Investigating the Intersection of Employee Voice and Resilient Healthcare Systems

Cayla Janse van Rensburg and Ilse Doyer
Department of Industrial and Systems Engineering
University of Pretoria
Pretoria, South Africa
caylajansevanrensburg@gmail.com, ilse.doyer@up.ac.za

Abstract

The importance of employee voice in Resilient Healthcare (RHC) systems is not well understood and is largely underrepresented in literature. However, it is believed that stronger acknowledgement of employee voice in healthcare settings can drastically improve RHC systems. As a result, this review aims to strengthen RHC implementations by analysing where and how the employee voice should be considered. The study follows a qualitative evidence synthesis approach, in which the analysis is performed thematically. This research firstly analyses literature to identify the critical points where Resilience Engineering requires the input of employee voice to establish a truly resilient system. Secondly, it analyses literature on employee voice in healthcare to identify challenges that pose a risk to the successful implementation of RHC. The originality of this review lies in its focus on the overlap between the role of the employee voice, and specifically the critical voice, in the establishment of RHC systems. Four RHC process steps were identified that depend on, or could benefit from, the employee voice: the identification of critical system parameters, the critiquing of such parameters, the monitoring of the parameters, and adapting the system or addressing identified gaps. Four healthcare issues are highlighted to pose a risk to the employee voice contribution: the disregarding / discrediting of the critical employee voice, the mutual distrust between doctors and nurses, time pressure and the fear of reporting issues where there is the perception of a punitive organisation culture. A matrix summarises the intersection of these findings.

Keywords
Employee voice, resilience, resilient healthcare systems, RHC, and resilience engineering

1. Introduction
The concept of Resilience Engineering (RE) evolved as a response to the Columbia disaster in 2003 (Pillay, 2018). This accident, in which a space shuttle disintegrated upon re-entry, was an unfortunate repetition of the Challenger disaster in 1986, urging scientists to develop a method to address these functional disruptions. After analysing the factors influencing the Columbia disaster amongst others, Woods (2005) presented five patterns that cause the majority of disasters:

Pattern 1: Drift toward failure as defences erode in the face of production pressure. Organisations are often confronted with a trade-off between efficiency and quality. Although it is of utmost importance for companies to address quality and safety concerns during the production phase, these issues tend to be increasingly overlooked or ignored as pressure builds towards meeting the deadline and production speed takes preference.

Pattern 2: Taking past success as a reason for confidence. Organisations tend to cease their testing after obtaining a few accurate results. In such cases, evaluation techniques are not reviewed or repeated to further reduce risk.

Pattern 3: Fragmented problem-solving clouds the big picture. During the Columbia disaster, decisions were made on unreliable and disjointed data analyses as no person had a comprehensive view of the entire system.

Pattern 4: Failure to revise assessments as new evidence accumulates. It is important for tests to accommodate new types and forms of collected data. Hence, a system should be able to adapt its risk evaluation actions swiftly and effectively.

Pattern 5: Breakdowns at the boundaries of organisational units. These communication breakdowns take place when the team in charge of tracking deviations while testing is unable to communicate issues to managers in different organisational units.

From the descriptions of the five patterns, it is clear what an important role the employee voice could play in countering these risks, and most especially so, the critical thinker's voice. Kivunja (2015) defines critical thinking as "drawing inferences from what is said, probing for underlying assumptions, and developing hypotheses which can be investigated to clarify issues". According to Miller (1990), the skill involves "engaging in inductive or deductive reasoning, to gain an understanding of what data really mean as well as identification and avoidance of prejudice". These definitions further highlight the role that the critical thinking employee voice can and should play in the prevention of disasters brought on by a systemic organisational failure. Known for his ground-breaking concepts of the six thinking hats, De Bono (2017) describes the concept of the "black hat" thinker. He defines this thinking style as the cautious and careful perspective and the basis of critical thinking. He further describes black hat thinking as the "mismatch mechanism" that picks up deviations from the norm. From de Bono's interpretation, it is evident what an important role the voice of the critical thinker or black hat employee voice will play in a system striving for resilience.

