing call for healthcare services. This rapid enlargement has raised concerns approximately the exceptional and consistency of medical schooling throughout the one-of-a-kind establishments. Ensuring amazing medical training is critical, as it immediately impacts the competence and performance of future healthcare carriers. Robust high-quality guarantee mechanisms are important to maintain standards and promote continuous development. The proliferation of medical schools worldwide with questionable education quality, coupled with the increased migration of physicians, has raised international concerns about safeguarding the practice of medicine and, ultimately, the service offered to patients. This study aims to examine the potential adoption and implementation of the World Federation of Medical Education (WFME) standards in medical schools in an emerging country context using the Kingdom of Saudi Arabia as a case study. The study investigated the quality assurance systems in four medical schools using semi-structured interviews developed based on the WFME framework to identify gaps that the WFME global medical standards could address and understand the challenges faced in the implementation of quality assurance, the findings of this research will contribute to the understanding of the implementation of quality assurance frameworks in medical education, with specific insights from the Saudi Arabian context. The outcomes can inform policymakers, medical education institutions, and stakeholders in their efforts to enhance the quality and consistency of medical education in the Kingdom.

**Keywords** World Federation of Medical Education, Quality Education, KSA Medical Schools.

## Introduction

Quality in education is an essential aspect that any educational provider and regulator would aspire to improve. In medical education mainly, there is a broader recognition that the quality of medical service delivery is a reflection of the quality of the medical education received (Bazargan, 2014); (Cantillon, 2017); (Dawka, 2013). Therefore, the quality of health care delivery could be improved by focusing on developing the quality of medical education. The close interface between medical education and health care delivery has increasingly been recognised at both national and global levels (Brauer & Ferguson, 2015); (Karle, 2006). This recognition has resulted in the increasing calls for strategic partnerships to improve the quality of medical education (Lilley & Harden, 2003). Besides, the growing trends towards the globalisation of healthcare which is reflected in the increasing number of migrating doctors and cross-border education providers (Karle, 2006) has hastened the need for an international perspective to quality implementation in medical education. However, despite the wide international adoption for quality improvement, most Gulf Cooperation Council (GCC) countries, Saudi Arabia included, have not adopted these international medical education standards (Khani & Zarghami, 2013); Smith and Abouammoh, 2013). Saudi Arabia established its independent authority responsible for determining standards and procedures for accreditation and quality assurance for post-secondary institutions and programs (NCAAA, 2018).

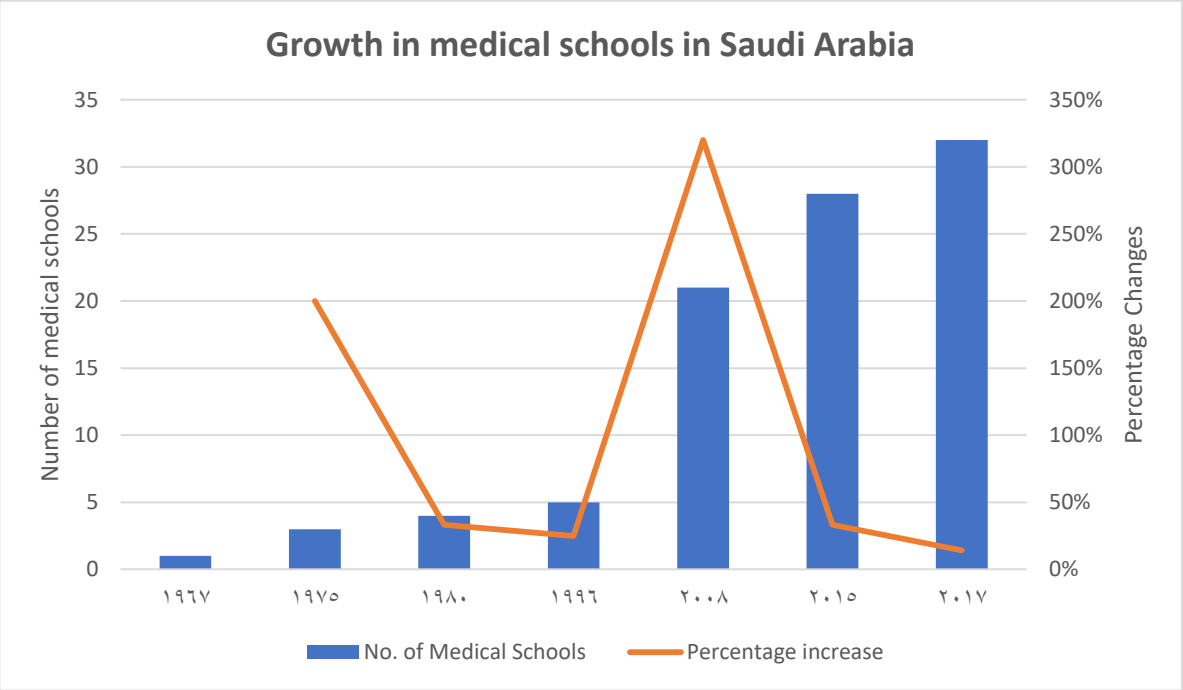
## Justification of this Study

While the NCAAA standards and accreditation process has contributed to improving education quality awareness and practices in Saudi Arabia (Alrebish, Jolly, & Molloy, 2017), these standards have been criticised for being too general (Smith and Abouammoh, 2013) and therefore, not specific to the medical education requirements. (Al-Muhanna, 2009) argued that the lack of a more specific standardised structure for medical schools to base and determine the format of education and the skills required has contributed to the failure to meet the medical professional demands. (Al-Muhanna, 2009) found that most medical institutions had no clear vision, had objectives that were obscure or unknown to most staff and students had also replicated western medical curricula with little or no adaptation to the local health needs. Besides, there was no uniformity of curricula and standards of medical education across the medical colleges. Similarly, (Hamdy, et al., 2018) found that while programs, as described on paper, look

good, what needed to be evaluated is the curriculum 'in action' especially that many medical schools have challenges "related to shortages of faculty, availability of clinical training facilities, and the need for more integration with the national health care services.

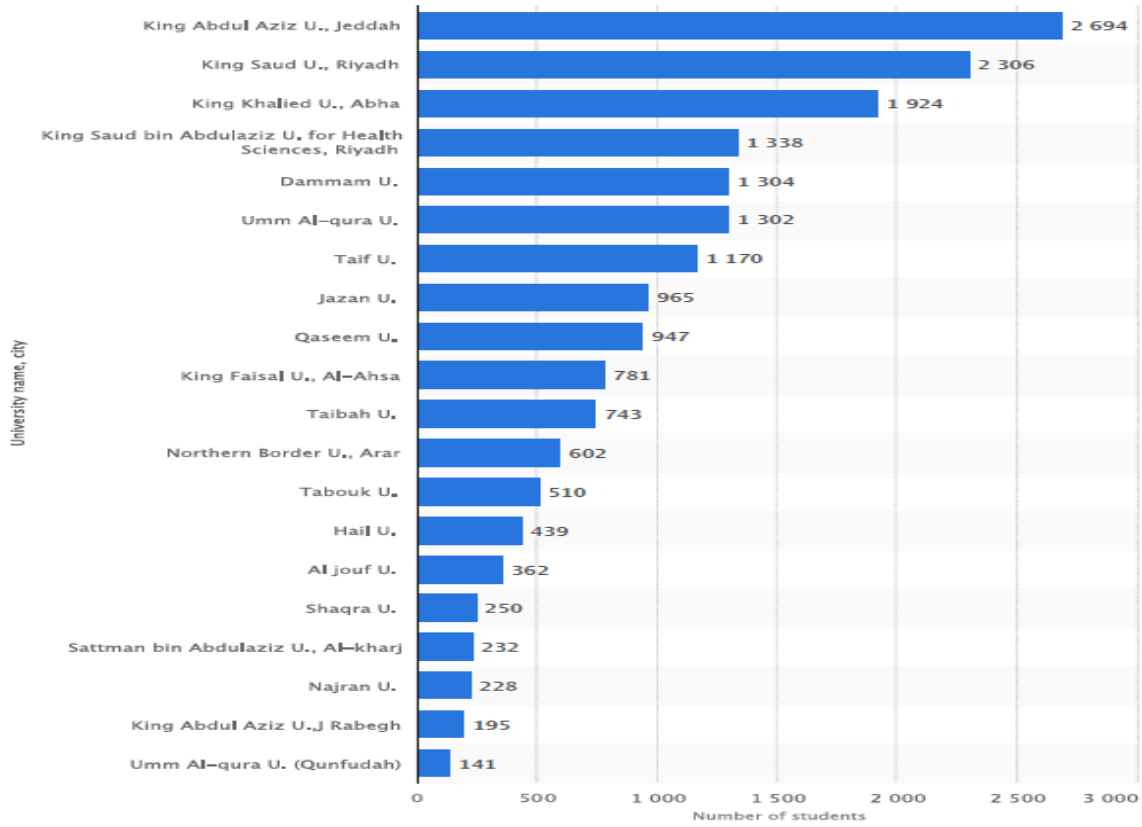
The Ministry of Higher Education, Saudi Arabia, invited the private sector to contribute and invest in higher education (Telmesani et al., 2011). With the support of the Ministry of Higher Education, the total number of medical schools increased to 21 by 2008, comprising three private and 18 governments (Hassanien, 2014), representing a 320% increase. Since 2008, 10 new medical schools have been established, bringing the total number of medical schools to 31 by 2017 (Figure 1). This essentially represents a growth of over 33% within ten years. The largest medical schools by student numbers are shown in figure 2 below.

**Figure 1: Growth in medical schools in Saudi Arabia**




Source: Ministry of Higher Education, KSA

**Figure 2: Number of students in the top 20 medical schools in Saudi Arabia**




Source: Statista, 2018

## Literature Review

(Lilley & Harden, 2003) highlight that "while many nations have rigorous evaluation and accreditation procedures to help ensure the quality of the medical education provided by their medical schools and others have embryonic accreditation procedures, most have no such policies and individual schools are free to implement their criteria in terms of the students admitted, their training and their assessment." The result is a wide variety in the quality and standard of education and training worldwide. Further, given the changing global trends and the nature of medical education, as socially vital since it provides a means for improved quality of life and social mobility, the need for internationally recognisable medical education standards become even more imperative. In this vein, several attempts have been undertaken over the years to provide some standardised structure, process, or product of medical education (Al-Muhanna, F.A.; Subbaroa, V.V., 2003). Notable among these international efforts are the works of the World Health Organisation (WHO), which defined the standards of medical education in terms of the local community and produced the 'five-star doctor' model. Further, the

World Federation of Medical Education (WFME) embarked on the development of international standards in medical education aimed at providing a tool for quality improvement. The WFME, in particular, has been widely endorsed and is currently being used in many regions around the world as a basis for improving medical education through providing a template for national and regional accreditation systems (Karle, 2006). The International Standards Organisation (ISO, 2018) defines standards as: documented agreements containing technical specifications or other precise criteria to be used consistently as rules, guidelines or definitions, to ensure that materials, products, processes and, services are fit for their purpose

Education standards play an essential role in education quality improvement by clearly defining what knowledge and skills are to be acquired and what kind of performance is to be expected (Joshi, 2012). These standards define the knowledge and skills that students are expected to possess at the different critical points in the educational path (National Research Council, 2001). There is no universally accepted definition of standards, as several definitions have been advanced. In this respect, standards in medical education can be perceived as the "professional attitudes, ethics and statements about knowledge and clinical skills graduates should have, and be able to demonstrate" (Al-Muhanna, F.A.; Subbaroa, V.V., 2003). One of the key characteristics of a medical education standard is that it should be "definable, meaningful, appropriate, measurable and acceptable by the users" (Hosseini, Einollahi, Zand, Nazaran, Niaei, & Avarzamani, 2002).

**The importance of quality assurance in medical education**

The underlying aim of any medical education system is to maintain and improve the quality of health care delivered by medical professionals to patients (Abdulrahman, 2008). The introduction of quality control systems in medical education is directed at promoting the quality of the product, i.e., the medical professionals. Further, the medical education system should also be responsive to the changing needs of healthcare (WHO, 2001). Thus, several calls for the need for the medical education system to reform and innovate to address the changing social and political environment have been made in the past (Hosseini, Einollahi, Zand, Nazaran, Niaei, & Avarzamani, 2002). Social accountability, in particular, in terms of the effectiveness and quality of medical education, has constantly been the main focus (Karle, 2006); (Lilley & Harden, 2003). Social accountability refers to the "willingness and ability to respond to the needs of society, of patients and the health and health-related sectors and to contribute to the national and international development of medicine by fostering competencies in health care, medical education and medical research" (WFME, 2015, p. 17). Organisations, medical schools included, use quality standards in the quality assurance systems as a way of managing quality in a more systematic manner (Buwalda, Braspenning, van Roosmalen, Van Dijk, & Visser, 2017). The need for medical schools to have efficient and effective quality assurance systems arises from the increasingly fierce competition

for students and resources that the education industry is currently faced with (WHO, 2001). The adoption and implementation of quality standards in medical education have been recognised as essential elements in the promotion of quality of medical professionals (Biggs, 2001); (Hopkins, 2015); (Thomas, 2015). As a result, medical educational institutions need to either establish institutional quality standards or adopt already established (national or international) quality standards to assure the quality of education offered. This is important as quality assurance requires transparency and dissemination of outcomes to all the stakeholders (Joshi, 2012), which makes the reporting based on established quality standards more effective.

Several factors contribute to the increasing relevance of quality standards in medical education. Firstly, with increased globalisation, there is a growing need for a set of minimum standards for medical education that could be implemented at a global level to build confidence in the medical professionals (Lilley & Harden, 2003). This is also notably the case given that many countries have no nationally accredited quality assurance systems (Al-Muhanna, F.A.; Subbaroa, V.V., 2003). This is more prevalent in less developed countries (Khani & Zarghami, 2013). The result is a wide variety of quality and standard of education and training worldwide. This wide variety of quality practices could be addressed by having some universally accepted standards. As depicted in section 2.2, these standards could be voluntary and private, which could supplement the local mandatory or public standards where these exist. Secondly, as a result of globalisation, there has been an increased migration of medical professionals (Eckhert, 2002); Ray et al., 2006; Van Zanten et al., 2012). Without uniformity in medical education, there are concerns regarding the knowledge and skills of medical professionals, especially from developing and emerging countries. In this respect, with international accreditation, validation, and audits, there is an assurance worldwide of the knowledge and skills of immigrant medical professions. Thirdly, besides the changing global trends, the nature of medical education as contributing to the quality of healthcare provision necessitates close monitoring. Medical education contributes to the quality of healthcare, making it socially relevant. This makes it more relevant to have mandatory or public standards, stipulating minimum requirement for quality improvement, in any nation.

**Factors that affect the implementation of quality standards**

*As quality standards contribute to the quality assurance system, the factors that affect the successful implementation of quality standards in medical schools could be easily understood from the broader perspective of the factors that affect the implementation of quality assurance systems in educational establishments. In the implementation of quality assurance systems in medical schools through quality standards, it is iimperative that 'patient safety' is seen as the ultimate priority of the quality assurance system implementation* (GMC, 2015). *Several factors underlie the successful implementation of quality standards. Firstly, an educational quality assurance system requires a learning*

*environment and organisational culture that is attuned to quality improvement* (GMC, 2015)*;* (Sallis, 2014). *The appropriate learning environment and organisational culture would support good practice that enables the achievement of the learning outcomes required by the medical school curriculum* (GMC, 2015). *Secondly, a quality assurance system requires good governance and leadership* (Aquilani, Silvestri, Ruggieri, & Gatti, 2017); (Arunachalam & Palanichamy, 2017). The top management commitment to quality improvement should be demonstrated at the different institutional levels (i.e., operational, managerial, and strategic levels). (GMC, 2015) highlights that the "educational governance system continuously improves the quality and outcomes of education and training by measuring performance against the standards, demonstrating accountability, and responding when standards are not being met." Besides, the educational governance system helps ensure that education and training are fair and based on principles of equality and diversity.

Thirdly, for the successful implementation of quality standards, there should support to learners and educators (GMC, 2015). In this respect, educators should possess the necessary knowledge and skills for their roles and also get the appropriate support and resources needed to deliver the required education and training. This aspect is consistent with the requirement for a supportive learning environment. From this perspective, institutions should perceive employees as the most valuable contributor to quality (Slack et al., 2010). Further, with respect to learners, the medical education institution should make sure that learners get adequate educational and pastoral support in order to achieve the designed education curriculum (GMC, 2015).

