Applying collaborative research supervision approach in higher education

Kaone Bakokonyane
Department of Educational Management, Institute of Development Management, Gaborone, Botswana, and
Nkobi Owen Pansiri
Department of Primary Education, University of Botswana, Gaborone, Botswana

Abstract

Purpose – The purpose of this study was to examine the application of the collaborative research supervision approach (CRSA) to learning projects in higher education, using socialisation, externalisation, combination and internalisation (SECI) dimensions. The study, therefore, examined how these dimensions assisted learners in Botswana’s higher education to generate research knowledge.

Design/methodology/approach – The study used a mixed-method research approach and exploratory research design. Purposive sampling was used to examine how the CRSA dimensions were employed in a classroom of 111 higher education learners who were carrying out research projects. Out of this population, 97 responded to a questionnaire, and 14 learners participated in a face-to-face interview. One hundred and eleven research documents produced by learners were analysed, and 42 observations were conducted.

Findings – The study found that the four dimensions of CRSA assist greatly in the development of knowledge of the research processes. This study confirms that the CRSA in higher education institutions has the potential to enhance research knowledge and skills, build learners’ confidence in research, engage in learning, reduce workload, reduce the frustration of doing research and help learners complete their work in time. Learners with weak research skills easily catch up with their average-performing peers.

Research limitations/implications – It is important to recognise the methodological limitations of this study. The study used a mixed method and a single case. As a result, the results’ significance cannot be justified. Additionally, the context and methodology restrict the findings’ generalisability. There is obviously potential for additional cases since this article only offers a preliminary analysis of the single case issue. Consequently, the study recommends that yet another study could be conducted to check if the approach could be used for graduate learners. Another study could also be conducted to check if the approach could be used as a supervisory approach that can provide prospects for knowledge sharing and creating learning in an organisation.

Practical implications – The study discovered that when properly implemented, CRSA arrangement enhances research knowledge development and reduces the workload for both the supervisor and the student. When choosing this desired research supervision approach, either in terms of policy or in actual practice, it is important to take the potential for information exchange into account. This might result in improved research supervision efficacy in higher education and hence the production of better quality graduate learning projects.

Social implications – This study recommends the use of the CRSA in higher education, so as to help learners with weak research skills, to collaboratively work with learners with high and average research skills. It also improves the quality of supervisor–learner learning relationship.

Originality/value – The research results were given to participants and respondents for approval to find out if what was written was what they said. The research results were also given to colleagues to check whether the analysis is balanced and fair and to check biases and exaggerations.

Keywords Higher education, Socialisation, Combination, Collaborative research supervision, Externalisation, Internalisation

Paper type Research paper

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Introduction

The creation of a knowledge-based economy is the primary function of higher education institutions (Matzembacher et al., 2019). To drive this priority, learners in higher education institutions are expected to participate in research and innovations which have an impact on the economic growth and social well-being of their countries at national and international levels (Rasyad et al., 2019; Leu et al., 2022). These then call forth for the conduction of quality researches that have an impact on the establishment and application of policies as well as the production of goods and services in these institutions (Hussain et al., 2018; Herauld, 2021). By developing these cutting-edge information frontiers of research, in higher education institutions learners are expected to create and transfer knowledge (Howells et al., 2012).

Unfortunately, and as argued by Askew et al. (2016), research supervision methods used for supervising learners in most of higher education, come up with challenges such as differences in the quality of supervision, unclear supervision pedagogy and unclear supervision approaches, workload, time constraints, quality of learners and these do not empower learners to create their own knowledge for a knowledge-based economy. The common experience is that research supervision methods in higher education institutions is focused one-to-one relationship between the supervisor and the learner (Wood and Louw, 2018). In the views of Zaheer and Munir (2020), these methods are more of a traditional apprenticeship supervision approach. The approach leaves learners in somewhat isolated one-on-one learning experiences and cannot produce knowledge-based learners for a knowledge-based economy (Wilton, 2011; Len et al., 2022). This study, therefore, recommends a collaborative research supervision approach (CRSA), where a relationship exists between a supervisor and learners well as between the learner and other learners to provide cohort interaction.