However, literature shows that the critical employee voice, the one that speaks up when change is needed, is not always used, or welcomed, in the workplace (Pattni et al., 2019, Okuyama et al., 2014). As shown in Figure 1, this paper synthesises literature to describe the overlap between employee voice and RE, with a specific focus on the healthcare sector. This sector presents unique employee voice challenges which will be investigated in more detail. Although developed in the aerospace sector, RE has expanded to other industries such as manufacturing, healthcare, aviation etc. In healthcare, RE is known as Resilient Healthcare, or RHC. The aim of this paper is to strengthen RHC implementations by analysing where and how the employee voice could ensure a robust and sustainable system implementation, and the challenges to be overcome in the process. Since the importance of employee voice in RHC systems is largely underrepresented in literature, this review endeavours to fill this gap by offering comprehensive insights into its impact.
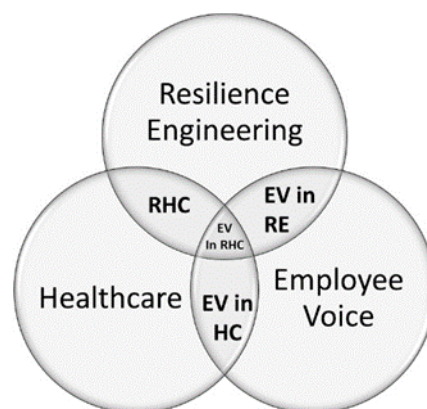

Figure 1. Exploring the overlap between RHC and EV

The review follows a methodology similar to a qualitative evidence synthesis as described by Grant (2009). This study design was chosen due to its usefulness for integrating and comparing findings from qualitative studies. The analysis

is performed by searching for relevant themes, in this case, resilience engineering, employee voice and resilient healthcare systems, that lie across individual qualitative studies.

The structure of this paper follows the format presented in Figure 1, covering an overview of RE and the role of employee voice in RE. This is followed by an introduction to employee voice in healthcare, which finally builds up to a synthesis on a discussion on employee voice in RHC.

2. Resilience Engineering

As a widely applicable technique, there is no single definition for RE. Woods (2018) and Hollnagel (2015) define RE as a paradigm for safety management that focuses on "how to help people cope with complexity under pressure to achieve success" while Pillay (2018) defines it as "developing an organisation's behavioural and cognitive capability such that it is able to effectively adjust to continue performing optimally near its safe operating envelop in the presence of everyday threats and environmental stressors at all levels of the organisation". Pillay (2018) investigates the concept of RE in even more detail by comparing 11 different definitions, concluding that RE is "a complex phenomenon that revolves around the adaptation of a system to pro-actively minimise risk". In other words, instead of simply reacting to failures such as breakdowns or crises situations, RE aims to pro-actively equip a system with the required tools to manage possible emergencies when they occur.

Based on the definition that RE is a "proactive approach that looks for ways to enhance the ability of organisations to explicitly monitor risks", Madni and Jackson (2009) designed a conceptual framework for the development of resilient systems. The framework is based on four capabilities: avoid (through anticipation), withstand (through absorption), recover from (through restoration), and adapt to (through reconfiguration).

For a system to be able to avoid disruptions, it must be able to anticipate emergencies by previewing possible outcomes. Withstanding disruptions, also expressed by system robustness, can be achieved through the implementation of various "shock absorbers", for example, resource buffers, which can prevent more predictable disruptions, or at the very least reduce the impact of unpredictable events. When disruptions are completely unexpected, the system must be able to recover and adapt through reconfiguration to survive the current disruption, as well as better manage future disruptions. Lastly, in the event that a disruption does occur and causes some level of damage, the system must be able to recover and restore itself to its pre-disruption state. From this framework, it can be seen that resilience engineering occurs in the past, the present and the future. RE takes on a future perspective when seeking to avoid and withstand future disruptions, while a present perspective is undertaken when adapting the system to function during a disruption. A past perspective is used when recovering from past disruptions.

Hollnagel (2015) suggests a different variation of abilities that ensures resilience, proposing that all resilient systems should have the ability to respond, monitor, learn and anticipate. He then uses these four abilities to develop a Resilience Analysis Grid (RAG), which provides a way to measure the potential for resilience in a system. The grid consists of a range of generic and specific questions for each resilient ability. For example, to measure a system's ability to respond one might ask: how fast is full response ability available? Or for how long can a 100% effective response be sustained? Each question is then given a score using a Likert-type scale with five ranks ranging from missing to excellent. Using the Likert-scale ratings for each question, a radar chart can be drawn up to provide a visual illustration of system resilience. An example chart for the responsiveness of a system is shown in Figure 2.