Fourthly, with a supportive learning environment, medical institutions should develop and implement curricula and assessments that can impact the required knowledge and skills in the learners (GMC, 2015). This is important as the qualified medical professionals from the institutions should demonstrate the expected high level of knowledge and skills to ensure proper medical practice. The requirements and expectations of stakeholders from the medical education system should be appropriately communicated to at the different levels of the institution in order to build a sense of social responsibility and accountability and shared vision and commitment (Cruess, Cruess, & Steinert, 2016); (Karle, 2006); (Lilley & Harden, 2003). Adopting or implementing quality standards, thus, forms an important aspect of quality assurance in the education system. These *quality standards must be applied to both the public and private sector education and also be supported by a comprehensive regulatory regime (The Commonwealth, 2016). The WFME standards (arguably) provide a source of comprehensive framework/guideline for quality assurance.*

**The World Federation for Medical Education Global Standards**

The World Federation for Medical Education (WFME) has developed global medical education quality standards. The WFME in 1998 launched a programme on international standards in medical education aimed at improving standards that should serve as a tool for quality improvement (WHO, 2018). The first set of global standards was issued in 2001, and subsequent revisions have been made since then. The international standards in basic medical education were "designed to enable medical schools at various stages of development, and with different educational, socio-economic and cultural conditions, to use the system of standards at a level appropriate to them" (WFME, 2003, p. 5). Thus, these global standards take into consideration the variations that exist among countries in the teaching tradition, culture, socio-economic conditions, the health and disease spectrum, and different forms of health care delivery systems (WFME, 2018).

The WFME global standards are relevant as they essentially address the problems identified in section 2.5 above. As highlighted, international standards in medical education are necessary because of increased globalisation, migration of medical professionals and cross-border education providers, the proliferation of medical schools worldwide with questionable education quality and changing social needs (Karle, 2006); (Lilley & Harden, 2003); (Van Niekerk, Christensen, Karle, Lindgren, & Nystrup, 2003). Further, international standards help to "address national problems and challenges resulting from changes in the healthcare delivery service, from institutional conservatism, and from insufficient management and leadership" (Karle, 2006), p. s44). Thus, the WFME standards would provide an avenue to address problems at both the national level and institutional levels. The advantage of the WFME global standards is that they promote the education quality while recognising the uniqueness of the social, economic and political context of the nation. Diversity of educational programmes, WFME (2018) state, should be promoted in order to account for the different educational, social, economic, and cultural conditions, different patterns of disease, and to support social responsibility. The benefit of the WFME global standards is that they do provide a template, and not a universal core curriculum, for medical education institutions and agencies which "accredit them to define institutional, national and regional standards, and to act as a lever for quality improvement" (WFME, 2018). In this way, the standards still promote national and regional autonomy.

**Studies on medical education quality standards Saudi Arabia and The Middle East**

Few studies exist (Al-Muhanna, F.A.; Subbaroa, V.V., 2003); Hamdy et al., 2010; Telmesani et al., 2011) that have examined the quality of medical education in the Kingdom of Saudi Arabia. However, none of these studies have examined the possible application of global standards in the country. Hamdy et al. (2010), in their study of medical education in the Gulf Cooperation Council (GCC), found that older medical schools were reviewing their education curriculum while new medical schools are increasingly developing their programs following current trends in medical education

which include problem-based learning and integrated curricula. (Al-Muhanna, F.A.; Subbaroa, V.V., 2003), in their study of standards in medical education and GCC countries, argue that a "radical change in medical education is necessary" in the GCC countries, Saudi Arabia included. Further, Telmesani et al. (2011) observed an expansion of the quantity in medical education which has been associated with a drive for higher quality assurance monitoring while (Al-Muhanna, 2009) found that the lack of a standardised structure for medical schools to base and determine the format of education and the skills required, contributing to the failure to meet the medical professional demands. Besides, (Al-Muhanna, 2009) found that most medical institutions had no clear vision, had objectives that were obscure or unknown to most staff and students, and had also replicated western medical curricula with little or no adaptation to the local health needs. Besides, there was no uniformity of curricula and standards of medical education across the medical colleges.

**Research Methodology**

This is an exploratory and descriptive study to examine the readiness of private medical schools in KSA towards implementing the WFME global medical standards. As Easterby-Smith et al. (2002, p. 27) argues that an understanding of the philosophical issues is beneficial, The Interpretivism approach has been adopted as the study seeks to understand the subjective interpretations of the education quality of the participants from the medical schools in Saudi Arabia. According to Interpretivism, the multiple interpretations or views of a social phenomenon can only be captured through the employment of relatively less rigid data collection techniques such as those within a qualitative research approach (Saunders et al., 2012). The use of structured interviews in this context was aimed at providing an understanding and evaluation of the quality assurance systems of selected medical schools in Saudi Arabia. The interpretations and explanations ascribed to the implemented quality assurance systems in the participants' respective medical schools revolve around aspects identified by the WFME global standards as key in quality implementation and monitoring. Thus, the structured interview questions (see appendix A) were developed to assess quality in nine components of medical education which are:

1. mission and objectives,
2. educational programme,
3. assessment of students,
4. students,
5. academic staff/faculty,
6. educational resources,
7. programme evaluation,
8. governance and administration and
9. Continuous renewal (WFME, 2018).

In each component, participants were asked questions that enabled the assessment of the existence or non-existence of component characteristics that contribute to quality in medical education.

Data collection and analysis

The total number of medical schools had reached thirty-two by January 2018. The thirty-two medical schools are composed of private (nine schools) and government (23 schools). However, the focus of this study was on the privately funded medical schools. This is due to accessibility constraints and the general argument in the literature that quality of education in privately funded medical schools is expected to be a challenge due to the lower financial base (Haque, 2017); (Shehnaz, 2010). Further, strategic and policy changes are also likely to be faster in privately owned medical schools that are not characterised by bureaucracy and red tape (Haque, 2017). Further, because of some constraints, face to face interviews was not possible. Hence, an online structured interview was designed, and participants sent the online link to access the interview questions (see appendix B). Appendix D shows an example of a completed structured interview. The benefit of this approach was that it gave the participants enough time to complete the structured interviews as they could finish in parts and continue at a later date. Further, some questions were left open-ended, enabling the participants to answer as detailed as possible.

As this study was exploratory, the aim was to capture as many aspects as possible in the identified quality assurance components. The respondents have been identified by letters A, B, C, and D. The positions of the respondents in their respective medical schools and how long they have served are shown in table 1.

**Table 1: Position of respondents in medical schools**

| Respondent | Position | Years served |
|---|---|---|
| A | Professor of Anatomy | 10 |
| B | Professor | 7 |
| C | Director of Quality management - Faculty of Medicine | 5 |
| D | Director of Quality and Academic Accreditation | 25 |

In addition to the analysis of structured interviews, documentary evidence has been sought on the current voluntary and regulatory requirements regarding medical education quality assurance implementation system; this documentary analysis helps complement the analysis of primary data.

**Discussion**

The key themes arising from the data obtained through structured interviews relate to the aspects of quality assurance that the WFME standards emphasise. These aspects mainly cover the entire process of the medical education process. Thus, the first part of the section discusses findings with respect to institutional mission and objectives, educational programme, assessment of students, students, academic staff/faculty, educational resources, programme evaluation, governance and administration, and continuous renewal. The second section reveals the identified constraints/challenges in the implementation of quality assurance systems. In the examination of the quality assurance systems implemented by Saudi medical schools, gaps are identified, that the WFME standards could potentially address. The WFME offers a developmental perspective to the attainment of quality assurance levels within any institution. As such, these standards can be used as fundamental to quality development levels or a tool for quality assurance and development of primary medical education. A medical school could, therefore, use these standards for self-evaluation and self-improvement processes. As highlighted in section 3.5, the development of the structured questions was based on the WFME standards, which have a developmental and self-evaluation perspective.

According to the WFME standards, a medical school must clearly outline its mission and objectives to its constituency and the health sector it serves (WFME, 2018). In its mission, the medical school is expected to outline the aims and educational strategy that would result in 'competent, capable, prepared and committed' medical professionals. The mission should have been developed encompassing "the health needs of the community, the needs of the health care delivery system and other aspects of social accountability" (WFME, 2015, p. 15). The mission developed by the medical school should also cover aspects related to medical research attainment and perspectives of global health.

Some aspects are partly or not fully addressed in the mission statements relate to the social accountability of the medical schools. In this respect, a gap exists in the explicit and appropriate communication of the institutions' social responsibility and accountability. Several studies have highlighted the importance of acknowledging the wider social responsibility of medical schools in society (Cruess, Cruess, & Steinert, 2016); (Karle, 2006); (Lilley & Harden, 2003). A document review of the NCAAA also shows no explicit mention of the social accountability of the schools. Further, two of the respondents observed that their medical schools' missions did not encompass research attainment nor aspects related to global health.

Further, with respect to the participation in the formulation of the missions and educational outcomes, there were some consistencies across the four medical schools. The consistencies related to the identification of the principal stakeholders; which were identified as students, medical community, society/public, and government. Respondent C also specified the teaching hospitals affiliated with the medical school while Respondent D included the 'patients,' 'students' families' and 'medical jobs market' as

part of the principal stakeholders. The reference to hospitals and patients shows an acknowledgement of the intended impact of medical professionals on healthcare delivery (Abdulrahman, 2008). Some inconsistencies, however, related to the role or input of these stakeholders in the formulation of mission and intended educational outcomes. While not specifying the specific roles played, two out of the four participants (50%) indicated that the stakeholders have an input in the process of formulating the missions and educational outcomes.

Education programme and education outcomes

With respect to education programmes, the WFME standards require that medical schools define the overall curriculum that prepares students for life-long learning (WFME, 2018). The delivery of such a curriculum should also consider principles of equality. As a medical school, the developed education curriculum should include elements of original or advanced research that have analytical and critical thinking. The curriculum should also identify and incorporate the contributions of the biomedical sciences, behavioural and social sciences, and clinical sciences to scientific, technological, and clinical development. This should remain flexible in order to anticipate the needs of the society and the health care system. All medical schools examined showed that their curriculum and instructional/learning methods stimulate, prepare, and support students to take responsibility for their learning process. However, how this is achieved is different among the medical schools. Respondent A explained that this is achieved through "student centred learning" which essentially supports both "team based learning" and "problem based learning". Problem based learning is also the approach attributed to by Respondent C whilst respondent D refers to "active learning" as the approach utilised in order to prepare students for life-long learning.

With respect to educational curriculum delivered in accordance with principles of equality, three out of four medical schools (75%) indicated that equality is directly promoted in the curriculum. Similarly, only one respondent (25%) stated that their curriculum did not include elements of original or advanced research. Some differences in participants' responses were observed with respect to their curriculum contributing to current and anticipated needs of the society and the health care system. Respondents A and C referred to continuous research in common diseases identified in the Kingdom of Saudi Arabia. For instance, respondent C stated that "continuous and advanced research, also how to treat and reduce common diseases" was the way in which the curriculum contributed to the current and anticipated needs. Respondent B, whilst not emphasising continuous and advanced research indicated that the medical school takes steps to identify common diseases. According to the respondent B, the common diseases and condition seen in the community are addressed in the curriculum, and a list of must-see cases are prepared and announced so that each student has the opportunity to see and discuss these common cases. Some respondents, however, stated that the "problem-based learning approach" (Respondent A) and "easy and flexibility of curriculum"

(Respondent C) captures these aspects. Further, in all medical schools examined, the curriculum allows students to have early patient contact and participation in patient care. The different components of clinical skills training have also been structured according to the stages of the study programme.

With respect to intended educational outcomes, the WFME standards recommends that medical schools should define the intended educational outcomes that students should exhibit upon graduation which might be related to their future roles in the health sector, their commitment to and skills in life-long learning or even the wider health needs of the communities (WFME, 2018). All medical schools investigated revealed that these educational outcomes are made known to the public through the institutions' websites and community medicine practices. Respondent D, particularly, stated that the medical school was using "social media, local and international higher education conferences and exhibitions" in order to publicise these educational outcomes. Further, in defining these intended educational outcomes, Respondent B highlights that these outcomes are "defined with the participation of a large group of faculty members and approved by the University bodies" whilst respondent C stated that these are defined in order to "develop and identify students' standards appropriately and identical with information, knowledge, skills, attitudes, behaviour and experience". Respondent D further highlights that the learning outcomes are defined through "comprehensive learning outcomes matrix for our educational programs". As such, there are no significant gaps observed in this respect among all medical schools examined. This is observable also with respect to the specification of intended outcomes of student engagement in medical research.

Students and assessment

Similar to educational outcomes, there is some consistencies observed among the medical schools examined regarding students and their assessments. Table 3 summarises the evaluation of aspects related to students and their assessment among the 4 medical schools. The differences between the medical schools is observable with respect to the need to use external examiners. Only 25% of the medical schools encourages the use of external examiners. The WFME standards advices that medical schools should "encourage the use of external examiners" (WFME, 2015, p. 27). According to the WFME standards, it's imperative that medical schools ensure that methods and results of assessments avoid conflicts of interest and that the assessments are open to scrutiny by external expertise. Further, the WFME standards provide that medical schools should state the relationship between selection and the mission of the school, the educational programme and desired qualities of graduates. A review of the four medical schools shows that only two have specified this relationship while the other two only relate the selection to the educational programmes.

Academic staff/faculty and educational resources

The WFME standards stated that medical schools must formulate and implement a staff recruitment and selection policy which among others: "outline the type, responsibilities

and balance of the academic staff/faculty of the basic biomedical sciences, the behavioural and social sciences, and the clinical sciences required to deliver the curriculum adequately; address criteria for scientific, educational, and clinical merit, including the balance between teaching, research and service functions; and specify and monitor the responsibilities of its academic staff/faculty.." (WFME, 2015, p. 32). Further, in the formulated policy for staff recruitment and selection, medical schools need to take into account, aspects such as economic considerations and relationship to the medical school mission. Some shortcomings were observed in one medical school in this quality assurance aspect. In particular, respondent B stated that the medical had no specific school policy for staff recruitment and selection, nor does the policy take into account economic considerations or relate to significant local issues. However, medical school does consider its teacher-student ratios periodically to make sure it's relevant to the curricular components.

With respect to educational resources, respondent A stated that medical school improves its learning environment to match up with developments in educational practices through "workshops, discussions, feedback from externals and continuous education" whilst respondent B commented that "new facilities (e.g. classrooms, clinical skills labs, laboratories, etc.) are built according to the needs of the students, and the curricular changes". These comments are similar to respondent C, who stated that the medical school encourages teamwork and workshops, and does continue to upgrade existing facilities (library, laboratories, classrooms, etc.). However, the use of existing and new information and communication technology was mostly attributed to independent learning as compared to other potential applications such as accessing data, managing patients and working in health care delivery systems. The WFME standards recommend that medical schools should enable teachers and students to use existing and exploit appropriate new information and communication technology for independent learning, accessing information, managing patients and working in health care delivery systems (WFME, 2015, p. 35). Further, medical schools should "optimise student access to relevant patient data and health care information systems" (ibid). In this respect, the medical schools fall short of the standard.

Programme evaluation and governance

Programme evaluation and governance form another critical aspect of medical education. Programme evaluation is "the process of systematic gathering of information to judge the effectiveness and adequacy of the institution and its programme" (WFME, 2015, p. 38). Every medical school is expected to: have a programme of routine curriculum monitoring of processes and outcomes; establish and apply a mechanism for programme evaluation; and also ensure that relevant results of evaluation influence the curriculum (WFME, 2015). In all the medical schools examined, there is a right policy to obtain and use feedback results for programme development which is recommended by the WFME standards also. However, there are differences relating to how the schools

analyse performance of cohorts of students and graduates. Some similarities in approaches are evident in medical schools B and C. Further; respondent D explains that the medical school's periodical evaluation of its academic leadership is done through "quality committee meetings" whilst medical school C involves stakeholders utilising questionnaires. There are also differences observed regarding medical schools exercising autonomy to direct resources, including teaching staff remunerations, as a way towards achieving intended educational outcomes. For instance, respondent D indicated that the medical school has no actual autonomy in the direction of resources contrary to respondent B, who highlighted that the school determines the staff policy without external influence. Differences also exist regarding programme modification in response to opinions in the society/community with one medical school, indicating that it does not adjust its programmes in light of these. The answers regarding the adjustment to changes or developments in medical sciences and health need where through adjusting the curriculum and mission objectives (Respondent A) and through curriculum development and researching diseases prevalent in the Saudi Arabia (Respondent C).

Administration and continuous renewal

A review of the medical schools shows that they all have an internal programme for quality assurance which is subject to regular review. The four medical schools examined have either a department or committee that is in charge of quality assessment and monitoring. The institutional quality assurance management system is mainly based on the Saudi Arabia's National Commission for Academic Accreditation & Assessment (NCAAA) guidelines (see section 2.5). One of the medical schools (medical school D) examined, however, has gone beyond the NCAAA guidelines to incorporate the ISO 9000 – Quality management standards and the Saudi Commission for Health Specialties (SCFHS) framework. The SCFHS is a professional body that regulates healthcare related practices and accreditations at all levels in Saudi Arabia (SCFHS, 2018). The adoption of NCAAA guidelines, however, was done at different times (see table 5 below) with the earliest of these adopted in 2008. Each of the medical schools have indicated commitment to a review of their quality assurance systems. This is consistent with the WFME standards that state that "the medical school must as a dynamic and socially accountable institution: initiate procedures for regularly reviewing and updating the process, structure, content, outcomes/competencies, assessment and learning environment of the programme; rectify documented deficiencies; and allocate resources for continuous renewal" (WFME, 2015, p. 45). The study also sought to understand the significant constraints that undermine the implementation of quality assurance systems in medical schools. As discussed in section 2.7, several factors affect the implementation of quality assurance system in institutions which include a *learning environment and organisational culture that is tuned to quality improvement* (GMC, 2015)*;* (Sallis, 2014), *good governance and leadership* (Aquilani, Silvestri, Ruggieri, & Gatti, 2017), supporting learners and educators (GMC, 2015) and development and implementation of

curricula and assessments that are able to impact the required knowledge and skills in the learners.