Wiyono et al. (2015) argue that collaborative research supervision is collegial developmental strategy that is more dependent on a partnership between the learners and their supervisor. This is supported by Wiyono and Triwiyanto (2018) who posit that this approach works best when there is a close peer relationship between the learners and their supervisor. The approach has been realised to have benefits such as accommodating learners of different learning capabilities and level of motivation (Willegerms et al., 2017; Rasyad et al., 2019). This approach can, therefore, assist institutions of higher learning to manage larger number of learners. It enables supervisors to have productive control over greater workloads brought on by huge courses and increased pressure for research publications and research grants (Wiyono et al., 2015; Da Costa, 2016).

Collaborative research supervision is an emerging dynamic theory of organisational knowledge generation (Nonaka, 1994). According to this theory, there are two types of knowledge formation, namely tacit and explicit. Tacit knowledge is one that exists in the minds of individuals, which can be expressed through actions, commitment and involvement in context (Nonaka and Toyama, 2002). Explicit knowledge is codified knowledge that can be transferred into a formal and systematic language (Nonaka and Toyama, 2005). It is argued that tacit and explicit knowledge interact continuously through the processes of socialisation, combination, internalisation and externalisation to produce organisational knowledge (Nonaka et al., 2000). According to Rice and Rice (2005), for tacit and explicit knowledge to be generated, there must be team interactions, conversation, metaphors, coordination, documentation, experimentation and learning by doing. This could be done through an upward spiral process from the individual level to the collective group level, to the organisational level and to the inter-organisational level (Nonaka and Konno, 1998). This connects the theory of knowledge to the practice of knowledge hence forming the general dancing between knowledge and knowing, which is consistent with Nonaka’s dynamic theory of knowledge generation (Gourlay, 2006).
Background
The concept of collaborative research supervision has been advanced in academia since the 1990s. Several reasons for this approach have been suggested by Willegems et al. (2017). This author argues that collaborative research supervision could improve learners’ knowledge and attitudes towards collaboration, reflection, inquiry and learner-centered learning. Lau et al. (2019) hold a similar view, that this approach to learning projects supervision enables learners to learn through observation and discussions between peers or between a peer and the supervisor. It inspires learners to gain self-confidence. Aghee (2015), argues that the approach actively engages learners in the research process and therefore fosters innovation and engagement.

Collaborative research supervision has also been said to encourage networking among learners which then makes them feel at ease because of the support they receive from one another (Hussain et al., 2018). It is also argued that this networking enables inter-thinking (Matzembacher et al., 2019; Stinchfield et al., 2019), because it uses language for thinking together, collectively making sense of experience and addressing challenges together which strengthens efficient learning (Wanesh et al., 2017; Lau et al., 2019).

The theory of Nonaka (2005) has been said to incorporate collaborative research supervision. This theory presents four dimensions namely, socialisation, externalisation, combination and internalisation (SECI). This theory has been put to the test in a few empirical studies. The studies have demonstrated that various knowledge processes can produce a variety of knowledge domains or outputs, including problem definition, problem recognition and problem resolution (Wiyono and Triwiyanto, 2018; Stinchfield et al., 2019).

Through efficient research supervision, these knowledge processes can produce a wide range of new knowledge that can be created and transferred. This involves activities and responsibilities such as coaching, facilitating, mentoring and reflective practice (Strieker et al., 2016; Costa, 2018). Starting with choosing a research topic, planning research, identifying and acquiring the necessary resources, managing the project, actively conducting research, performing the literature review, analysing and interpreting data and writing the thesis, this field of knowledge can help learners and their supervisors (Boehe, 2016; Len and Chen, 2022).

It is argued that knowledge created relies on the context in which it is used (Aghaee, 2015; Guin, 2019). This, therefore, suggests that the research tasks vary across the many research stages and different tasks require different supervision, guidance and support. However, it is critical to ensure success in tracking the work progress, timetables and offering help in all research stages for specific tasks if these changes in research supervision are adequately taken into account (Wiyono and Triwiyanto, 2018; Matzembacher et al., 2019).