Figure 2. Example RAG radar chart assessing system responsiveness

Table 1 shows an example of how the responsiveness of a system is scored. Similar tables exist for the other three metrics. These detailed descriptions of a resilient system were used to analyse the role played by the employee voice in resilient systems, which will be discussed in the next section.

Table 1. RAG criteria for system responsiveness (Hollnagel, 2015)

Attribute	Question
Event list	What are the events for which the system has a prepared response?
Background	How were these events selected (tradition, regulatory requirements, design basis, experience, expertise, risk assessment, industry standard, etc.)?
Relevance	When was the list created? How often is it revised? On which basis is it revised? Who is responsible for maintaining and evaluating the list?
Threshold	When is a response activated? What is the triggering criterion or threshold? Is the criterion absolute or does it depend on internal / external factors? Is there a trade-off between, e.g., safety and productivity?
Response list	How was the specific type of response list decided? How is it ascertained that it is adequate? (Empirically, or based on analyses or models?)
Speed	How fast is full response ability available? How fast can an effective response be implemented?
Duration	For how long can a 100% effective response be sustained? What is the minimum acceptable response level and how long can it be sustained?
Stop rule	What is the criterion for ending the response and returning to a "normal" state?
Response capability	How many resources are allocated to ensure response readiness (people, equipment, materials)? How many are exclusive for the response potential? Who is responsible for maintaining the response ability?
Verification	How is the readiness to respond maintained? How and when is the readiness to respond verified?

2.1 Employee Voice in RE

Specialists in several engineering fields have stressed the importance of the employee voice in building and maintaining resilient systems (Jafari et al., 2018). In this paper, the role of employee voice in RE will be investigated using the RAG developed by Hollnagel (2015) for the four resilience abilities of responding, monitoring, learning and anticipation.

2.1.1 A Responding System Needs a Critical Employee Voice

According to the RAG of Hollnagel (2015), the responsiveness of a system is established by identifying and listing events that need a prepared response, critiquing and reviewing this list regularly, and designing and planning

appropriate responses for these events. Although a team of specialists, in itself an employee voice, should initiate and coordinate this activity, the wider employee voice can contribute greatly to the drawing up and the critiquing of this list, as well as reviewing the design of the responses. The involvement of a wide range of employee voices in this aspect of resilience design significantly increases the robustness of the response attribute. The critical thinking employee voice, as defined by Kivunja (2015) and Miller (1990) in the introductory chapter, is especially valuable in the role of critiquing an already created list and plan as these voices are able to spot gaps and challenge the status quo.

2.1.2 A Monitoring System Needs a Critical Employee Voice
The monitoring ability of a resilient system is enabled through the identification and monitoring of critical leading and lagging indicators (Hollnagel, 2015). Once created, the list of indicators should be critiqued for completeness, validity and practicality. The monitoring system should subsequently be set up in terms of frequency of measurement, scheduling of resources, type of data to be collected etc. Again, this whole function of monitoring depends on the voice of the employee to create and critique the list for gaps and validity, but also in the flagging of any abnormalities or deviations from the agreed standard. As the flagging of abnormalities is akin to receiving bad news, the organisation striving for resilience should adopt a critical thinking ear to these employee voices that execute the "mismatch mechanism" of the organisation.

2.1.3 A Learning System Needs a Critical Employee Voice
Building a learning organisation towards a resilient system again requires a detailed discussion around how the learning will take place – when, how, what, who, where (Hollnagel, 2015). Although such a system is clearly best designed and implemented with the help of the employee voice, it is the ability of the organisation to identify what worked and what did not work that will create a learning system. Here the engagement of the employees at all levels of the organisation would be a rich source of input. The critical thinkers, with their ability to probe and look beyond the surface of things, would be especially valuable and their voices should be solicited.

2.1.4 An Anticipating System Needs a Critical Employee Voice
According to Hollnagel (2015), the RAG of a system's ability to anticipate disruptive events centres around an organisation's ability to look toward the future and identify potential risks. This futuristic functionality will most probably be executed by experts. However, a secondary ability highlighted in the RAG is the building of a risk awareness culture. Such a "black hat" culture can only be built where the employee voice raising alarm is welcomed, and the management agenda sets aside specific time for the black hat voice to be heard.

The five patterns leading to disasters, identified by Woods (2005) and discussed above, showed how the black hat voice is increasingly dismissed as pressure mounts. Furthermore, the four RE abilities described by Hollnagel (2015) again show just how important the black hat capability of the organisation is. The next section will further investigate how this plays out in the healthcare sector.