An investigation into the four medical schools reveals some of these aspects are constraining the effective implementation of quality assurance systems. Lack of sufficient top management support was highlighted as one of the major challenges. Respondent A, for example stated that "Accreditation committee, Vice Dean's office" did not provide the support needed. Further, the organisational culture was highlighted as not attuned to quality improvement with observations such as "delays in reports from department administrators" (Respondent C) and "reports from the course and clerkship directors do not always come in time, and they are not shared with the faculty and departments/course directors" (Respondent B). Thus, without leadership and a supportive learning environment that promotes a quality improvement culture, the potential benefits arising from quality assurance standards would be constrained. Considering the challenges, respondents suggested changes that could enhance the institutional quality assurance system. These included establishment of an "office of quality control and accreditation" (Respondent B); provision of "assistance and support from the Dean of the school and working collectively" (Respondent C) and the need for qualified staff to work in quality unit, provision of training programs in quality, and the need for full support from top management" (Respondent D).

The identified gaps include lack of explicit and appropriate communication of the institutions' social responsibility and accountability; the lack of responsiveness of the curriculum to changing demographic and cultural context; the need to use external examiners or external scrutiny, the need to link the selection policy to the mission of the school, the educational programme and desired qualities of graduates; the importance of specific school policy for staff recruitment and selection that takes into account economic considerations or relate to significant local issues; the need for increased autonomy to direct resources, including teaching staff remunerations, as a way towards achieving intended educational outcomes; the importance of programme modifications in response to changing opinions in the society/community and the importance of continuous monitoring and review of the quality assurance system. Some challenges in the implementation of quality assurance systems were also observed such as inadequate top management support and a general environment whose culture is not attuned to quality improvement.

**Conclusion, recommendations and implications.**

The study utilised structured interviews, which were developed based on the WFME standards in order to capture the different aspects of quality assurance in medical education which included institutional mission and objectives, educational programme, assessment of students, students, academic staff/faculty, educational resources, programme evaluation, governance and administration and continuous renewal (WFME, 2015). Further, the documentary analysis was employed to supplement the primary data

obtained through structured interviews. This study is exploratory, which adopts interpretivist perspective. A case study approach was employed in examining four privately founded medical schools in Saudi Arabia. An examination of the four medical schools found that they all either have a department or committee that is in charge of quality assessment and monitoring. The medical schools' quality assurance management systems are mainly based on the Saudi Arabia's National Commission for Academic Accreditation & Assessment (NCAAA) guidelines (see section 4.2.6). These were adopted at different times with the earliest being 2008. Further, of the 4 medical schools examined, only 1 had gone beyond the nationally expected NCAAA guidelines to incorporate the ISO 9000 – Quality management standards and the Saudi Commission for Health Specialties (SCFHS) framework. The study has revealed that largely, there are some consistencies across the medical schools on the quality assurance aspects. This is consistent with studies (e.g. Hamdy et al., 2010) that highlight a gradual improvement in medical education process. However, there still exist some significant gaps which include: a lack of explicit and appropriate communication of the institutions' social responsibility and accountability; a lack of responsiveness of the curriculum to changing demographic and cultural context; the need to use external examiners or external scrutiny, the need to link the student's selection policy to the mission of the school, the educational programme and desired qualities of graduates; the importance of specific school policy for staff recruitment and selection that takes into account economic considerations or relate to significant local issues; the need for increased autonomy to direct resources, including teaching staff remunerations, as a way towards achieving intended educational outcomes; the importance of programme modifications in response to changing opinions in the society/community and the importance of continuous monitoring and review of the quality assurance system. These gaps support other studies (Al-Muhanna, 2009); (Al-Muhanna, F.A.; Subbaroa, V.V., 2003) that highlight the need for reforms to address inconsistencies.

The study has revealed that critical challenges or constraints are associated with the lack of sufficient top management support and an organisational culture or environment that is not attuned to quality improvement. This is reflected, for instance, in delays in submitting monitoring report and lack of training on quality. These findings are largely consistent with the literature that shows leadership, organisation culture and supportive environment as important components of quality assurance systems (Aquilani, Silvestri, Ruggieri, & Gatti, 2017); (Sallis, 2014)

**Study Limitations**

The study has some inherent limitations despite the rigorously attempt to make it as comprehensive as possible. Limitations, for instance, relate to the methodological approach used in employing the structured interview method. Some questions could have been misunderstood, and thus, the response also incorrect. Further, there was no opportunity to clarify or explain these aspects more. Limitations also exist concerning

respondents not getting into detail, or providing explanations for some answers. This makes the interpretations of responses limited. Another limitation of the research is concerning generalisability of the results as only four out of nine privately founded medical schools were examined. However four out of nine (i.e. 44%) is representative of the privately funded schools.

**Recommendations and implications**

These recommendations and implications are based on the findings of the study. Table 7 below, summarises the recommendations and implications. These combined factors raise the need for medical education standards in Saudi Arabia. The adoption of the WFME medical education standards could fill this gap of the lack of specific standards for medical education in Saudi Arabia. This research makes a contribution to the extant literature which advocates for the promotion and development of international quality assurance standards in medical education, given the changing social, political, and economic trends exacerbated by globalisation. Further, it contributes by giving an emerging country, the perspective of the Kingdom of Saudi Arabia, were such research is rare. The study also makes a contribution through highlighting the current challenges of the existing quality assurance systems, and the potential benefits that could result from international accreditations.

Table 2: Recommendations/implications of findings

| Study Findings | Implications | Recommendations | Responsible office/dept |
|---|---|---|---|
| Medical schools' quality assurance management systems are mainly based on Saudi Arabia's National Commission for Academic Accreditation & Assessment (NCAAA) guidelines | This is positive for the country as it ensures uniformity in quality assurance. However, different stages of adoption imply that some medical schools would have not fully implemented the national quality guidelines | Medical schools should strengthen the institutional capacity to adopt the quality assurance standards fully. | Medical schools' top management, quality assurance committees |
| Some medical school adopted ISO 9000 – Quality management standards and the Saudi Commission for Health Specialties | The international quality assurance standards complement the national standards, which leads to better quality assurance systems in schools. | Encourage the institutional adoption of internationally recognised quality assurance standards | Medical schools' quality assurance departments/committees |
| The study has revealed that large, and there are some consistencies | The overall quality and competence of medical professionals | NCAAA should strengthen the accreditation and | NCAAA working with individual |

| Study Findings | Implications | Recommendations | Responsible office/dept |
|---|---|---|---|
| across the medical schools on the quality assurance aspects. | is improved across the national, which makes a contribution to the health care needs of society stronger. | monitoring process to ensure long term standards are maintained | schools |
| • A lack of explicit and appropriate communication of the institutions' social responsibility and accountability;<br>• a lack of responsiveness of the curriculum to changing demographic and cultural context;<br>• the need to use external examiners or external scrutiny, the need to link the student selection policy to the mission of the school, the educational programme and desired qualities of graduates;<br>• the importance of specific school policy for staff recruitment and selection that takes into account economic considerations or relate to significant local issues;<br>• the need for increased autonomy to direct resources, including teaching staff remunerations, as a way towards | • The implications of the medical schools to the broader society need to be an integral part of its operations.<br>• This implies that medical schools' curricular should be responsive to changing health care needs of society.<br>• Without social accountability and responsiveness, the medical schools would be distanced from the society that their graduates are meant to serve.<br>• Without autonomy to direct resources, changes are hard to implement which could affect the effective functioning of the quality assurance systems. | Medical schools should have a broader approach and standards which give this perspective adopted.<br><br>Medical schools should adopt the WFME global standards as these will help address the existing gaps and strengthen the quality assurance systems.<br><br>NCAAA to review the existing guidelines in order to bridge gaps. | NCAAA to support institutional efforts to adopt WFME standards.<br><br>Medical schools' top management and quality assurance department.<br><br>Staff engagement and communicatio n. |

| Study Findings | Implications | Recommendations | Responsible office/dept | Adopting WFME Standards |
|---|---|---|---|---|
| achieving intended educational outcomes;<br>• the importance of programme modifications in response to changing opinions in the society/community and the importance of continuous monitoring and review of the quality assurance system | | | | |
| The study has revealed that key challenges or constraints are associated with the lack of sufficient top management support and an organisational culture or environment that is not attuned to quality improvement. | Quality assurance systems would not function fully if these constraints are not addressed. The consequences of ineffective quality assurance systems | Institutional changes need to be implemented to support quality assurance systems:<br>- top management commitment should be sort.<br>- There should be staff engagement and communication | Top management with quality assurance department | |

Thus, while notable improvements have been made in Saudi Arabia, there is a need for the identified gaps to be filled, and institutional challenges addressed. Considering the identified gaps, adoption of the WFME standards is highly recommended, which will lead to better quality assurance system. However, this should be coupled with the strengthening of the institutional contexts to support the quality assurance systems.

**Recommendations for future research**

Further research could utilise other methodological approaches to gain a better understanding of the quality assurance systems. Besides, further research could consider either increasing the number of medical schools examined for generalisability or delve into specific medical schools to gain a deeper understanding of structural constraints or influencers in quality assurance. Nonetheless, this research contributes to the quality assurance literature in GCC countries. Some significant gaps still exist which include: lack of explicit and appropriate communication of the institutions' social responsibility

and accountability; the lack of responsiveness of the curriculum to changing demographic and cultural context; the need to use external examiners or external scrutiny; the need to link the selection policy to the mission of the school, the educational programme and desired qualities of graduates; the importance of specific school policy for staff recruitment and selection that takes into account economic considerations or relate to significant local issues; the need for increased autonomy to direct resources, including teaching staff remunerations, as a way towards achieving intended educational outcomes; the importance of programme modifications in response to changing opinions in the society/community and the importance of continuous monitoring and review of the quality assurance system. Some key challenges in the implementation of quality assurance systems were also observed, such as inadequate top management support and a global environment whose culture is not attuned to quality improvement. These findings have implications which include the need to consider the strengthening of the institutional context before considering the adoption of WFME standards or updating the NCAAA guidelines to cover the existing gaps.

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# Applications of Organisational Learning in the Healthcare Sector



**Mahmoud Khalifa**[1] **& Samah Anwar** [2]

[1]*Applied Science University, College of Administrative Sciences, Bahrain*

[2]*Liwa College, Faculty of Health Sciences, UAE*

*Corresponding Author: mahmoud.khalifa@asu.edu.bh*

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## Abstract:

Organizational learning is the process by which organizations acquire, share, and apply knowledge to continuously improve their performance and adapt to changing environments Applying organizational learning principles to health care can have a significant impact on patients quality control, professional development, and overall organizational effectiveness Healthcare organizations operate in a complex, rapidly evolving environment characterized by advances in medical technology, changing patient demographics, and the need for evidence-based decision-making Recognition of organizational learning can help healthcare organizations increase their capacity for innovation, for a culture of continuous improvement . To address these challenges, healthcare organizations must be knowledge producers, consumers, and co-producers of co-created knowledge. This knowledge needs to be developed continuously, involving everyday healthcare practice and organized collaboration around organizational learning processes. In this paper, we hope to provide a scholarly contribution on this issue, along with an outline of different theoretical and practical approaches, before detailing research projects about Greece and then summarizing the lessons learned. This comprehensive review of the applications of organizational learning in healthcare will contribute to the understanding of how healthcare organizations can leverage this concept to enhance their performance, improve patient outcomes, and navigate the evolving landscape of the healthcare industry.

## Keywords:

Organizational Learning, Healthcare Sector, Patient Safety, Continuous Improvement, Knowledge Management

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## 1. Introduction

(Goula, Stamouli, Latsou, Gkioka, & Kyriakidou, 2021) Worldwide, healthcare systems face significant demographic, financial, and technological challenges. The radical aging of the world population is accompanied by an increased prevalence of chronic and communicable diseases and a growing demand for health services. In addition, financial resources are regularly shrinking in many parts of the world, causing additional challenges that should be addressed with imaginative solutions. Finally, technological advances, like the revolution in digital media and the change process, need to be integrated into clinical practice, putting additional pressure on healthcare professionals. As a result of these changes, the expectations of patients and families from healthcare organizations are also moving from focusing on the number of services (e.g., timely access to primary care and emergency services) to also focusing on the quality and outcomes of their care, patient safety and a professional attitude to their health issues. To respond to these challenges and to be fully prepared for the future, healthcare organizations must learn to adapt (Nuño-Solinís, 2017).

### 1.1. Definition and Key Concepts

In the healthcare sector, the important consequences of these issues are ethically problematic value contradictions between the research community, patients, and care professionals. One of the most well-known examples is the lack of evidence for the effectiveness of many interventions in the healthcare sector and the fierce debate about the extent to which what is known is used in practice. This often contrasts with research-based medicine's ideal of evidence-based health care and the patient's right to being examined and treated based on "research and research-based knowledge." To seek to build up similar situations in which research-based production and health care, on the other hand, is a goal. The idea about learning health systems is that research and practice should be part of each other in a permanent learning process (McLachlan, 2020).

It is suggested that organizational learning be clarified; a delimitation of a field that is first and foremost about its challenge of opening the mind to social intelligence will be helpful. One of the most frequently quoted definitions refers to "the generating, accepting, testing, and modifying of expectations and beliefs about the behavior of organizational members, which forms the basis for them to choose actions in the organization in response to problems and opportunities" (Petropoulos, et al., 2023).

### 1.2. Importance of Organisational Learning in Healthcare

A learning organization positively impacts patient care, clinical outcomes, extent of coordination, patient satisfaction, innovation, and cost efficiency of healthcare organizations. A series of reported benefits have been experienced by doctors and nurses from organizational learning, such as improved communication among healthcare professionals, decreased error occurrence, better implementation of clinical processes and guidelines, increased professional satisfaction and empowerment, and even personal learning. Although the underlying mechanisms of how organizational

learning leads to these performance outcomes in healthcare are less evident, healthcare-related variables like co-works support and feedback from top management are significant mediators between organizational learning (Ni et al., 2019).

Organizational learning refers to the process by which a group of people collectively and continuously learns to develop new ways of thinking and behaving in response to a changing environment (B. Alonazi, 2021). The essence of organizational learning is how healthcare organizations translate their knowledge, capability, and behaviors to clinical practices, healthcare service quality, and patient safety. Although the concept of 'organizational learning' is not new and has significantly been studied in the business sector, few studies highlight the importance of learning organizations in healthcare. It has gained focus in the last few decades and a systematic literature review found an increase in the number of articles related to organizational learning in the healthcare sector from 1991 to 2013 in nine electronic databases

## 2. Theoretical Foundations of Organisational Learning

From the book chapter (Nuño-Solinís, 2017). This chapter will introduce its theoretical foundations and, more specifically, how each single-loop and double-loop learning is enacted within healthcare organizations. We'll translate these theories into practical examples to help you understand how they are relevant to continuous improvement within healthcare organizations. (Sarakbi, Mensah-Abrampah, Kleine-Bingham, & B. Syed, 2021). You will then judge how this approach to organizational learning could bring about the changes intended in the new socio-techno-organizational healthcare system needed in the twenty-first century.

The following four sections describe how the components of a learning health system concretize within teams, organizations, and systems: psychological safety, inter-professional collaboration, leadership and management practices, and performance measurement. At the individual level, the section on psychological safety discusses the importance of sharing information and views within one's work environment. This reciprocal process is at the core of single-loop learning. (Ni et al., 2019). In a learning health system context, inter-professional collaboration is the second building block that allows knowledge transfer across professional boundaries.

This ensures rethinking past practices when evidence surfaces that these are outdated or ineffective. In this context, expanding the 'toolbox' in which effective practices are stored within one's memory is generally a learning proposition, but more specifically linked to single-loop learning. Although the single-loop learning literature often emphasizes uncertainty within a predictable context, in any healthcare system, double-loop learning is at the heart of organizational innovation. To help connect this theoretical foundation to real-world examples, we draw from the case of inpatient handovers in a Norwegian hospital system. (Buckell & Macintyre, 2021)

### 2.1. Single-Loop and Double-Loop Learning

Triple-loop organizational learning is the highest level of the loop. For example, Kofman and Senge (1993) argue that universities must develop reflective learning to

improve the learning process (triple-loop, educative learning) and initiate sustainable change. Higher learning abilities, like reflective learning that require not only changing the routine but also changing the premise or the value of the system, will foster a more sustainable organizational change, whereas lower learning abilities, like restorative learning that only foster changing the routine, without changing the value of the system, result in unsustainable organizational change (Senge, 1999).

Senge (1999) suggested that if learning is optimized in the organization, then triple-loop learning (reflective learning) will allow employees to experiment with the process, structure, and culture and focus on the organization's overall purpose. Overall, higher levels of learning demand employees to increase scrutiny and authenticity, which makes it possible to take a deep look at the underlying mental model and involved values to choose sensitive and responsive behavior in the new environment.