More broadly, a relatively small number of scholars have investigated whether elements of Nonaka’s theory SECI or approach could lead to enhanced performance and the creation of value (Strieker et al., 2016; Higgins et al., 2018). Some scholars argue that the SECI approach was too generic and did not account for knowledge replication and cross-cultural transfer (Rice and Rice, 2005). Other scholars contend that the SECI approach has no influence on social practices (Gourlay, 2006). Meanwhile, some authors concluded that the SECI approach does not consider the importance of contextual elements such as health, safety, well-being and engagement in physical activity, as well as external influences (Rice and Rice, 2005).

Furthermore a study was conducted to determine whether implicit and explicit knowledge processes were poles of a continuum in knowledge rather than dichotomous qualities of knowledge that exist between theory and practice during conversion processes (Nonaka and Toyama, 2005) or whether it is necessary to distinguish between implicit and explicit knowledge (Gourlay, 2006). It was found that not all the conversion processes that make up the SECI approach are generative. It was argued that there was a need for more research to clarify these implicit and explicit knowledge processes (Gourlay, 2006). Otherwise, it remains assumed that only procedures that really alter the nature of knowledge (transforming it from...
tacit to explicit or vice versa) should be strictly regarded as knowledge conversion procedures. Rice and Rice (2005) and Gourlay (2006) specifically believe that processes should only be considered knowledge conversion processes if they change the quality of knowledge (from tacit to explicit or vice versa), by creating new knowledge. Martin-de-Castro (2015) embarked on an additional investigation, and the outcomes were inconsistent across the two independent samples and did not support the theoretical framework. Most studies have targeted managers, limiting the opportunity to look at employees’ perspectives (Gourlay, 2006; Martin-de-Castro, 2015). This approach was tested in this study, and it fitted well in the Botswana higher education context because one of Botswana’s social development principle is “unity” emphasising that for Batswana to succeed in whatever that they do, they must consider the “unity” or togetherness as a social value that can lead to success. This approach was also influenced by one Botswana proverb that says “Moroto wa esi ga o ele” and “Setshwarwa ke ntsa pedi ga se thata” meaning when people do something collaboratively there are higher chances that they would succeed as compared to an individual effort.

**Problem statement**

While Botswana drives its development toward a knowledge-based economy, most of its higher education institutions are stuck with the traditional practice of the one-on-one expert-apprentice approach of learner supervision. When the traditional method of supervision was used, the outcomes over the previous five years (2015–2019) were examined, see Table 1.

147 learners from (2015–2019) who completed research reports had a quality pass that included distinction (80–100%) and merit (70–79%) that was captioned at an average of 26%. The average quality mark of this group showed that the supervision mode led to less competitive, less productive and less innovative outcomes, thus suggesting learners’ poor research processes, poor performance and poor standard research that were not impactful. Worse, though, there was one lecturer supervising all these learners, and this led to poor research supervision outcome because the success rate was conspicuously low. This scenario may mean that most Botswana’s higher education learners struggle with the same research product success rate problem. The researchers were, therefore, motivated to investigate the applicability of the CRSA because of the issue that was pervasive in higher education institutions. The study sought to determine whether the CRSA has the potential to enhance research knowledge and skills, build learners’ confidence in research, engage in learning, reduce workload, reduce the frustration of doing research, and if it could enable learners to complete their work in time and if it could provide learners with weak research skills with improved chances to easily catch up with their average-performing peers.

<table>
<thead>
<tr>
<th>Year</th>
<th>No. stud</th>
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<th>M</th>
<th>C</th>
<th>P</th>
<th>Total</th>
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<th>M Total</th>
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<tbody>
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<td>57</td>
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<td>7</td>
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<tr>
<td>2018</td>
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<td>0</td>
<td>7</td>
<td>10</td>
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<td>17</td>
<td>94</td>
<td>1</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>2019</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>100</td>
<td>0</td>
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</tbody>
</table>

Table 1. Research marks when the traditional method of supervision was used

Source(s): Authors own work
Research purpose
The purpose of this study was to examine the applicability of the CRSA to learners in Botswana’s higher institutions of learning using the 4 research supervision dimensions. The study determined how the 4 dimensions of the CRSA could assist learners in Botswana’s higher education institutions generate research knowledge.

Research questions

RQ1. What collaborative research supervision dimensions could assist learners in their research knowledge generation in Botswana’s higher education institutions?

RQ2. How collaborative research supervision dimensions could assist learners in their research knowledge generation in Botswana’s higher education institutions?