3. Resilient Healthcare
Resilient Healthcare (RHC) was introduced in 2012 by Hollnagel et al. (2013). This is a branch of the more traditional RE that applies resilience concepts in healthcare by strengthening health system performance under unexpected circumstances. The emergence of RHC can be closely linked to the medical industry's shift from the traditional reactive Safety-I approach to the pro-active Safety-II approach (Hollnagel et al., 2015).

Safety-I defines the concept of a safe environment as one where few things go wrong and assumes that emergencies simply occur due to identifiable breakdowns and defects. Hence, under the Safety-I approach, it is believed that safety can be improved simply by eliminating the relevant causes of these adverse outcomes. In contrast to the Safety-I approach, instead of focussing on making as few as possible things go wrong, the Safety-II approach aims to make as many as possible things go right. In other words, Safety-II recognises healthcare as a complex system and incorporates systems thinking to shift the focus to equipping the system to handle difficult situations proactively rather than reacting to failures by seeking to eliminate the cause after a breakdown occurred. Hence, RHC can be defined as "the capacity of health actors, institutions, and populations to prepare for and effectively respond to crises; maintain core functions when crises hit; and, informed by lessons learned during the crises, reorganise if conditions require it" (Kruk et al., 2015).

Similar to RE, there is no single application for RHC as resilient techniques can be applied in a large variety of healthcare environments. The generic elements of avoid, withstand, recover and adapt, as proposed by Madni and Jackson (2009), are covered by various applications in healthcare. A few of these applications are described here to further investigate the role that the employee voice plays in the effective implementation of the various RHC applications.

3.1 Notable Applications of RHC in Healthcare

In a study done by Clay-Williams et al. (2015), system resilience is improved in an Intensive Care Unit (ICU) by implementing clinical guidelines. To achieve a more stable system, the authors use the Functional Resonance Analysis Method (FRAM) to attempt to align Work-as-Imagined (WAI) with Work-as-Done (WAD). As the name suggests, WAI describes clinical practices as it is supposed to be done in an ideal world. However, due to the complex nature of health systems, disruptions often prevent clinical practices from complying with planned guidelines, resulting in WAD. It is shown that the alignment of WAI and WAD result in a decrease in system variability, leading to more predictable system performance. To gain insight into the functionality of the WAD and to capture essential system characteristics, the FRAM method is used. This method analyses some critical activities, or functions, in a system by investigating the inputs, outputs, preconditions, resources, control and time taken to complete each activity. After fully analysing the WAD, discrepancies between WAD and WAI are identified and guidelines are established to minimise or eliminate these discrepancies.

Raben et al. (2017) investigate the use of the Leading Indicator Identification Method (LIIM) to identify critical leading factors in a blood sampling process. The authors define leading indicators as activities that should be present and functional for desired outcomes to be achieved. This methodology is based on systems thinking theories and also incorporates some aspects of FRAM. To identify activities critical to the success of the system, LIIM adheres to the following methodology: the identification of relevant system functions, clustering the functions into sets, identifying possible variability of functions, identifying couplings of functions, combining variability and couplings to identify candidate leading indicators and confirming the final system leading indicators. The leading indicator activities are then improved and enhanced to increase system resilience.

Ekstedt and Ödegård (2015) take on a more qualitative approach in a study to improve the resilience of cancer care systems. The study aimed to identify "gaps in the continuity of care" which can include losses of information or other errors made by medical staff. These "gaps" substantially increases the risk for adverse effects after the patient has been discharged and system resilience is thus increased by lowering the probability of "gaps" occurring. Data were collected by conducting focus-group interviews with 34 healthcare professionals from three Swedish hospitals, covering various different specialities in cancer care. After conducting the interviews and thoroughly analysing the data, practical solutions were developed to address the identified causes of "gaps". What makes this study especially interesting and different from the above-mentioned applications of RHC is the involvement of medical staff in the analysis of the system.

The applications above are not an exhaustive list of RHC applications, which is better explored in an article by Berg et al. (2018), but demonstrates three examples of how the medical sector has adapted RE for use in different settings. It is notable that these applications follow a similar pattern to that of the RAG by Hollnagel (2015) of identifying (critical parameters or gaps), critiquing where needed (compiled lists), measuring (identified parameters), and adapting (where necessary) or addressing (identified gaps). In each of these the critical thinker employee voice is a valuable asset for their ability to probe and look beyond presented information and challenge accepted standards by identifying risks and gaps in a system. The discussion below will however highlight the unique communication challenges aced by the healthcare sector.