(Berta, Cranley, W. Dearing, J. Dogherty, E. Squires, & A. Estabrooks, 2015) The distinction between single-loop and double-loop learning in healthcare is not new. Structural reform and public administration have long been identified as likely to be sites for double-loop learning and change (Benson, 2005; Chandler and Plano, 2009). Single-loop learning occurs when the focus is on action (the 'how') when the assumption (or mental model) determines goals and strategies remains unquestioned. Learning and change activities are considered successful only when separate, 'closed-loop' improvement decrees are implemented (Thorpe and Howell, 2002), and where organizational members collide with and adjust to minor constraints without fundamentally changing the accepted goal, strategies or underlying values, this merely leads to routine restorative change. In contrast, double-loop learning is distinctive: existing goals and strategies, i.e., the 'why' questions, are open to challenge and, along with them, the mental models from which they spring.

## 2.2. Organisational Learning Theories: Argyris and Schön, Senge

Challenging senior management is essential if the organization is to evolve and improve, and questioning is a constant of the organizational learning abilities in the context of culture theory or, more formally, in Sveinung Jorgensen and Barbara Czarniawska's concept of institutional entrepreneurship (Harrison, M.; M. Shortell, S., 2020). In a climate where there are no major disruptions at the strategic level and where it is not necessary to annihilate any consensus, allowing each member of the organization to take on the role of the entrepreneur in a dominant position would be an expression of organizational balance. In contrast, entrepreneurial projects are legion, and sometimes, even more in the case of an organization whose main focus is the exploitation of results. However, a managerial entrepreneur encourages the members of his/her team to take creative initiatives and consider, without too much pressure, the key decisions.

Many times, the theories of organizational learning are referenced related to the definition of a concept of an ideal organization where shared vision and the principles

of Systems Thinking prevail. Nevertheless, concepts such as the learning process, organizational vulnerability, and, finally, McLuhan's concept of Learning Organization are pointed out (Dingsøyr, 2019). Senge, in collaboration with other authors, extends the original concept and is centered on the relationship between learning and the changes in strategy. According to the authors of "The Agile Organization," these must promote strategic polemic as "a fundamental organizational activity [...] in which many layers join to consider, and often re-consider, important decisions concerning the identification of emerging opportunities and threats to established business".

## 3. Drivers of Organisational Learning in Healthcare

Finally, establishing a learning health system aims to facilitate population- and patient-centered learning to drive high-value care and promote learning so that evidence is created as a byproduct of each healthcare encounter. Due to the considerable impact of hospital standardization and the growing importance of knowledge management and evidence-based practice in hospitals, it is important to consider the nature of hospital mergers and their impacts on educational development processes. Specifically, hospital standardization can be considered a learning process (Nuño-Solinís, 2017). However, the innovation and the development of new products, technologies, and treatment models can also be interpreted as creativity and learning processes that take shape during a hospital merger. The dynamics of education, knowledge sharing, and knowledge management differ in merger phases.

Several drivers influence the expression of the learning processes in healthcare organizations, as established in the literature. Some drivers are centered around hospital standardization, which can be discussed in terms of both organizational- and dynamic capabilities. An appropriate level of standardization of hospitals modulates the study-to-study variation, through which meta-learning can build individualized clinical predictive models based on fewer or shared-to-moderately correlated training data. The adoption of electronic medical records is also among the main drivers that have a positive impact on learning capability. (McLachlan, 2020) (Rafiei, Moore, Jahromi, Hajati, & Kamaleswaran)

### 3.1. Regulatory Requirements

The medicine increases longevity and quality of life but is equally associated with direct and indirect harm (Sujan, 2018). Direct harms are chalked up to side effects, complications, and ineffectiveness of treatments, whereas indirect harms have to do with morbidity and mortality associated with mistreatment or excess of treatment. There is a need to selectively prescribe treatments only to those patients best expected to benefit from them. Presently, this is far from the state of practice. Despite much medical progress in identifying effective treatments for various conditions, the predictability of which intervention works for whom is still modest. Present clinical medicine fails to care for the occasional exception and most patients (Ni et al., 2019). At the same time, the realities of clinical practice create a focus on individualized state-of-the-art treatment, associated with barely any comfort in case of diagnostic doubt, rather than on a patient-centered diagnostic approach, from holistic physical-examinational evaluation

through referral to appropriate interventional diagnostics aiming at determining a selectively decisive diagnosis, i.e., the cause (or main cause) of clinical complexity. This is the prerequisite of causative therapy, i.e., pathogenesis-based therapy allocated to an individual's disease taxonomy, and can help reduce known relevant (direct and indirect) medicine harms (Petropoulos, et al., 2023).

### 3.2. Quality Improvement Initiatives

Advancements in ICT, cloud computing, and distributed work allow healthcare professionals to become globally connected, always learning, innovating, and actively mastering new digital tools. QI and professional development are thereby no longer seen as sacrifice and burden but as delight and growth. Healthcare organizations also become health and social enterprises. Here, ICT, big data, and AI offer transformed business opportunities with significantly more value creation than is currently perceived, such as telemedical networks or apps connecting patients with boundary spanners and professionals. Academic networks and organizations must influence the systematic development of cloud computing in medicine and health.429 Also, the sustainability argument must be grasped on the societal, environmental, and economic levels. (Ngwa, Olver, & Schmeler, 2020)

Quality improvement (QI) is a key focus in healthcare organizations worldwide. If QI initiatives are to be effective, healthcare professionals arguably need to bring clinical knowledge to bear by using an audit to collect evidence of patient experiences and outcomes while using qualitative data to communicate with care recipients and providers (Sarakbi, Mensah-Abrampah, Kleine-Bingham, & B. Syed, 2021). A learning culture in healthcare organizations is linked to improved clinical practice, productivity, and lifelong learning (Goula, Stamouli, Latsou, Gkioka, & Kyriakidou, 2021). A key finding is that, in the healthcare sector, a learning approach appears to reduce quality costs substantially while having a more limited impact on non-quality costs, which may be related to different organizational learning practices, such as a lack of systematic feedback and feed-forward loops with the customer in management activities and R&D. This feedback loop can foster greater patient orientation, a significant component of healthcare, which cannot be measured easily. (Pereira, Silva, Carvalho, Zanghelini, & Barreto, 2022)

## 4. Technological Tools for Facilitating Organisational Learning

Artificial intelligence methods in healthcare provide analysis of complex data, technological, medical, or socioeconomic information that arises from routine clinical practice. In this sense, the AI system acts as an interconnection, a translator, and translational administration of information received from the organism-organizer to the patient, who can interpret the translated information and convert it into personalized action. In contrast, all the time, training and strengthening the system with new, precise, individual information that remains in the EMR becomes capable of solving new tasks and treating a high-risk patient differently. Using the technologies of organizational learning applied within the framework of the conceived model in everyday life, the AI software can initiate actions instead of people while at the same time translating this

information to the informed patient and training the system in the process, thus efficiently realizing health-oriented organizational learning in medicine in the future (B. Alonazi, 2021).

The healthcare sector continuously generates data, a considerable portion of which is stored as unstructured information (Alkhatib, Talaei-Khoei, & Ghapanchi). Due to the exponential increase in the volume of available data in different electronic formats, finding and accessing relevant, fragmented, or time-sensitive information has exacerbated existing organizational challenges. Knowledge graphs (KGs) are being increasingly considered by biomedical and healthcare researchers as a method for creating structured and interlinked knowledge representations of domain entities and their relationships (Ammar, E Bailey, L Davis, & Shaban-Nejad, 2021). KGs re-arrange the chaos of unstructured datasets through representation learning algorithms, enabling an active strategy for disseminating information to patients, providers, researchers, and healthcare managers.

## 4.1. Learning Management Systems

Physical analysis and examination are usually carried out in laboratories. Still, it is equally important to analyze students' emotional states regarding their attitudes, satisfaction, and engagement toward their online training. As expected, HCI and ergonomics are generally treated in the literature regarding technology integration in the educational sectors. However, it is still important to deepen the analysis, considering that nursing students should be able to perceive a high quality of individualization, flexibility, time efficiency, interactivity, and quick feedback during their formative experience. A more global and qualitative analysis should be conducted to deepen these phenomena, directly involving students in the university context to facilitate health and psychological well-being (Steindal, et al., 2021).

Learning Management Systems (LMS) have become necessary, especially during the COVID-19 crisis. For the Healthcare & Medical Sciences sector, LMS plays an essential role by assisting in transitioning from face-to-face to online learning. LMS helps to manage curriculum delivery and administration, track student progress and improve, and create new learning environments that affect consolidated workplace learning positively and promote team learning. Such online learning could benefit all kinds of students, especially those who are more introverted; for example, asynchronous online formation could facilitate their interaction and collaboration, leading to social interaction and gains acting as a strong motivation for them. Additionally, online learning increases student engagement and motivation. (Dubrowski, Kapralos, Peisachovich, Da Silva, & Torres, 2021)

These new behaviors could drive students' professional growth; due to this reason, it is important to deepen the students' attitude towards the LMS, supporting their engagement and self-regulated study strategies by adhering to the development of individual and collaborative cognitive processes. In healthcare students, we need to consider the "professional practice" aspect of individual learning, involving more

cognitive and emotional variables, such as “willingness” or “motivation to learn.” (Meaklim, et al., 2020)

### 4.2. Data Analytics and Business Intelligence

Big data analytics and business intelligence in the healthcare segment essentially consist of primary and secondary care data from commissioning institutions. This, in due course, results in the availability of rich datasets regarding the characteristics of the patient population. The prime criterion for big data is its value, and in healthcare, the value criteria falls upon the quality of services. The big data generation is exponentially high, and keeping it in an appropriate format is essential. The inception of tools and techniques for appropriate visualization is essential to big data. (Guo & Chen, 2023)

Data analytics and business intelligence in the healthcare sector are growing at a rocket pace with the industries accelerating their concentration and efforts maximizing its applications and services (Rehman, Naz, & Razzak, 2020) Data analytics and business intelligence in the healthcare sector are growing at a rocket pace, with industries accelerating their concentration and efforts on maximizing their applications and services (Rehman, Naz, & Razzak, 2020). There is a data influx in the healthcare industry, propelling business intelligence in the healthcare segment. All of these vital data contribute to the requirement for advanced applications and services in the healthcare segment, thus accelerating the implementation of predictive models into advanced analytics and business intelligence applications and paradigms (Alkhatib, Talaei-Khoei, & Ghapanchi)

The healthcare industry is thoroughly experiencing data transformation resulting from the significant volume of data collected from individuals and healthcare services. Organizations in the healthcare segment are gradually transforming from being cautious of the data to utilizing it to save and enhance lives. (George & George, 2023)

## 5. Case Studies in Organisational Learning in Healthcare

Machine learning (ML) algorithms have been gaining momentum as healthcare management tools. Most decisions made in healthcare insurance and practice are based on human intuition. ML algorithms detect hidden patterns and add value across the healthcare value chain. Although the establishment of ML, health informatics in the hospitals insurance claim rejections, etc, have been the most important focus of the discussion. To assess the State of Knowledge (SoK) in the domain of ML and propose a future roadmap, using the Keystone CSWs (Criteria for Scientific Writing or Keystone guidelines) for the review on ML and healthcare. Several articles on ML in production and process, which include studies on the healthcare-applicability of the developed algorithms/modules and do not differentiate between healthcare applications, hospital management, healthcare insurance, etc., even if the focus of their healthcare management is on hospitals and healthcare insurance, can potentially be included in the performance and process management areas. The fifth analysis of the period 2013-2017 includes a focus on the healthcare area with sub-areas on healthcare production and

practice and healthcare-related specialties but ignores the processing and operational management part of it (Roy, J. Minar, Dhar, & T M Omor Faruq, 2023).

Organizational learning in healthcare has several applications that, when effectively tailored, can be used to structure learning and QI activities. Two case examples are provided to illustrate these points. The learning, communication, and teamwork interventions developed in this study were based on current organizational learning and QI theory (Harrison & Grantham, 2018).

Data from the interactive parts of the process were content analyzed according to the taxonomy for learning and QI in healthcare organizations. How these insights were used to enhance the learning from the "actions"/walk-about observations in the organization is described. This article shows that when applying the categorizations as part of the data analysis and translating the data from the case into how it could be used to enhance the collaboration within the healthcare teams involved, it enacted organizational learning as an "intervening" feedback cycle and theories, theory-testing thus occurred inherently in the "action" part of the action research. (Buljac-Samardzic, Doekhie, & van Wijngaarden, 2020)

## 5.1. Hospital A: Implementing a Continuous Learning Culture

The individual suggestion senders' expectations of the suggestion management organization or the managers' communicated tolerance for real responsibility are improving the weak suggestion culture. This was not to have been followed by the department leaders and the management administrations officially because this culture-oriented HR tool was initiated by a low-level trade union, and supporting management and HR part systems were not to be in charge-making roles. The conductors of the employee suggestions and the leader of management administration. This corroboration of the result of Bergström also shows a control-oriented pattern for organizational learning at the hospital (Sarakbi, Mensah-Abrampah, Kleine-Bingham, & B. Syed, 2021).

Employee Suggestion Management was introduced on a local hospital level in 2006 with the main purpose of changing the work culture at the hospital and making it into "a learning organization," according to Peter Senge's theories of Organizational Learning culture (Goula, Stamouli, Latsou, Gkioka, & Kyriakidou, 2021). Suggestion management was supposed to develop a culture based more on dialogue, openness, and organizational development and deal with learning-oriented problems and opportunities. The employee suggestion management system managed, to a high degree, to turn the buying of suggestions into between-culture, "courtroom contests." In prevails a command and control culture in the rotativity way, and hopefully learning oriented dialogues and flow culture in all suggestions with in insight wandering around contemporary exponents, leadership and culture in a clear direction. It is a complex question why this top-down strategy, contrary to Simons' rule-based control systems, changed a lot of employees' mental models. Especially the management system influenced the direction and mental and culture models in a bureaucratic, control-

oriented way (Petropoulos, et al., 2023) even though the ten years of trying with obvious success have been a very long helmet.

Hospitals are complex organizations consisting of various departments. As a result, it can be assumed that "patterns of learning, i.e., mental models, norms, and values, can differ between organizational units within a hospital." The development of learning-oriented mental models, formulated as "continuous learning culture," introduces systematic learning processes to an organization, involving the changed behavior of employees and procedures dealing with problems. Senge articulated that these interlinked, hierarchical levels of change may all be necessary to create a continuous learning culture. This article explores the concerns mentioned above by focusing on the following research questions:
How does introducing a continuous learning culture tool (Employee Suggestion Management) at the local hospital level affect a hospital's management structure and culture? (Argote, Lee, & Park, 2021)

## 6. Challenges and Barriers to Organisational Learning in Healthcare

In addition, initial empirical analysis of organizational learning initiatives, which have been implemented within RΣLM has identified numerous challenges related to unsustainable research and clinical ethics processes, the establishment and standardization of learning hospitals, the provenance of data and the growing disconnect between system and data process silos (Goula, Stamouli, Latsou, Gkioka, & Kyriakidou, 2021) In addition, initial empirical analysis of organizational learning initiatives, which have been implemented within RΣLM, has identified numerous challenges related to unsustainable research and clinical ethics processes, the establishment and standardization of learning hospitals, the provenance of data, and the growing disconnect between system and data process silos (Goula et al., 2021). Our findings suggest that a substantial technological infrastructure is in place at The Children's Hospital at Westmead to potentially support a 'Learning Health System' approach to research; yet, such an approach requires considerable integration of EMR and other data stores to optimize the goals of precision and customizability best.

(Nuño-Solinís, 2017) Traditionally, human subject research has been framed in a clinical ethics framework. Still, the tension between the pace of innovation in healthcare and existing concepts of ethical protections and procedural regulation has rendered traditional clinical research ethics less than ideal (McLachlan, 2020). More recently, there has been a push towards enabling clinical learning through electronic medical record (EMR) implementation and the advocacy of developing a 'Learning Health Systems' approach to research, which would enable formal inclusion of clinical innovation and improvement in healthcare decision-making strategies.

### 6.1. Resistance to Change

- The organizational assimilation process takes place in a variety of ways and under the influence of several factors, including organizational culture and traditions, disturbances related to cognitive, normative, or instrumental kind, interests these cultures champions

or defends, circumstances of individuals and groups, the dialogue and evidence consulting pattern supporting power asymmetries, degrees of centralization of power and control of organizational structures and regimes and the level of transparency and accountability of organizations as well. Planned organizational learning includes markets and potential consequences of adopting or rejecting changes, the processes of project trodden organization, and the actual business of hospitals and pathways being negotiated. When changes are not fully controversial, professionals are usually asked to deliver a series of interventions tailored to the institutional culture of the unit involved and adjust their stance to match the rhetoric of their leaders. It will be necessary to develop models for collecting various forms of AVR resistance (E Crites, C McNamara, A Akl, Scott Richardson, A Umscheid, & Nishikawa, 2009).