Literature review

Collaborative research supervision dimensions
It has been discovered that the Nonaka Approach has four dimensions that can assist learners in their research knowledge generation. These dimensions are SECI (Nonaka, 1994). Nonaka (1994) posits that socialisation is one of the knowledge generation dimensions which encourages interaction between people through processes of human-touch elements such as imitation, observation and training. The author continues to argue that the structural part of socialisation can create networks in which the teacher and the learners are embedded by strong links, which can help effective learning to take place.

Consequently, Nonaka (1994), defines externalisation which is one of the dimensions of knowledge generation as the process by which unrecognised implicit (unspoken) knowledge is changed into fresh explicit (clear) knowledge in the form of concepts, images and written materials. Nonaka (1994) continues to state that here, conversations, team confrontations and dialogues are effective ways for people to communicate tacit knowledge (knowledge from the mind). Saleem and Mahmood (2018), concur with Nonaka (1994) by claiming that persuasive discussions among peers’ aid in the transformation of tacit information (knowledge from the mind) into explicit knowledge (clear knowledge).

Furthermore, Nonaka (1994), avers that combination is another dimension that helps in the generation of knowledge. Nonaka (1994) asserts that combination is a mechanism that takes place when some explicit knowledge is joined with explicit knowledge. The author argues that here an individual combines what he knows and what he has been taught. Hence, Karunaratne (2018), suggest that in this dimension, a learner blends what he already knows with what he has learnt from peers and lecturers, which aids in knowledge discovery, acquisition, transfer and maintenance. Nonaka (1994), argues that internalisation is yet another dimension that enables people to develop competitive knowledge. Similarly, Nonaka (1994) asserts that this dimension assesses whether participants in a task comprehend the task. According to Wood and Louw (2018), in this dimension, learners work freely on their projects without the lecturer or other learners interfering, which enables them to choose the knowledge they need and reveals their level of comprehension.

How collaborative research methods assist learners to generate knowledge through socialisation
The tacit-to-tacit conversion mode also known as “socialisation” according to Nonaka (1994) is covered by the first dimension, which primarily captures interpersonal knowledge exchange. The author continues to state that socialisation as a dimension assists an individual to develop knowledge through interpersonal relationships within their own
groups and mentorship techniques. Four authors discussed the application of socialisation in research supervision such as (Wilton, 2011). Boehe (2016) asserts that by mentoring, research supervisors may teach their less experienced learners’ information, best practices and abilities on research. Consequently, Higgins et al. (2018) posit that research supervisors should use mentoring since it improves understanding of research values and has a variety of good behavioural, attitude and interpersonal benefits. For instance, more experienced research supervisors could offer less experienced learners’ insightful criticism. On the same note, Da Costa (2016) argues that the optimal method of research supervision is argued to involve mentoring since it connects the acquisition of practical skills with personal growth. Furthermore, Aghee (2015) asserts that learners in higher education institutions pick up knowledge through observing, imitating and incorporating the implicit and unconsciously acquired abilities in research activity.

How collaborative research methods assist learners to generate knowledge through externalisation

The second dimension according to Nonaka (1994) is the tacit-to-explicit conversion mode (Externalisation), where team members must develop a common vocabulary to give the context of their actions. Nonaka and Toyama (2005) aver that this conversion style places a strong emphasis on information sharing among group members, which opens the door to the development of a wealth of shared knowledge. Stinchfield et al. (2019) argue that doing so can promote team reflexivity, where teams could critically evaluate their goals, strategies, practices and working environment as a whole, which could improve research performance and innovativeness. However, Nonaka (1994) argues that Organisations “continuously develop new knowledge by rebuilding current viewpoints, frames, or premises on a daily basis,” (p. 341). According to Lau et al. (2019), through dialogue and discussion about the experience, processes of abstraction, like maps, or symbolisation, such as metaphors, are used to extract and make apparent tacit knowledge, leading to increased awareness and meta-level learning in research processes.

How collaborative research methods assist learners to generate knowledge through a combination

The explicit-to-explicit conversion mode is addressed in the third dimension (Combination) by Nonaka (1994). According to Nonaka (1994), the combination dimension enables one to blend what one already knows with what one has learnt from his/her supervisor and other peers. Wahesh et al. (2017), state that one may analyse the mistakes one made in the end and avoid them from happening again by combining what one already knows with what one has been taught. Moreover, Nonaka (1994), posits that this combination encourages a person to organise, store and retrieve past experiences and occurrences.