3.2 The Employee Voice in Healthcare

This paper focuses on the employee voice of nurses within large healthcare settings such as hospitals, where hospital management, as well as doctors, function as the superiors of the nurses. A literature review showed that several studies have investigated the dynamics around the communication of nurses with doctors or hospital management. Several studies that highlight communication dynamics that will specifically affect the functioning of RHC are described briefly here.

In his book titled "Exit, voice and loyalty", Hirschman (1970) describes three potential employee reactions when faced with unfavourable circumstances at a business. Take, for example, a lack of Personal Protective Equipment (PPE) during a pandemic such as Covid-19. Employees can either choose to exit the company by resigning, keep silent and remain loyal or voice their concerns by communicating directly to management. A paper by (Adkins, 2020) explains how a gag order – an order for employees to remain silent regarding system abnormalities – "reduces employees to functionaries". The paper describes how employees who publicly announced PPE shortages had been discredited, disregarded and even fired from their positions as hospital staff. This situation is a typical example of where the black hat voice is not only unwelcome within an organisation, but even punished.

Two separate studies highlighted the complicated relationship between doctors and nurses with mutual poor perceptions of the other. For example, doctors listed nurses' lack of specialist knowledge, competency and skills as barriers to good communication, whereas nurses listed the perceived arrogance of doctors as a prominent barrier to communication (Amudha et al., 2018, Park et al., 2018).

Time pressure was mentioned by both doctors and nurses as a barrier to communication with doctors feeling impatient with nurses' long explanations, resulting in nurses not having the confidence to speak up as often as needed (Amudha et al., 2018, Park et al., 2018, Tjia et al., 2009).

Many articles reported on nurses' underreporting medication errors due to fear of the consequences in an organisation culture that addresses such issues punitively and individually, rather than systemically. A lack of safety culture is thus a barrier to the black hat employee voice (Kagan and Barnoy, 2013, Rutledge et al., 2018, Bayazidi et al., 2012, Kim et al., 2007).

A study by Kwon et al. (2020) tested the perceptions of doctors and nurses on various issues such as patient safety, error reporting, nurse-doctor cooperation and found that doctors and nurses do not agree on these matters and have substantially different perceptions, with nurses taking a more pessimistic view of the different situations. A study by Willmott and Mould (2017) proved the opposite with doctors taking a more pessimistic view of issues such as patient safety culture in their hospitals than did the nurses. The differences in perception between doctors and nurses were further confirmed in a recent study by Al-Mugheed et al. (2022) which showed statistically significant differences in attitudes towards various aspects of the healthcare system. These studies point to biases within groups within healthcare, highlighting the importance of soliciting a wide range of employee voices rather than that of a single group.

4. Employee Voice in RHC: Critique and Recommendations
Based on RE, RHC is a systematic and comprehensive approach to pro-actively and actively manage risk and disruptive events in healthcare systems. By its definition, RHC is the domain of the critical thinking, black hat voice that sounds the alarm and challenges organisational prejudice to create a robust and prepared system. The role of the employee voice in RE in general has already been analysed in section 3.2. This section links the literature on barriers in healthcare communication with the implementation of RE in healthcare, looking at challenges and opportunities that exist where employee voice meets RHC.

As discussed in section 3.1, RHC applications generally follow a process of identifying (critical parameters or gaps), critiquing where needed (compiled lists), measuring (identified parameters), and adapting (where necessary) or addressing (identified gaps). Based on what is reported in literature, RHC usually involves only management, or a panel of experts, during the design phases of setting up the components of the resilient system. Noting the differences in perceptions of issues by different groups within healthcare (Al-Mugheed et al., 2022, Kwon et al., 2020, Willmott and Mould, 2017), using the input of a single group within the healthcare system to compile and design a system might not lead to the most resilient and robust system. Engaging with a wider variety of employee voices might result in legitimate challenges to biases and prejudices held by one specific group within a system.

The analysis of the role that the employee voice can and should play in RE, indicated the various places where the black hat voice specifically should be solicited: in both critiquing and reporting. Even in situations where an RHC implementation does not invite critiquing by a variety of employees, the RHC system will most certainly depend on employees to report any deviations from the standards set during the initiation of the RHC system. However, various studies highlighted the reluctance of employees to report errors if a system was perceived to be punitive (Kagan and

Barnoy, 2013, Rutledge et al., 2018, Bayazidi et al., 2012, Kim et al., 2007). The presence of a learning, transformative culture was deemed most likely to facilitate an environment where employees will participate in reporting of system deviations (Barrachina and González-Chordá, 2016).