- Resistance to change has been treated by several approaches over the years, from being placed at the center of analyses as a psychological phenomenon to being incorporated as a procedural element of the change (R. Nilsen, Dugstad, Eide, Knudsen Gullslett, & Eide, 2016). This resistance can stem from an unhealthy institutional culture due to a lack of a learning approach. There is ample evidence of the identification of institutional cultures that have undeniably been detrimental to healthcare professionals' demonstrations of superior results of their new skill sets, research into evidence, and motivations to change their habits (Goula, Stamouli, Latsou, Gkioka, & Kyriakidou, 2021). (Goula, Stamouli, Latsou, Gkioka, & Kyriakidou, 2021) Cultures that abhor professional qualifications elevate power and competition among professionals, prohibit excessive expressions of charismatic successful speech, and downplay sharing modes of empowerment sufficiently have been reported. Presently, resistance to change management in organizational cultures is currently a global guillotine that can impede care recipients' potential and inflict frustration among members of the professions in all countries.

## 6.2. Lack of Resources and Time Constraints

Creating an Organisational Learning (OL) culture in any organization is a complicated process, especially for healthcare organizations. The many uncertainties and risks that characterize them and the constant lack of resources add an extra layer of complexity that cannot be ignored. By examining this research on the Internal and External Pressures theme with this in mind, it has become evident that several factors like Lack of Resources (LR) and Time Constraints (TC) greatly affect the successful formation of an OL culture. This agreement leads to the following recommendations: since healthcare organizations are suffering from multiple threats deriving from the cutbacks given the ongoing global financial crisis it is both suggested and reasonable for hospital managers to single out potential financial support sources (external or internal) as well as promote human resource development geared towards knowledge management, OL culture further adoption, and OL maintenance (Goula, Stamouli, Latsou, Gkioka, & Kyriakidou, 2021). Moreover, special emphasis should also be given to the materialization of the everyday, additional pressures that healthcare professionals are subject to so that a bottom-up approach, in response to the Organisational Learning's

theory (OL) suggestion, is assured since the advantages linked to the patient care and the right application of the OL practices and values, are strictly connected to my fellow health care professionals maintaining and increasing their motivation and morale. Therefore, cost-effective protocol elaborations and continuous learning data administration coordination of the hospital nursing personnel could be considered, amongst others, as well as their participation in various meetings, healthcare programs, and Continuous Medical Education activities (Harrison, M.; M. Shortell, S., 2020).

## 7. Strategies for Overcoming Barriers to Organisational Learning

Despite the healthcare sector being among the most important sectors worldwide, learning is often set aside for daily emergencies and twin-billion projects. The literature points out the importance of creating a learning organization culture. Most strategic-level managers do not think about it simply because they cannot perceive and experience it concretely. There are many suggested ways to develop a learning organization culture. Based on social exchanges theory, it may be wise and profitable to align the strategies to follow the strengths of innate mechanisms for learning to underline hospital educators' qualities in creating a setting for automatically promoting a culture of learning. The shared-to-achieved model as an illustration of a multilevel modifiable determinants system (M-MDS) may also guide implementers in managing learning organizations.

Building an effective learning culture within the healthcare sector allows clinicians to adapt and innovate in managing patient care (B. Alonazi, 2021). Knowledge must flow between clinicians and healthcare agents, but this does not always happen. Healthcare settings are influenced by structural indicators such as system connections, embedded systems, and teamwork. Thus, despite the recognized necessity for open communication and information sharing, the nature of healthcare settings does not always translate into an ideal climate for learning. In this context, how can obstacles be overcome and learning facilitated? Reflective journals, direct teaching, online, and interdisciplinary in-services may support learning and change; however, whether these work– and if initiatives differ between sectors is unclear.

### 7.1. Leadership Support and Buy-In

Moreover, Acker and Stroup suggest that researchers in the Leader-Member Exchange (LMX) tradition and in the enrichment tradition conduct further studies using safety culture (McLachlan, 2020). For instance, it could be relevant to investigate the relation and interaction between safety culture, on the one hand, and possibly construct a level of LMX quality and, on the other hand, regarding work culture enrichment and job enrichment. Furthermore, such studies would not only provide valuable descriptions of the relationship between safety culture and leadership. Still, they can also give an understanding of how daily work and leadership practices could influence the implicit safety culture of the healthcare unit. If employee participation and co-determination are more frequent according to other HR policies and structures, this could impact the level

of safety culture. Such empirical research utilizing mixed designs (combining qualitative and quantitative data) is strongly recommended.

The board members at Profmed need to obtain buy-in by participating in discussions about where the board needs to focus their efforts. For instance, the board should discuss and understand JCI's requirements and 'common areas' concerns (Sarakbi, Mensah-Abrampah, Kleine-Bingham, & B. Syed, 2021). Furthermore, the board must talk with professionals and acquire knowledge of the effects of problems on patient safety. It could be envisioned that the goal is to motivate medical staff members to report relevant patient safety incidents and problems voluntarily. The medical professional group C builds an ideal model to illustrate how Profmed as an organization could develop and learn from any adverse event and problems in patient safety. No information on the patient, except the advantages and incidents where it was closed, should be collected. A reward for patient safety incident reports could achieve the medical staff's buy-in and help open up the dialog. As a result, the medical staff could lower the reporting threshold and enhance Profmed's ability to learn and improve.

## 8. Ethical Considerations in Organisational Learning in Healthcare

The transformation of healthcare into a learning health system aspired to combine research and clinical practice to improve patient outcomes. Under the current healthcare delivery system, the knowledge garnered, from an increasing number of activities treated with the benefit of hindsight as 'experiments', remains largely locked in the proprietary systems of delivery organizations. The maturation of genomic, proteomic, metabolomic, and social network data expands the number, variety, and complexity of relevant variables that must be accounted for in any substantial individual nomothetic problem. This vast explosion in possibilities challenges the notion that an increasingly data-rich treatment process will also be a similarly self-improving one, and broad societal support for the perpetuity of the health industrial complex is likely to require substantive and increasingly unavailable work in showing that healthcare delivery is part of the ongoing epistemic project of learning (Sarakbi, Mensah-Abrampah, Kleine-Bingham, & B. Syed, 2021). An evidence-based approach to operational research, concerning its effectiveness, efficiency, and cost when applied at the country and organizational levels, promises to be one of the future research directions that could yield significant improvements in our healthcare delivery systems (Ni et al., 2019).

Healthcare leaders recognize the paucity of knowledge about creating and managing a learning health organization. This study addresses that gap by examining ElS characteristics of a learning health organization (LHS) and identifying the key factors affecting this goal (Harrison, M.; M. Shortell, S., 2020). A qualitative case study method with grounded theory was used to develop a deep understanding of how these characteristics grow, determine the key factors, and predict the outcomes. The learning health organization tries to use processes that are designed to support high-reliability outcomes and rapidly engage in learning, i.e., there are frequent and iterative learning cycles. It is anticipated that this study will provide essential information about the conceptual and organizational challenges to overcome in managing an LHS effectively.

### 8.1. Patient Privacy and Data Security

The rise of digitalization has positively impacted the availability of large electronic health record datasets from electronic health records and other clinical sources. However, this rise almost automatically leads to the inability of machines to guarantee high-quality patient care without human intervention. This is because the machine learning models learned from past healthcare data may derive patient characteristics incorrectly. The data from such sources are often from hospitals and sometimes already contain patients' identifiable information that is heavily regulated by patient consent (Ramakrishnan, Nori, Murfet, & Cameron, 2020). This requires researchers, hospitals, and insurers to guarantee encryption methods to encrypt the data stored and temporarily processed in their systems and build a contractual fabric, as done with an increasing number of hospitals and cloud storage providers, reflecting strict data protection regulations. Access to the data provided by hospitals' EHR databases must be regulated so EHR systems comply with the patient's consent.

Data management systems within the healthcare sector must be compliant with strict data protection regulations enforced by the institution that governs patient privacy and data security. The consideration of sensitive data isn't only important but necessary. Protecting sensitive personal information is inescapable for an integral individual healthcare system in which consent plays an important role. Google's (via its acquisition of DeepMind Health) deal with the Royal Free Hospital Trust highlights the healthcare sector's difficulty with data protection and contract compliance (Rehman, Naz, & Razzak, 2020). Despite the undoubtedly huge potential healthcare data holds, dealing with it isn't easy, particularly those that involve personally identifiable information. GDPR and HIPAA mandate that EHR systems be equipped with security mechanisms protecting the confidentiality, integrity and availability of personal health data.

## 9. Conclusion and Future Directions

By providing a direction for future research, our findings will prompt the exploration of connections between empirical health service research and organizational theories such as transaction avoids cost theory (McLachlan, 2020). Effectively functioning health services are integral to high-performing health systems and necessary for achieving higher patient outcomes that can drive service satisfaction (B. Alonazi, 2021). Sustained and adaptive management at every level is the secure foundation of strong performance. However, besides the managerial capabilities and functional strategies at the individual and team level, overall system enhancement, culture, and leadership within existing structures for healthcare configurations also critically count. There is a need to account for such variables to fill the gap between our healthcare system's current state and the required state.

The healthcare sector is currently grappling with several complex challenges, including the spread of chronic diseases and the increasing cost of care. The knowledge-driven era has made it clear that knowledge is a competitive advantage and an important resource that contributes to an organization’s performance. From a healthcare system perspective, organizational learning may be seen as the main engine that supports the

buildup of knowledge and the transformation of this knowledge into actions to improve the quality of care provided (Akhnif, Macq, Idrissi Fakhreddine, & Meessen, 2017). This has inspired recent interest in organizational learning within the healthcare sector. Regarding the focus of this paper on organizational learning in the healthcare sector, it is clear that pressing challenges demand a better alignment between available knowledge and action. Identifying the strategies that are necessary in leading healthcare organizations to develop and learn how to exploit better the knowledge they have is critical. We have distilled the current state and potential future directions for the literature examining the relationship between organizational learning and healthcare organizational and patient outcomes.

## 9.1. Summary of Key Findings

Secondly, while many papers have been studied with the explicit intention of explicitly focusing on health care, issues of safety or improvement, impact, contribution, and relevance for health care are seldom discussed, let alone critically cross-checked with prior research reports. Thirdly, the special issue has shown that learning spillover is experienced positively to increase knowledge-based innovation quality in health care. This spillover effect was explicitly linked to implementing (O)L models, albeit in a roundabout way. These studies are part and parcel of the continuous effort to gather multiple types of evidence needed to build a knowledge base for working with complex (O)L model heuristics. Combining these models with knowledge-based innovation supports the trend to revisit structured real-time routines in health care.

Several conclusions can be drawn from analyzing the papers on this special issue. Firstly, the concept of (O)L was utilised with a variety of interpretations and meanings, reflecting the state of the art in this wide and ambiguously defined area of knowledge.: context-free citations that typically attribute the original definition of (O)L to several references (Argyris & Schön, 1978; Senge, 1990), which incorrectly trace back the roots of the concept and also side-step a comprehensive discussion in management theory about (O)L. The topic is ripe for theoretical and methodological clarification, and it still needs to be discussed. In other words, the critical literature review showed many differences in the understanding of both the (O)L concept and the application of the (O)L framework.

## 9.2. Recommendations for Future Research

(B. Alonazi, 2021) Hospitals that are learning organizations have more agility in managing the rapidly occurring changes such as those brought on by the COVID-19 crisis,. To create a learning culture in hospitals, hospitals are suggested to be designed as learning organizations, which are organizations focused on the acquisition, transfer, and use of organizational knowledge. The COVID-19 pandemic has increased demands on products and services in the healthcare sectors, and significant governmental regulations have strived to manage the COVID-19 crisis. Healthcare organizations must adapt to the circumstances to manage the increasing number of incoming patients. However, most of the decisions for developing learning organizations have been taken by placing more emphasis on external environments, especially not paying much

attention to employee engagement and the social domains of learning. There are four main dimensions to conducting a more comprehensive learning culture as social and cultural dimensions as well as the technological and external environments: 1) first, organizations should focus on building connections among constitutive elements to advance or refute the context-related knowledge-based assertions automatically; 2) second, organizations should have integrative structures and work in a participatory culture to support collaborative learning not only among the members of healthcare organizations but also with the members of external organizations. Hence, it is necessary to employ social and organizational embeddedness through multi-actor knowledge in organizational mechanisms to generate valuable resources; 3) third, organizations are used to be engaged with different groups for making continuous learning with more combination of related multi-level systems to supply their context-related visions, and ideas, and skills. Employers should accordingly employ a causal recursive model to enable their employees to change and integrate their transferred knowledge. Also, it is to contribute to the formation of a good relationship or partnership with the external organizations to shed light on the important contents to promote knowledge associativity and credibility consequently; 4) finally, they needed to build learning operation competencies and to design learning roles to create between- and within individuals knowledge-based supply and demand for distributing philosophical pedagogy. From the initiative of individual members comes the critical mass for conductive and secure novelty and decision-making in organizational programs. The ultimate aim of hospitals is to integrate a better understanding of learning operation causations, whether they are system-related or structural or related to the poor development of learning atmospheres between patients and staff. Contribute to this by incorporating personalized competencies through clinical education, development, support, transfer, and learning-based clinics, as well as exploring the social haptic and tangible symbolic psychosocial 'environment-structure' practice initiatives of adaptive urban and rural management perspectives to provide strategic global health content in a boundaryless governance organization. Therefore, this paper on healthcare and community interventions and the pandemic edition can be especially informative for government authorities, nursing managers, educators, and occupational therapists.

(Rafiei, Moore, Jahromi, Hajati, & Kamaleswaran) Shortly, due to the COVID-19 pandemic, healthcare organizations faced increasing demand from current patients, considered themselves with a disability of the healthcare professional in place, and continually innovated approaches to learning. Therefore, significantly and surprisingly, organizational experts believe these intolerable and complex common dynamics of healthcare sectors are not only economically toxic but also cause deadly and depressing suffering to all people. This qualitative study presents the first investigation into the work motivators of learning in Chinese public healthcare organizations during COVID-19. To our knowledge, no earlier published investigations have given particular consideration to employees inside China's public hospitals and the COVID-19 event. The action research results, consistent with the existing literature, uncover that hospital staff are significantly driven by a competitive, supportive, and self-concordant job as

well as learning atmospheres in the changeable knowledge-sharing events. Nevertheless, patients, visitors, comparables, suppliers, information technology, multimedia strategies, public health practice professionals, and humans of different social cultures do not fully trust healthcare services and resources. Therefore, it endeavors to reveal regulations and social theories to explain online health practices, in line with investigations that specify the recommence of identifying the main intention of studying.

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# Real-Time Nonconformity Management in SMEs Within the Internet of Things and Industry 4.0 Concepts

**Aleksandar Đorđević Marko Pantic; Suzana Petrovic Savic; Dragan Dzunic; Milan Eric; & Miladin Stefanovic**

*University of Kragujevac, Faculty of Engineering, Kragujevac, Serbia*

*The Corresponding Author:* adjordjevic@kg.ac.rs

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## Abstract

This paper proposes a software answer for nonconformity detection and preventive and corrective moves definition. The solution objectives to increase the usage of part gadgets in compliance with Industry 4.0 and Quality 4.0 paradigms. The software program answer layout is based on the JavaScript programming language and its capability to be applied throughout all software program solution levels thru interconnected frameworks (MongoDB, Express.Js, Angular, and Node.Js) in a MEAN stack architecture. The advanced answer has been carried out in 3 small and medium organisations. Initial consequences show numerous benefits, together with elevated nonconformity detection and reporting. All nonconformities were linked to precise sections of the ISO 9001:2015 requirements, enabling satisfactory managers and enterprise managers to benefit perception into the assets of the problems and establish a foundation for defining suitable managerial moves. The paper's important contribution is the presentation of this software solution, which is intended to offer a lower priced approach for the identity and large reporting of nonconformities, incorporated with different software program modules. This approach aligns with the ideas of Industry 4.0 and Quality 4.0, leveraging edge gadgets and facts-driven insights to enhance exceptional management methods within businesses.

***Keywords:*** Information technology, Inspection, Industrial engineering

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## 1. INTRODUCTION

This paper primarily intends to demonstrate that technologies from the Industry 4.0 (I4.0) toolset could be implemented in Quality Management (QM) and Nonconformity Management (NCM), making an essential step towards I4.0 and Quality 4.0 (Q4.0) convergence (Zhou, Liu, & Zhou, 2015). To achieve this goal, authors have developed and implemented an innovative software solution with several advantages affordable for Small and Medium Enterprises (SMEs). Developed software application for mobile devices will enable all employees to report and manage NCs using the steps and directives from ISO 9001:2015 (detection, reporting, decision-making, and the definition of preventive and corrective actions). The main contribution reflects in the presented software solution for affordable identification and massive workload Nonconformity (NC) reporting, integrated with other software modules for quality analysis and prediction. In this way, it is possible to obtain horizontal scalability and richness of the proposed software solution for smart enterprises focused on World Class Manufacturing and Lean manufacturing. The presented solution usage contributes to all participants involved in the organisation of production and production itself, through (1) involvement of all employees; (2) digitalisation and improvement of existing nonconformity reporting systems; (3) improvement of nonconformity perception; (4) improved awareness and evaluation of employer's contribution to nonconformity management; (5) making the technology easy to use inexpensive and suitable for a wider industry audience.

In the following sections of the paper, the authors have presented the concept of NCM in I4.0 (Section 2), with the proposed general software components and their relationships design (Section 2.1) and process flowchart (Section 2.2) included. Additionally, mobile devices, cloud and Q4.0 application trends, JavaScript, and Typescript based solutions have been considered. Lastly, the authors have presented a specific case of developed software infrastructure, with the possible benefits of the solution (Sections 3 and 4).

## 2. THEORETICAL BACKGROUND AND LITERATURE REVIEW

### 2.1 Industry 4.0 and Quality 4.0 concepts

I4.0 ought to improve the information flow throughout the entire organisation, enabling better control and operations to be adapted in real-time (Moeuf, Pellerin, Lamouri, Tamayo-Giraldo, & Barbaray, 2018) to respond to stakeholders' expectations while maintaining a competitive advantage.

In the I4.0, the quality concept has been broadened, and it includes personalised service quality and personalised production. Quality goals have evolved along with the phases of revolution in industrialisation. According to the literature sources (Foidl & Felderer, 2015), crucial preconditions for sustainable economic success in modern manufacturing companies focus on QC, QM, and QMS.

The core concept of Q4.0 encompasses eleven axis (components) according to (Jacob, 2017), including: (1) big data with characteristic of volume, variety, velocity, veracity and transparency; (2) analytics framework that provides descriptive, diagnostic, predictive and prescriptive analysis; (3) connectivity that may enable near real-time feedback from linked edge-devices, people and processes; (4) collaboration through digital messages, description of the activity flows (visual), and social (social) media; (5) app development including mobile applications, platforms, virtual reality, augmented reality, web-client, browser and applications for robot (measurement and manipulation) and machines (CNC, DNC, sensors, etc.); (6) horizontal scalability represents the ability to support a growing and large volume of data, users, devices and analytics globally; (7) management systems that monitor autonomous and connected processes; (8) compliance that among other things includes electronic submission of the compliance/NC reports and automation of flows in the compliance area; (9) quality culture representing among functionally strong cooperation, credibility, and shared responsibility; (10) leadership expressed through quality performances, process ownership, and goal scheduling; and (11) competency considering employees training as one of the most crucial fields for business progress. Therefore, through Q4.0, critical new technologies are affordable and accessible to the broader circle of business organisations, with the provided opportunity to solve long-standing quality challenges and adopt new solutions. Following these suggested axes, the primary objective of this paper is a representation of the mobile solution for NCM that is based on a collection of big data, management support, improved communication between employees, and improvement of quality culture as essential toolset elements in the Q4.0 concept.

### 2.2 Nonconformity management

Due to increasing market competition, organisations have adopted QMS like the ISO 9000: International Standard Series. According to the ISO survey, 878 664 organisations worldwide have certified ISO 9001:2015 (International, 2015). The establishment of tools for prevention of NCs and elimination of their causes represents a mandatory requirement of QMS, and as such, NCM receives sub-process function in the general production process (Závadská & Závadský, 2018). NCM should (according to ISO 9001:2015) be implemented during the realisation of all organisational processes, and the organisation should retain documented information about NCs. As specified by standard requirements, documented information can be formulated as a report with a description of NC, undertaken actions, obtained concessions and identified authority. Additionally, the standard requires documented information as evidence of any corrective action results, supplementing the report, as mentioned earlier. By utilising the report, corrective and preventive actions are taken to eliminate identified NCs.

This paper focuses on NCM, intending to decrease the number of products and processes of NCs and effectively implement proactive and corrective measures adequate for product and process quality improvement. Ideally, NC and waste should be eliminated, whereby Zero-defect production should be achieved. It is necessary to implement QC in real-time, enabling NC detection in an early process stage and reducing production waste. In general, these requirements could be derived from a standard, a specification, a customer or a stakeholder.

Therefore, the detection and reporting of NC could happen during the audit, inspection, documentation review, product testing, customer complaints, stakeholders feedback, and general observation based on experience (Luca, 2015). In addition to the above, NCs can take many forms and types, which may vary depending on the industry type, so that common NCs include: failure to identify issues, failure to define processes, plans, and schedules adequately, process deviations and product defects, deviations from a specification of product characteristic, missed plan, customer and supplier return. Taking into consideration the facts stated, NC data are scattered throughout different organisation systems in heterogeneous formats. Specific ICT solutions with scalable capabilities could be applied to overcome data formating diversity and heterogeneity, creating a real-time informed decision-making environment for NCM by creating homogeneous digital NC reports.

### 2.3 Initial presumptions and goals for the current research

The initial presumptions, based on which the research was conducted, are that a sufficient information flow is highly emphasised for the continuous operating of the advanced manufacturing processes and that, however, unpredicted situations and quality issues have to be often resolved by utilising imprecise and incomplete information. Therefore, it is crucial to perform frequent comprehensive and reliable quality inspections to conduct and deliver defect-free and high-quality processes and products and be competitive. Although traditional data analytic techniques and tools have been widely and successfully used for quality inspection, new I4.0 techniques may be applied to mine massive data sets gathered through automated industry architecture.

Following the presumptions mentioned above and demands of Q4.0, including NCs reporting, this research's primary intention is to adopt technologies from the I4.0 toolset (such as cloud computing, artificial intelligence, mobile platforms, advanced information technologies) to demonstrate road to possible transition of quality to Q4.0 model. In this research, the authors will be focused on QM and NCM as essential elements of the quality approach. This paper's authors demonstrated that affordable open-based solutions developed on open source technologies could improve the NCM and basic principles of QM. The authors presume that the development of affordable cloud solutions based on the MEAN stack may be used for real-time NCM to improve basic principles of QMS such as engagement of people, improvement, and evidence-based decision-making.

## 3. ARCHITECTURE AND CHARACTERISTICS OF DEVELOPED SOLUTION

### 3.1 Incorporated application and introduction of advantages for Q4.0 and NCM

Based on the stated presumptions and intentions, the requirements for an NC reporting software solution are as follows: the solution has to be able to report stand-alone NC and to assign NC to a specific employee to be managed and resolved; to record one or more preventive/corrective actions and to associate them with reported NCs; to allocate responsibilities for the implementation of the preventive/corrective actions; to investigate notifications, with reminders, to determine correlations between process performances and NCs, within specific periods, utilising statistical analysis methods; to use data storage and further subsequent use to form the necessary knowledge in KDD for the future decision-making processes. Accordingly, the software solution contains the following modules: statistical and communication modules, the module for possible product barcode detection, the module for initial NC reporting, the module for pattern recognition, the module for statistical analysis graphical presentation. The solution can be included in the IoT architecture of the MOs and connected with other databases via web services. The collected data related to the definition NC, its management, identification of products or processes in which NC has occurred, and the proposed actions to resolve the NC can be used to form KDD that may be subsequently utilised, alongside RNN, for pattern recognition and proposal of appropriate preventive/corrective actions.

Figure 1 shows the implementation of the proposed solution based on JavaScript MEAN frameworks' application. The expression MEAN stack represents a set of JavaScript-based technologies appropriate for web applications development. MEAN is an abbreviation derived from the first letters of the used technologies, i.e., MongoDB, ExpressJS, Angular and Node.js. MEAN is an open-source stack with the possibility to develop adjustable and scalable applications, and as such, it is the perfect candidate for cloud hosting (IBM cite 2020). The presentation tier is developed through the Angular framework; the application tier is introduced through Express.js and Node.js capabilities, whereby MongoDB was adopted to define the cloud database. Consequently, technology selection can be considered as an essential aspect, as it affects the cost, performance and possible functionalities of the NCM reporting solution and the overall Q4.0.

If multiple companies apply the solution, collected and integrated data could be used for pattern recognition. In this case, they will learn from each other and have patterns for recognition of NCs and the selection of possible management initiatives. The proposed method has clear advantages because it utilises a new approach in application development to fulfil the principles of QMS. This approach with availability and personalisation increases employees' participation and involvement and provides a broader base for NCM and evidence-based decision making.

The presentation tier is deployed through JavaScript/TypeScript open-source Angular framework. Increased use of Angular framework is derived from the fact that it supports Progressive Web Applications' concept. This concept indicates that an introduced application is: instantly loaded, independent from the network slow or unstable

connection, responsive, and, among other things, with features, such as Web Bluetooth API, that makes the application to be more native-like. Node.js represents an asynchronous open-source JavaScript run-time environment carried over Google Chrome's JavaScript engine V8 to create scalable applications independent from the browser. Besides the V8 engine, Node.js contains an abstraction layer library to handle asynchronous events. Node.js unifies application development merely around JavaScript programming language. The NC reporting data are sent from the presentation layer to the business layer in a lightweight data-interchangeably JavaScript Object Notation (JSON) format. This format is language-independent, and it has been fitted for data sharing among interconnected clients. As compact and straightforward, JSON is efficiently generated and parsed by machines and easily read by humans. JSON became a fitting solution for cloud NoSQL database within this study based on the mentioned advantages. MongoDB databases belong to the NoSQL databases class, unlike SQL relational databases, where columns are eliminated, and rows are documents used to store information about the data and the data itself. Since the data are stored in a BSON format that presents a binary JSON document, MongoDB proved to be a reasonable solution for JavaScript-centric application development. This module adds an entire tier of features on top of MongoDB that enables the definition and maintenance of data structure and data models and their utilisation to introduce direct interaction from application code to the database.

### 3.2 Software solution capabilities

The software solution aims to provide real-time reporting in the NC occurrence caused by deviations in organisation or supplier processes. Adequate NC reporting should comprehend critical elements, such as positioning, identification, documentation, and disposition.

The solution can get the data generally from three sources: manual input from employees and data gathered directly with the sensors incorporated in production and IoT. Through these sensors, dedicated software incorporate functionalities of external devices or sensors connected to peripheral I/O. This option demands customising the solution on the companies perimeter, which includes existing sensors in the system.

Within the presented solution, it is possible to utilise the Recurrent Neural Network (RNN) to detect possible patterns for preventive/corrective measures (Lukoševičius & Jaeger, 2009). RNN is a neural network (NN) class that extends the conventional feedforward NN with loops in connections (Mou, Ghamisi, & Zhu, 2017). RNNs differ from feedforward NN since they can process sequential input data through a recurrent hidden state whose activation in each subsequent step depends on the previous step's activation. In this way, the RNN can expose dynamic behaviour.

For the NC and corrective actions pattern recognition, the given sequence is $nc = (nc^1, nc^2, \dots, nc^k)$ representing NC occurrence descriptions so that the RNN framework can calculate the hidden vector sequence as $h = (h^1, h^2, \dots, h^K)$ by iterating the following equation from k= 1 to K:

$$h^k = \varphi(w_{ih} nc^k + W_{hh} h^{k-1} + b_h)$$

Where $w_{ih}$ indicates the input-hidden weight vector, while $W_{hh}$ denotes the context weight matrix of the hidden layer, $b_h$ is the bias vector in the hidden layer, and $\varphi()$ is the hidden layer activation function (possibly sigmoid or tan-sigmoid function). Finally, predicted corrective action $q_a$ could be computed as follows:

$$q_a = W_{oh} h^K + b_o$$

Where $W_{oh}$ indicates the output-hidden weight matrix, and $b_o$ is the bias vector of the output layer. The motivation is to present different NC occurrences and corrective actions as sequential data so that an RNN can be adopted to model pattern recognition.

### 3.4 CASE STUDY AND INITIAL RESULTS OF IMPLEMENTATION

The developed solution has been used in three SMEs in plastic and rubber parts production intended for the automotive industry. The NCs of plastic and rubber products could be different, hard to determine and report, or significantly different to detect using classical control systems.

By applying the solution, the employee can document and report NC. It is possible to provide measurement or use correlated barcode data to trace previous similar products of NCs, to acquire the knowledge necessary to presume what to do with this type of NC. The software system using the RNN module provides the mentioned decision and action.

The authors monitored the implementation and initial results of represented software in three SMEs. The data were gathered for six months. Keeping in mind that companies have different production programs and amounts of production and different products, it could be concluded that implementing and utilising such a system improves employees' involvement in the process and quality culture. On the other hand, it enables easier detection, reporting and digitalisation of spotted NCs and reduces reporting and taking actions periods.

The authors detected that recognising the patterns using RNN could help take managerial actions in NCM and QM. From the obtained and presented data, it is evident that the number of detected and reported NC and the number of corrective and preventive actions taken have been increased. It is essential to consider that many measures taken were based on suggestions developed on pattern recognition. Besides, this user-friendly software, with innovative modules, improves employees' participation in NC reporting. It may be concluded that this solution enables important principles of QM: participation of employees and evidence-based decision making for quality managers.

All companies have introduced, implemented and certificated QMS according to ISO 9001:2015. Data where the correlation between NCs and sections of ISO 9001:2015 standards were established (Table 1). This correlation table allows quality managers to

track back all NCs and have clear managerial implications for future inner and external audits.

Table 1. The number of NCs detected six months before software implementation and six months after software utilisation (NCs) is related to specific ISO 9001: 2015 sections**.**

| Subsections of the ISO 9001:2015 standard | Before software utilization | | | After software utilization | | |
|---|---|---|---|---|---|---|
| | SME 1 | SME 2 | SME 3 | SME 1 | SME 2 | SME 3 |
| 4.1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4.2 | 0 | 0 | 1 | 2 | 1 | 3 |
| 4.3 | 2 | 2 | 2 | 3 | 3 | 3 |
| 4.4 | 2 | 1 | 2 | 1 | 2 | 3 |
| 5.1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5.2 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5.3 | 2 | 2 | 3 | 3 | 3 | 4 |
| 6.1 | 2 | 2 | 3 | 3 | 3 | 4 |
| 6.2 | 3 | 3 | 2 | 4 | 4 | 3 |
| 6.3 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7.1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7.1.1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7.1.2 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7.1.3 | 2 | 3 | 3 | 4 | 3 | 4 |
| 7.1.4 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7.1.5 | 1 | 1 | 2 | 3 | 2 | 3 |
| 7.1.6 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7.2 | 1 | 1 | 3 | 2 | 2 | 2 |
| 7.3 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7.4 | 0 | 0 | 1 | 0 | 0 | 0 |
| 7.5 | 2 | 2 | 1 | 0 | 0 | 0 |
| 8.1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8.2 | 2 | 2 | 0 | 0 | 0 | 0 |
| 8.3 | 0 | 0 | 2 | 0 | 0 | 0 |
| 8.4 | 2 | 3 | 1 | 4 | 3 | 6 |
| 8.5 | 4 | 7 | 4 | 8 | 8 | 7 |
| 8.6 | 2 | 1 | 1 | 2 | 1 | 0 |
| 8.7 | 4 | 4 | 3 | 7 | 6 | 5 |
| 9.1 | 2 | 2 | 2 | 1 | 2 | 2 |
| 9.2 | 1 | 2 | 2 | 2 | 2 | 1 |
| 9.3 | 2 | 2 | 3 | 2 | 2 | 2 |
| 10.1 | 0 | 0 | 0 | 0 | 1 | 0 |
| 10.2 | 2 | 1 | 2 | 0 | 0 | 0 |
| 10.3 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 38 | 41 | 43 | 51 | 48 | 52 |

Applying the software makes it possible to connect NCs with specific sections of the ISO 9001:2015 standard. Each company could have evidence of their data and define managerial actions according to the detected NCs primary sources. According to Table 4, it could be observed that most NCs could be connected with sections 8.7 and 8.5, but also significant NC number is related to 6.2.

To further extend the case study and consider the developed solution's performance, tests were performed to compare the developed solution with the possible solutions based on affordable technologies, including PHP, Apache server, MySQL and MariaDB. The authors tested the solutions on the identical infrastructures, which included servers for data storage with structures based on technologies MySQL/Apache/PHP, MariaDB/Apache/PHP, and MongoDB/Node.js/Express.js, and remote users presentation tiers with structures based on an application of HTML/CSS, HTML/CSS, and Angular, respectively. Testings reflected the most realistic possible scenarios to determine which technologies best performance in terms of forwarding queries and data retrieval from the databases.

Different NCs query workloads were created to test the previously used solutions' databases and current solution responsiveness. Each benchmark test was performed under the same quality manager user credentials, applying the default database settings.

First of all, there were three scenarios, including data insertion, modification, and selection. The first scenario is used to test the insertion agility for a more extensive set of data objects in a specific request, the second scenario to test the modification agility and the third scenario to test selection agility. Each test scenario was performed five times for different query quantities so that a mean value was calculated for each test type. The procedure was repeated due to variations that may occur during the execution of the tests. The tests contained syntax and structure, as shown in Table 2.

Table 2. *Insert, Update* and *Select* queries per second for each considered technology

| **MongoDB *Insert* syntax sample** | **MariaDB/MySQL *Insert* syntax sample** |
|---|---|
| db.nonconformity.insertMany([<br>{<br>"_id" : 1001,<br>"mark" : "1657774A",<br>"part name" : "Bumper",<br>"quantity" : 20,<br>"description" : "Rear bumper dimension mismatch",<br>"placement" : "Assembly machine",<br>"selected disposition" : "Alternative use",<br>"disposition description" : "use NC products for a purpose other than originally defined",<br>"production date" : new Date("2019-05- | INSERT INTO nonconformity VALUES (1001, '1657774A', 'Bumper', 20, 'Rear bumper dimension mismatch', 'Assembly machine', 'Alternative use', 'use NC products for a purpose other than originally defined', '2019-05-10') |

| | |
|---|---|
| 10")<br>}<br>]); | |
| **MongoDB *Update* syntax sample** | **MariaDB/MySQL *Update* syntax sample** |
| db.nonconformity.update(<br>{ _id: 1001 }, // specifies which document to update<br>{<br>$inc: { quantity: 25 }, // increments the field value<br>$set: { // replaces the field value<br>"selected disposition" : "Return to the supplier",<br>"disposition description" : "Products have to be returned to the supplier since they are damaged."<br>}<br>}<br>) | UPDATE nonconformity<br>SET quantity = quantity + 5<br>selected disposition = "Return to the supplier",<br>disposition description = "Products have to be returned to the supplier since they are damaged"<br>WHERE _id = 1001 |
| **MongoDB *select* syntax sample** | **MariaDB/MySQL *select* syntax sample** |
| db. nonconformity.find( {} ) | SELECT * FROM nonconformity |

After preparing the test conditions and the tests' realisation, all three considered scenarios results were determined (Table 3).