The reported mutual distrust between doctors and nurses (Amudha et al., 2018, Park et al., 2018) creates a risk in the successful implementation of RHC as the doctors' poor regard for less experienced nurses will make them hesitant to involve these voices in the setting up of the system, and will also more easily disregard these voices when they raise issues. The poor perceptions held by nurses of those in authority might make nurses hesitant to wholeheartedly engage in RHC activities.

A practical consideration in the implementation of RHC is the time pressure under which both doctors and nurses find themselves (Amudha et al., 2018, Park et al., 2018, Tjia et al., 2009). RHC is not something to be rushed. It needs a detail-oriented, thorough approach and implementation on an ongoing basis. Time pressure puts strain on both formal and informal reporting of issues. Debottlenecking of the reporting of errors is thus critical to the successful implementation of RHC.

Table 2 shows a summary of where the issues identified in literature could negatively impact the implementation of RHC.

Table 2. Where employee voice issues could negatively impact RHC

		Employee voice challenges in healthcare			
		Disregarding / discrediting employee voice	Mutual distrust between doctors and nurses	Time pressure	Fear of reporting issues
RHC Processes	Identifying / Listing	X	X		
	Critiquing	X	X	X	
	Measuring / Monitoring			X	X
	Addressing / Adapting	X	X	X	X

6. Conclusion

This paper introduced the concepts of RE and RHC, and showed how the employee voice, especially the voice of the critical thinker, enhances the implementation of resilient systems. In the discussion on employee voice in the healthcare sector, several issues were raised that present barriers to the engagement of the employee voice in RHC.

However, soliciting the black hat voice of the employee, the nurses in the case of RHC, by asking them to critique the comprehensiveness and practicality of the designed system, will not only strengthen the system as a whole and set it up for practical implementation, but might also create buy-in from the stakeholders who will be relied upon to implement the system on a day-to-day basis. Nurses possess a unique perspective and approach, grounded in their interaction with the operational level of the systemthat can add to the well-read and bigger picture perspective of management and experts. Literature confirms that the perception of issues of nurses often differ to those held by management and doctors (Al-Mugheed et al., 2022, Kwon et al., 2020, Willmott and Mould, 2017). Although these findings pose a threat to communication, they could easily be turned into a strength when it comes to the creation of a robust RHC system.

Furthermore, as the implementation of the design, such as the monitoring of the system to detect and report abnormalities, heavily depends on the engagement of employees at the front line of the organisation, resilient systems cannot afford to disregard such critical voices as that of the nurses.

Ultimately, the success of an RHC system will depend on the ability of the organisation to adopt a culture that welcomes input as an opportunity to learn and improve.

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Biographies

Cayla Janse van Rensburg graduated from the University of Pretoria with distinction in Industrial Engineering and was one of the top three achievers in the Faculty of Engineering, Built Environment, and Information Technology. She received a scholarship to the University of Cambridge, England, where she is currently completing her MPhil in Population Health Sciences.

Ilse Doyer is a lecturer at the University of Pretoria and is busy completing her PhD. She has more than twenty years of operations excellence experience in manufacturing, mining, agricultural processing, and service environments. She was Organization Development Manager for Cadbury and a senior management consultant with Organisation Development International (ODI). Her field of research is operations excellence, and she is doing her PhD in project selection within the realm of operations excellence.

Review response:

Reviewer number	Reviewer comment	Action taken
1	Please add the page number where you used quotations - "According to Miller (1990), the critical thinking skill involves "engaging in inductive or deductive reasoning, to gain an understanding of what data really mean as well as identification and avoidance of prejudice"	Citation revised and page number added.
1	" Incorrect in-text referencing format used - (Willmott and Mould, 2017).	Referencing revised and corrected.
3	The paper does not lay down its contribution and this must be clearly stated	Abstract and introduction revised to clarify paper contribution.
3	The paper does not have a clear abstract which must be clearly stated.	The abstract was revised and rewritten to state main objectives clearer.
3	Clearly show the methodology. It is not clear.	A paragraph on the methodology was added.
3	The introduction should be clear because this forms the basis for the study	Introduction revised to clearly state research objectives and methodology.