Table 3. Queries per second for each considered technology

| ***Insert* queries** | | | | | | |
|---|---|---|---|---|---|---|
| **Previous technologies** | **500** | **1000 q** | **2500 q** | **5000** | **7500** | **10000** |
| MySQL/Apache/PHP | 0.0800 | 0.1638 | 0.4019 | 0.8014 | 1.2037 | 1.6027 |
| MariaDB/Apache/PHP | 0.0692 | 0.1439 | 0.3479 | 0.6931 | 1.0385 | 1.3846 |
| MEAN | 0.0224 | 0.0660 | 0.2323 | 0.3671 | 0.6284 | 0.9271 |
| ***Update* queries** | | | | | | |
| **Previous technologies** | **500** | **1000** | **2500** | **5000** | **7500** | **10000** |
| MySQL/Apache/PHP | 0.0697 | 0.1552 | 0.3873 | 0.8789 | 1.4402 | 2.0828 |
| MariaDB/Apache/PHP | 0.0783 | 0.1445 | 0.2722 | 0.3427 | 0.5177 | 0.6900 |
| MEAN | 0.0106 | 0.0525 | 0.2023 | 0.3254 | 0.3677 | 0.4368 |
| ***Select* queries** | | | | | | |
| **Previous technologies** | **500** | **1000** | **2500** | **5000** | **7500** | **10000** |
| MySQL/Apache/PHP | 0.0394 | 0.0732 | 0.1965 | 0.3943 | 0.6011 | 0.7999 |
| MariaDB/Apache/PHP | 0.0306 | 0.0655 | 0.1696 | 0.3385 | 0.5156 | 0.6826 |
| MEAN | 0.0037 | 0.0328 | 0.1116 | 0.1832 | 0.3110 | 0.4597 |

The tests introduced in this part of the study have been performed on a single server, but things might look different with data shared across clusters. This fact should be taken into account in future testing. Table 3 shows that the solution based on MongoDB has

higher velocity when it comes to data insertion, modification, and retrieval compared to the solutions based on MySQL and MariaDB, mainly when dealt with a considerable amount of data. The increase in time for all three types of solutions DBMS seems to be linear. In the scenarios and circumstances covered in this study, the authors discovered that by switching from MySQL and MariaDB technologies to MongoDB technology, it is possible to get a significantly faster database with a relatively similar structure.

## 4. DISCUSSION

This paper is constituted on the I4.0 research starting from quality objectives to achieve conformity related to specifications, variations reduction, waste reduction, defects prevention, alignment between strategy and operation enhancement, efficiency and effectiveness of equipment and operations enhancement.

The presented software included some demands and unique features that differ it from similar solutions, primarily in the module where the: 1) Android Sensor Framework employed sensors from mobile platforms, that also the authors of this paper used; 2) novel RNN model could effectively analyse possible NCs, as sequential data determined corrective action, based on the knowledge about previously recognised NCs; and 3) authors enabled mobile platform to collect data from other sensors and IoT. It ensures that this solution surpasses similar products, bringing additional value to organisations. The presented solution enabled identifying products or resources, turning the mobile platform into a barcode reader, enabling full reporting traceability. When NC product or situation accrued, established algorithm forwarded task to dedicated quality manager suggesting possible actions. The authors implemented a module for RNN to detect possible patterns for corrective actions. This module will enable the responsible person to use some defined patterns or decide using suggestions or making entirely new actions. Besides, the solution could help define the same actions, such as rework, repair, permissions, corrections, and scrap.

A fundamental novelty, which is presented in this paper, refers to integrating research in QC, management, and software engineering. The developed software solution is intended to be used for affordable identification and reporting of NC with the possibility to integrate other software modules for quality analysis, problem-solving, corrective/preventive actions, and using a high level of applied methods (machine learning and artificial intelligence optimisation methods).

In addition, this paper indicates that small, affordable solutions developed to be user-friendly could incorporate some of the main principles of QM, such as employee engagement. In addition, the use of the MEAN stack provides an improved possibility for pattern recognition and fulfilment of other principles of QM, such as improvement and evidence-based decision making.

## 5. CONCLUSION

The amount of real-time data accumulated from multiple sources in production organisations is steadily increasing. If this data is stored, there is a tremendous

opportunity to facilitate information flow and improve production processes with big data analytics and the right decisions. Therefore, this study's core premise is that one of the possible fundamental steps towards the I4.0, and subsequently, Q4.0 concepts incorporation, is to deploy mobile applications to enhance QM and production output. Accordingly, this study proposes a specialised role-based mobile application with multiple interfaces divided by roles that can be utilised to report real-time NCs and gain data-driven insight into subsequent production defect and root cause detection, defect mapping, machine failure, and downtime reduction.

As NCM represents one of the essential tasks of QM, it is necessary to acquire and use ICT to facilitate information and enable the implementation of effective proactive and corrective QM measures in real-time. Along with identification, documentation of NC has emerged as a problem. Solutions on this topic from broad literature are mainly based on traditional measures and procedures for solving NC and are usually being taken only by QM representatives and require a significant amount of time. Some of these dilemmas could be untangled by the convergence between Quality, I4.0, and IoT. Innovative software solutions could contribute to more advanced NCM.

The software solution brings benefits for both employees, managers and stakeholders through (1) involvement of all employees; (2) digitalisation and improvement of existing NC reporting systems; (3) improvement of NC culture; (4) better understanding and measurement of employer contribution to NCM; (5) making the technology ease of use both affordable and suitable for broader industry audience (the source code of a demo version, is publicly available on the GitHub repository: https://github.com/cqm-quality-center/nonconformity.

Finally, the developed solution is implemented in 3 SMEs. Initial results show several benefits in increasing NC detection, reporting, time, and increasing participation of employees number of preventive and corrective actions and improved QM system as a whole. The number of corrective and preventive actions was taken based on the assistance of the RNN module. All NCs were related to specific sections of ISO 9001:2015 standards so that quality managers and managers in the companies could have insight into the sources of the issues and the foundation for defining different managerial actions.

The system could be upgraded and expanded in many different directions, such as development modules for documentation management or advanced system image recognition (as part of QC) to support and interconnect with other systems (safety, environment management).

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# The State of Organisational Learning Post-COVID

**Alaa Garad[1] & Miladin Stefanovic[2]**

*[1]Al-Maktoum College of Higher Education, Dundee, UK*
*[2]University of Kragujevac, Faculty of Engineering, Kragujevac, Serbia*

*The Corresponding Author: A.garad@almcollege.ac.uk*



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## Abstract

The COVID-19 pandemic has had a profound impact at the landscape of organizational gaining knowledge of. This article explores the cutting-edge nation of organizational studying within the put up-COVID generation, analysing key elements which have evolved and the rising tendencies shaping the future. The paper starts off evolved by means of reading the impact of COVID-19 on organizational learning. It discusses how the unexpected shift to remote work and disruption of conventional learning strategies have challenged groups to rethink their approaches. The article then delves into the precise challenges faced through corporations, which includes the need for increased virtual infrastructure, keeping employee engagement, and ensuring the effectiveness of getting to know projects in a dispensed paintings environment. In reaction to these challenges, the paper highlights the adaptations and innovations companies have made of their mastering strategies. This includes the multiplied adoption of virtual school rooms, on-line courses, and collaborative gaining knowledge of platforms. The position of management in fostering a way of life of non-stop getting to know during this period is likewise examined, in conjunction with the importance of worker engagement and the strategies employed to sustain gaining knowledge of motivation. Furthermore, the article explores the evolving tactics to measuring the effectiveness of mastering initiatives, addressing the need for records-driven insights and the mixing of getting to know analytics. Finally, it delves into the destiny developments in organizational studying, together with the expanded emphasis on personalized gaining knowledge of, the combination of synthetic intelligence and digital fact, and the growing significance of pass-functional skill improvement.

## Keywords:

Organizational Learning, COVID-19 Pandemic, Remote Work, Technological Infrastructure, Employee Engagement

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## 1. Introduction

A worldwide pandemic such as the COVID-19 outbreak presents an unprecedented health challenge and already has a powerful economic and social impact on people and organizations. Research in organizational learning has barely scratched the surface of the consequences of a global pandemic. However, it is relevant for organizational crises, and the pandemic represents humanity's most pervasive and disruptive crisis in the last 100 years. As we consider the consequences of the pandemic in terms of organizations and their human resource systems, we need to recognize the potential positive consequences for organizational learning. This paper uses a scenario approach to look at the state of organizational learning post-COVID and to consider HR implications for whether or not organizations will enable that learning.

### 1.1. Background of Organisational Learning

With the growing body of research on organizational learning, technological improvements have led to increased research contributions, and the role of the social conditions for embedding organizational learning capabilities has become the dominant phrase in attempts to describe effective organization in knowledge generation and application. Reporting organizational learning in tourism firms has attracted little attention, even though it is important for many stakeholders. The prolonged COVID-19 pandemic's onslaught on tourism has put firms' decision-making, operational learning, and renewal in the spotlight because firms use resource capacity to mobilize awareness-building measures to resume adaptation and reposition themselves in the market. (Giermindl, Strich, Christ, Leicht-Deobald, & Redzepi, 2022)

Organizational learning refers to improving actions undertaken by existing knowledge or acquiring new knowledge and insights regarding the environment and one's conduct. There are various levels of organizational learning, but organizations are generally embedded within individual learning, and their actions complement embedded dynamics. (Antunes & Pinheiro, 2020)

## 2. Impact of COVID-19 on Organisational Learning

For most organizations, the COVID-19 pandemic was an unlearning and relearning experience. The prevalent structures of top-down decision-making and dependency on physical presence were considerably impacted. Critics of the Japanese business strategy ridiculed how big players in the technology game, like Toyota, Hitachi, and Sony, could not make a difference during the pandemic, with most of their workmen being corralled indoors due to the government's nationwide lockdown. In reality, while manufacturing

ground to a near-standstill, Japan managed a cool, uneventful slowdown. (Vu & Nguyen, 2022).

The tranquil façade belied one of the world's harshest lockdowns, where most workmen and staff employed in the manufacturing sector were clubbed as essential workers and obliged to move out in public transport to the closed factory. These companies quietly took over the maintenance of the local railway stations nearer the factory in a quiet agreement with the regional railway companies, removing the stress of utilizing the otherwise crowded trains. The IC chips designed by these companies were prioritized for medical devices and were rerouted back to the domestic market for COVID-19 kits. A glimpse of the pandemic-attached shift in organizational learning surfaced. (Pennisi, 2022).

Organizations worldwide have not had the chance to plan their organizational learning on dealing with a global pandemic triggered by nearly instantaneous lockdowns, widespread health issues, and traumatized economies. With most of the world having eased up grips on COVID-19, albeit with flare-ups, organizations are now reflecting on the changes required to resurrect, redesign and realign with the lessons learned. Despite a decade of technological leaps resulting in the digitalization of business functions, organizations have almost universally acknowledged a fumbling approach to business continuity with the onset of the COVID-19 pandemic. (Schmid, Raju, & Jensen, 2021)

## 2.1. Shift to Remote Work

It led to a reassessment of the real estate footprint, with 69% reporting at least a 30% reduction in the area per employee. The earned permission for a more flexible workforce was driven by the enlightening proof that the investment in technology had been worth it. It has driven a need for every leader to upgrade remote and virtual collaboration capacity. From live broadcasts reaching across time zones, tracking the diversity and length of speaking in group meetings, and banishing those awkward at-camera Q&A silences to infusing each touchpoint in the everyday working application suite with a shared sense of connection. The broad playbook enables every individual to take and lead the virtual stage. How can we turn resistance into readiness and leverage the intended destination for competitive advantage beyond its pick-and-mix resolution for health, productivity, and employee retention? (Cheng, 2022); (Tieleman, 2021)

According to the Global Workplace Analysis, pre-COVID, 80% of the global workforce reported they would like to work from home at least part-time. As COVID forced organizations to enable remote working on a global mass scale, EY found that 67% of workers felt as or more productive. Post-COVID, 83% desired a more flexible remit, allowing them to continue to work remotely from home or an office. Senior leaders echo this change in sentiment. In a McKinsey Survey, the consensus is that a hybrid model with a mix of remote and onsite work is here to stay. (Jain, Currie, & Aston, 2022)

## 3. Challenges Faced by Organizations

This crisis, in the form of the Covid-19 pandemic, has, for good, changed the norms of education, teaching, and learning worldwide. The abrupt halt to classroom teaching and the sudden shift to remote teaching came with their challenges. Both the students and educators had to adapt to technology, and the new normal mode of teaching and learning. The entire world was at a standstill, with campuses isolated. This paper reflects on strategies for continued and quality school teaching (Mikušová, Klabusayová, & Meier, 2023).

The transition to remote learning has raised several pedagogical and technological challenges (Russo, 2023). Areas mostly affected by the pandemic included science, engineering, mathematics, and other disciplines that usually involve access to laboratories, studio-based teaching, live performance, or on-site internships. This transition to complete 100% online teaching affected how engineering was taught and learned, impacting the typical element of engineering pedagogy - hands-on learning and real-world application (Abdulla & Ma, 2021). Hugs, handshakes, and human interactions came to a standstill. The Covid-19 pandemic forced the world to resort to a remote and virtual classroom environment.

### 3.1. Technological Infrastructure

The technological infrastructure is an urgent issue that needs to be addressed as part of any organizational change process. The COVID-19 pandemic has revealed the lack of a solid infrastructure foundation, which may make activities vulnerable under continuous pressure. This study emphasizes the importance of proceeding from considering the technical demands of a technological infrastructure to a social and societal view of e-learning, which leads to an interest in and understanding of the conditions necessary to enable and sustain new modes of e-collaboration and e-communication, which can be seen as examples of new social requirements. The notion of infrastructure may be understood and addressed from a technical or both /and perspective. Any university, individual department, or teacher has the choice of focusing on the provisioning of technological infrastructure only, or the necessity of social and organizational support can also be considered a requirement, an essential resource with equivalent status as the technological infrastructure, and this can indeed create future challenges when work moves from face-to-face to online. (Adarkwah, 2021)

(World English Journal & Alshammari, 2021) With remote work firmly establishing itself as the work mode of the future in a rapidly evolving technological landscape, the availability of technological infrastructure takes center stage as it allows for the provision of digital alternatives and the required flexibility. As educational institutions worldwide transition preliminarily from face-to-face to remote and digital learning modalities in response to the ongoing pandemic, the need to provide digital alternatives of differing nature and degrees to facilitate organizational learning has become paramount (Singaram & Mayer, 2022). It is further acknowledged that different teachers and students have differing digital needs and require different modes of technological support. In the long-term, transforming a traditional, local, face-to-face organization

into a virtual and e-learning organization is far from a trivial task; it involves a large-scale organizational change. For organizational change to be successful, the technological infrastructure, in terms of technological literacy, e-skill, and digital competence development, as well as digital communication and interaction patterns, needs to be addressed systematically.

## 4. Adaptations and Innovations in Learning Methods

Throughout the COVID-19 pandemic, a team of educational researchers and practitioners across multiple disciplines came together to discuss what they might learn from one another and the educational contexts themselves. They formed an interdisciplinary, collaborative workgroup—COVID Conversations—dedicated to sharing learning, dialoguing about research findings, and exploring possibilities for a more integrated approach to understanding education from multiple disciplines. The collaborative processes, mechanisms, and structures we fashioned may forever shape how we think about and conduct transformative research. Our interdisciplinary pedagogical, research, clinical, and managerial mechanisms were widely successful. (Brown, et al., 2023)

The laboratory has experimented with a widely re-designed curriculum with the research practicum replacing most didactic and clinical practicum work. One possible outcome is that the trainees might work together even more frequently, sharing learning and the results of program evaluations—a natural “hive mind” in action. This was a profoundly positive and affirming project to be a part of. We encourage similar groups of researchers to collaborate on this scale in whatever best suits their setting, research design, and disciplinary expertise (Ferguson, C. Rentes, McCarthy, & H. Vinson, 2021).

After the strata of any organization or educational institute, the next peer is the campus administrator or the department head, the principals of the colleges, and various government administrative officials working from remote locations and trying to complete the work without any trouble (Kumar Jena, P., 2021). A small group of senior faculty members, self-employment schools, and other teaching staff are the decision-makers, contacting the various stakeholders and officially communicating with the students, parents, and other teachers. They are also involved in the process of strategy-making and providing policy support through video conferencing and online classes without having much connectivity and immersion in reality. They have less tolerance and willingness to accept new situations, less intensity of reactions, and more problems associated with sleep, accompanied by the students' adherence. Some studies have found that specific types of stress induce the involvement of both faculties and students with a greater sense of purpose as they prepare to cope with potential challenges in the future (Walugembe, Ntayi, Olupot, & Elasu, 2022)..

### 4.1. Online Training Platforms

Best practices have been developed for which structures and methods are effective for teaching on an online platform. Unlike the pandemic period, where it was hard to overcome online fatigue and reluctance to use online learning tools before lockdown,

we have seen increased motivation after experiencing online training as a convenient lifestyle. It does not matter who your students are; they prefer live online classes to asynchronous platforms, showing that the fear of individual interaction window for students can be managed with good classical pedagogy only now online. During this period, training platforms should also meet international standards to attract domestic and foreign students. Social media platforms and congresses can be used to communicate with the students' parents. Also, meeting education standards is difficult. We discuss how we could find a way to prove those who have provided online lectures and practice; we discuss how and what we mean by saying "a qualified teacher" and "qualified participant." The premature standard definition in coordination with central organizations in Turkey regarding obligatory online training and digital teaching universities to prove who could provide education and deliver professional service to others was found to be repressive in some parts. (Moshtari & Safarpour, 2024)

The COVID-19 pandemic has also significantly affected the learning processes, and the shift has been made to fully online (World et al., 2021). From our perspective, a sudden change in teaching format imposed a relatively quick adaptation of undergraduate dermatology education to an all-online format (Askenazy, et al., 2022). Although we have experienced some drawbacks, the future will be different from before COVID-19 because analogous pedagogical reforms at an unprecedented pace took place in a wide range of schools and countries that otherwise saw only minimal educational reforms in the past few years. Online training and education will continue to develop even more, and we assume they will soon become the main method; face-to-face learning will also continue (M. Lo Hog Tian, et al., 2022). Thus, the future could be blended rather than exclusive.

## 5. Leadership and Organisational Learning

This aspect of leadership is steady and resistant to change. Externalizing answers to strategic questions does not permit creativity, risk-taking, and internal knowledge-building at the heart of the principles of the central themes of LO. The potential of explicit staff commitment to strategic decision-making becomes stifled. The concept of a more lateral form of leadership, one sensitive and prepared to change and more likely to be discovered in the literature of LO, seems more suited to facilitating organizational learning. This follows the specific principle of LO, which is that the organizational model must reflect the external context, i.e., the organizational leadership model must reflect the degree of complexity in the environment. It shows that environments that create organizational learning create the pressing need for leadership that nurtures that learning. (Weiner, Francois, Stone-Johnson, & Childs, 2021).

Leadership is a useful concept in discussions of organizational learning. Senior management often act out their leadership roles by explicitly prioritizing the value of learning. By arguing for the value of learning, inherent in such acts of leadership is the promotion of risk-taking behavior and the environment in which risk-taking and the questioning of assumptions about business practice can occur. Such creativity is necessary for the organization to adapt in an uncertain and unpredictable business

context. Promoting learning makes it safe for the individual to act on these beliefs. To go out on a limb, to be creative and risk-taking, indeed to act as though they are an individual and not an extension of the organizational bureaucracy, demands that individual feelings of exclusion and risk are minimized. Leadership prioritizes learning and expresses a set of values and principles that members might adopt. (Sjödin, Parida, Jovanovic, & Visnjic, 2020).

### 5.1. Role of Leaders in Fostering Learning Culture

Leaders play a key role in creating a positive learning environment and maximizing learning opportunities provided to individuals, work teams, and the whole organization. Bartlett et al. identified three key roles leaders play in creating a 'Learning Organization.' They must be personal role models for value development and learning and create a 'safe space' for experimentation. They must understand that they have a servant-leadership role to build the capability of their team members continuously. The managers usually control resources and, hence, can decide how to enable their teams best. Good development discussions between employees and supervisors are a key building block in the hierarchical model that provides the necessary resources such as coaching and training. (Morris, Lummis, Lock, Ferguson, Hill, & Nykiel, 2020).

Reese and Koenig have extensively studied the impact of culture on organizational success, and they have established a model called 'Culture Change', which details the nuances of the role of leadership, strategic vision, goals, and measurement. Horton dedicates an entire book to this topic, outlining several good examples of how to build a 'Landmark Culture'. He gives several case studies to show the direct linkage of learning to strategy and how such organizations create strong learning communities.

There is a strong correlation between learning culture and organizational growth. Over the years, a lot has been written about developing a learning organization, and most books highlight three key aspects to develop such a culture: leadership, learning systems, and learning communities. Some authors also question this emphasis on a learning culture, but most experts agree that it is critical, especially in the fast-changing environments of today's digital world like ours. (Naveed, Alhaidan, Al Halbusi, & Al-Swidi, 2022)

## 6. Employee Engagement and Learning

Effective learning only happens when individuals want to learn – believe they can make a difference (self-efficacy); apply learning to current and future work challenges based on testing new ideas and getting meaningful, specific, constructive feedback; learn to learn and adapt to complex, changing situations; and get the help they need as and when they need it – access to subject matter experts, coaches, mentors, and guided learning modules. In times of accelerated change, it is essential to monitor employee attitudes with perception surveys specifically evaluating the right corporate behaviors for the new economy and adjusting both learning resources and corporate governance systems to deliver regular feedback for different manager levels along with tools to understand, explain, understand, and address disparities. (Roberts, 2020).

Research has shown that people realize their value and potential at work in many different ways. We know that organizations need to create a broad social lexicon for all these very different, powerful conversations, which describes and accounts for different learning needs, interests, and aspirations. The two most important questions I always encourage people managers to consider are then: 'What conversation would we like to happen more frequently around here?' and 'How can we develop and use our conversations in a way that reflects our individual and collective values and expectations?' A technique I used with several clients was to choose several activities people could do to ensure these conversations happened. This could be through regular surveys; easier still, however, is using activity and learning data to identify themes and having feedback conversations where there are clear differences in ages, levels, or other divides. (Janssens & Zanoni, 2021).

Simply put, employee engagement is the extent to which people feel part of their workplace and want to do their best job. The more engaged employees feel, the more likely they are to go the extra mile to make their organization successful, show a real passion for their work, be dedicated to doing their best, be willing to challenge the way things are done, give more discretionary effort, and lead change. As well as making a significant difference to an organization's profitability and creating a great place to work, the quicker an organization can create engagement in people who have joined it during the pandemic, the more effective they'll be at helping persuade existing employees that management is serious about their development. The best way to engage employees is to talk this through and co-create solutions – helping them engage in the process. (Surma, Nunes, Rook, & Loder, 2021).

## 6.1. Importance of Employee Involvement

The state of organizational learning after the COVID-19 pandemic presents international, comprehensive interrogations on the themes of 'Organisational Learning & Learning Organisations.' It does so within the context of learning in the post-COVID era. Learning professionals' contributions are beforehand placed into a wider, deep context scene set by management, HRD, psychological, HRM, organizational, and political analysis. Before assimilation and application advice, sections included interpreting the context freshly and anew. Only articles focus as singularly as ours on one type of situation: a pandemic. The predictive power of the coronavirus made it even perhaps an unusual focus on us, but for as long as we are in the immediacy thereof, its significance is poignant. Since the early 20th century, scientific management thinkers have suggested increased worker participation, allowing them increased involvement in decisions that affect them. (De-la-Calle-Durán & Rodríguez-Sánchez, 2021)

This final section in the concluding paper on the state of organizational learning after the COVID-19 pandemic highlights key features of the papers included in the special issue by discussing findings, themes, and usable ideas (also known as the need for transferability). The theoretical and empirical expositions intend to address the original questions set in the CFP while prioritizing the management recommendation needs of practitioners and people in work. A subtle shift is observed between debates on

challenges and solutions. Simultaneously, the interconnectedness of structural determinants by discussing individual learning, team learning levels, and the wider institutional and national environments remains throughout. We, therefore, jointly provide a comprehensive discussion referring to each paper in turn and the potential for 'next theories.' (Chemali, Mari-Sáez, El Bcheraoui, & Weishaar, 2022).

## 7. Measuring the Effectiveness of Learning Initiatives

A pioneering study—Learning to Win, published by the Good Judgement Project—has shown the value of the rigorous analysis of the effectiveness of learning initiatives in the context of the USA intelligence and other government organizations. With stakes as high as they are, measuring learning effectiveness has moved beyond the standard learning function dashboards and direct correlation-based metrics that have been predominant. Instead, measurements are carried out in a broader context, which evaluates learning at the team, organizational, and industry levels and in the national security context. What is important about this initiative is that it combines two elements: its ability to measure, contest, and reward teams and its broader-based scorecard. (Fanzo, et al., 2021).

Redefining success means being more conscientious when choosing what we measure (or do not). Take the marketing field. As digital data have allowed them to measure many things, the challenge has become discerning what moves the needle regarding profitability and customer value. The same applies to learning. We should no longer focus on measuring satisfaction. Our purpose now is to hand the CEO more reasons than ever to continue to make learning investments even in the post-COVID world. We need to measure learning impact and how it changes our people and our organization – and we need to do so in the wider context that now defines success. We assume that the broad challenges we identified at this paper's beginning will be more pressing, rather than less, in the post-COVID world. But now, with new priorities, there are fewer second chances. (Sharma & Alvi, 2021).

### 7.1. Key Performance Indicators

Therefore, key performance indicators (KPIs) can be grouped into two major categories: input and output indicators. Input indicators are chosen based on the different processes with strong connections, which can be measured, particularly concerning some key organizational goals. While output indicators give information on results achieved and the quality of a problem solution. It may provide actions to improve the quality indicator. Organizations then need to select the KPIs most relevant to their objectives and that most reflect real, current issues in their operations and outcomes, hence contributing more and providing real meaning to business decisions, hence translating their strategy into actions. (Li et al., 2020)

KPIs help one to measure the performance and well-being of an organization. They are used in business to gauge a company is success, particularly concerning fulfilling organizational obligations and profits and achieving positive arrays of actions that address matters of interest to larger groups of well-wishers. Different KPIs are available

for companies, whether large or small experiments. They can be categorized into different areas, such as sales, human capital, health and safety, customer services, and innovation. However, applying KPIs as a method of evaluating the system, process, organization, and employee performance is widespread and its popularity keeps growing. There is a trend towards utilizing KPIs at both strategic and operational levels. Yet, due to the huge growing demand, the timely construction of the relevant sets of KPIs is a very challenging. (Guo, 2023).

## 8. Future Trends in Organisational Learning

As the education system was disrupted globally, it also brought to light a level of vulnerability of the AISA trilingual capacity. Dependence on skilled, local IT experts to translate, interpret, and create policies and frameworks for virtual education and to ultimately troubleshoot and leverage localized platforms led to gaps in educational delivery strategies and network efficiency (Chen, et al., 2020). The virtual world presented networks that needed expansions, they demanded online training updates and tools that could strain the adaptations in place. It made leaders quickly align their instructional strategies. In such times of being separated from and uninformed by a dominating "Diaspora narrative," it became imperative to recognize, understand, and own the local experience narratives for learning from them. Alternatively, the experience led to the resurgence of IKS for homeschooling and adjustment to hybrid integration to balance local and global imperatives, addressing local issues, finding international best practices that align with the local context, and communicating this to stakeholders effectively. For example, Uganda's school system interoperates the Western, globally transformed education system. The COVID-19-induced experience is not just a by-product of institutional closings, social isolation, and work migration. However, it offers empirical insights into how education systems can be re-imagined and strengthened. Some studies argue that remote learning should not be seen as a last resort during a crisis, but the experience post-COVID-19 could give a rare opportunity to improve things. (Pillai, 2020).

The COVID-19 pandemic disrupted educational, work, and family life worldwide, and organiza-tional learning was no exception. It highlighted the need for reinvention, and learning and development departments found imaginative ways to facilitate continuous professional development for their employees. The COVID-19 pandemic has effectively demonstrated the importance of tailored online training and continuous professional development for staff (Bieńkowska, Koszela, Sałamacha, & Tworek, 2022). This is because of the need for mass reskilling and upskilling. In international schools, many students have left and are enrolling instead in schools back in their home country. Thus, these schools no longer need the same ratio of local staff to manage the lower numbers of students and the residual numbers of long-term expatriate families. Consequently, many international schools made large numbers of staff redundant, including significant numbers of expatriate staff, who found themselves without a job, without a home, and much notice. The mass departure of international teachers at the end of one academic year leads to a significant need to recruit and induct a professional and committed new

staff for the following academic year. This means many people are changing jobs, so a system to induct these staff successfully is essential.

### 8.1. Personalized Learning Experiences

Customized learning modalities seem to be the most used strategies in the educational field to improve and stimulate individual cognitive skills. The effectiveness of personalized learning is that it intertwines the learning process with an effective acquisition of knowledge. Generally, it is possible to see the learning experience from different points of view. In the first case, the didactic process could be seen as an optimization problem, in other words, to try to identify the sequence of contents that minimizes the probability of a mistake from the student, maximizes the likelihood of learning something new or optimizes the estimated benefit for the student. In the second case, it is possible to see the training process as adaptive learning. In this second version, the expected learning dynamics are not directly related to an internal cognitive variable. Rather, The goal is to adapt the expected training timelines to maximize the number of plausible hypotheses in light of the provided data and previous knowledge. It is clear that the objective of personalized learning is to improve the way we learn and the way we select, modulate, and organize educational content. Its objective is to focus on the needs and desires of each individual so it is possible for everyone to change their qualities thanks to education and to fulfill their possibilities in the best way. Equipping ourselves with this approach, also in this reality, will offer a concrete response to the educational needs that have emerged in educational contexts. (Sharma & Alvi, 2021).

The demand for personalized learning experiences is increasing and becoming an essential way to design education to meet the needs of every student. According to research, this trend is due to the spread of digital technologies widely present in learning management systems (LMS) and web-based systems. In the last year, the COVID-19 pandemic forced everyone to redesign everything related to their daily activities, including teaching and learning. As a consequence, and to develop a personalized educational way as much as possible, new tools and strategies have been needed. These same tools appear at the center of the solutions against the emergency everyone was facing, and their use was strongly incentivized (Toccafondi, et al., 2020).

## 9. Conclusion and Recommendations

The reality is that learning can only be achieved by an organization, at the individual, group, and organizational level, if that organization is conducive to learning and the time has never been riper for developing these capabilities. The doors to the potential of the virtual and digital organization are now open and wide for saving and or making money. By developing the only three real assets that an organization has: the intelligence and creativity of the people within those organizations, it can then be launched into a world more uncertain and complex but rich in potential and possibilities than at any time in the known history of this planet. Too little is written on the overarching resources of organizational learning and intellectual capital that have potential beyond the realization of the potential of the learning organization (Retno Rahayu, Santoso Utomo, Riskiyana, & Nur Hidayah, 2022).

[[article_main_idea]] Although the COVID-19 pandemic has been a disaster for both countries and organizations, it has also been a phenomenal and creative learning journey. Indeed, the whole world has received forced and intensive schooling in how existence in a world forever changed by a virus and the dynamics of the pandemic. A "new normal" world is beckoning, and it is the time for new thinking and a primary focus on capability development and learning (Seivwright, et al., 2022).

## 9.1. Strategies for Enhancing Organisational Learning

(Kumar Jena, 2020) Suggestions for handling issues created by COVID-19 include ensuring online platforms have enhanced safety measures, providing training on online learning for all education stakeholders, and offering support to learners from low-income families. Additionally, institutions can facilitate practical classes through virtual labs, provide academic and psychological support to students, and create an integrated technology platform for learners. (Kumar Jena, 2020) Payment of school and college fees has been delayed during the lockdown, impacting parents' ability to pay. To enhance organizational learning, India should develop creative strategies to ensure sustainable access to education, implement quality assurance mechanisms for online learning, integrate traditional knowledge into higher education, and address issues related to distance learning. Additionally, there is a need to improve digital capabilities and infrastructure and to plan for educational activities while maintaining social distancing. A senior academic administrator stated they planned a blended learning approach combining online learning and the traditional classroom experience for the coming academic year [ref: article_id]. When the students come to campus, some university programs classes will be held in the classroom while others will be moved entirely online. The university also plans to maintain appropriate social distancing and hygiene measures to ensure the students' safety when they attend classes in person. This form of pedagogy will also become the new normal in India as it is predicted that the rates of virus transmission will continue to be high (Toccafondi, et al., 2020) Healthcare organizations struggle to translate incident data into meaningful learning and practice improvements. Successful organizations anticipate, monitor, and adapt to changes, fostering a culture of organizational learning. A proposed framework aims to help organizations learn from positive changes during the pandemic and become more resilient by creating safe spaces for staff to contribute to learning and take ownership of improvements. The case of Denmark has been selected for this study as Danish healthcare organizations quickly responded to the COVID-19 pandemic and began transmitting data regarding surgical site infections to the Danish Surgical Database [ref: article_id]. For example, Aalborg University Hospital shifted from medical risk assessments to focus on infection prevention, screening, and minimally invasive techniques. This was a positive change as it will likely lead to a reduction in deep surgical site infections.

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