How collaborative research methods assist learners to generate knowledge through internalisation

Nonaka (1994) states that the fourth dimension of knowledge generation is Internalisation. This is also known as the explicit-to-tacit conversion mode. According to Nonaka (1994), internalisation occurs when a person draws on their existing knowledge to create original work. This is supported by Nonaka and Konno (1998), who state that this dimension involves using knowledge in the eyes of the beholder and giving value through one’s use of it. On another note, Willems et al. (2017) states that, this dimension can help research learners evaluate their work, give meaning to their research experiences and assign value to their research output.
Ultimately, Herauld (2021), states that internalisation could make research learners create an environment where everyone is encouraged to study and realise their full potential.

**Collaborative research supervision approach**

The collaborative research supervision (CRS) approach is a holistic approach and gradual development of knowledge in any given research project. It is holistic because it covers the entire project from beginning to end. It is also gradual knowledge development because it is a step-by-step build-up from section one to the last section or first chapter to the last chapter. It provides an opportunity for developing a shared conceptual understanding of the research conducted. This is critical because the foundation of the CRS approach is anchored on the notion that higher education learners are more likely to study effectively when they are exposed to a variety of knowledge sources within a research community (Zhao, 2003; Lau *et al*., 2019). To foster a more fruitful and interesting research project method experience, the CRS approach integrates learners’ individual learning experiences with involvement in an academic community (Matzembachelor *et al*., 2019). According to this concept, the supervisor must organise learners’ learning through interdependence, much like cooperative learning situations (Stinchfield *et al*., 2019).

With clarity over conceptual understanding (at each stage or step), each individual learner would be better placed to apply their knowledge and to their individual project (See Figure 1).

**Research approach and research design**

This study used a mixed-method approach for seven groups of research learners consisting of one hundred and eleven learners from 2020 to 2022. Mixed method approach according to Maree (2019) involves mixing and combining quantitative and qualitative research techniques, methods, approaches, concepts, or language into a single study. The study used

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**Figure 1.** Collaborative research supervision (CRS) approach

**Source(s):** Authors own work
quasi experiential approach where 111 non-equivalent group were controlled who were studying research (Gribbons and Herman, 1996). They did their research using an intervention of the collaborative research supervision model. These learners were exposed to the same model and same environment to make it plausible if the intervention had an effect on how they generated knowledge through four dimensions of the Nonaka approach of knowledge generation using collaborative research supervision (Gribbons and Herman, 1996). The study site which was of Botswana tertiary institution was selected for this experiential research, precisely because it was underperforming in research (Gribbons and Herman, 1996). More broadly the quantitative approach through the use of questionnaires, documenting and analysis of academic performance and observation of 111 learners who were doing research modules were used (Creswell, 2009). The qualitative approach was also used through periodic interviews of 14 learners to uncover the key contextual factors that contribute to learners’ knowledge generation using collaborative research supervision intervention (Creswell, 2007). The use of explanatory sequential design helped on how the collaborative research supervision dimensions assisted learners in their research knowledge generation in Botswana’s higher education.

Sampling procedure
The study used learners 111 learners who were at a B Ed Educational Management programme. 97 learners were purposively picked to answer questionnaires since they were the ones doing research project modules (Chilisa and Preece, 2005; Creswell, 2009). These participants’ contributions made it possible to examine whether the CRSA could help learners generate their own knowledge (Creswell, 2006). Simple random sampling was used to select 14 learners to be interviewed (Burns, 2000). The simple random sampling was done in a single step with each subject selected independently of the 111 participants. This sampling was considered the best method because it gave each member an equal opportunity of being selected (Maree, 2019). A list of learners who did the research module was availed and every third learner from the list was chosen (Creswell, 2003).

Data collection procedures
The researchers spent 3 years gathering data in a higher education institution. Interviews, observations and document analysis were used to gather information for the study. 97 learners answered the questionnaires and 14 learners were interviewed, one hundred and eleven research documents produced by learners were analysed, and forty-two class observations were conducted. The data acquired from interviews and observations were supplemented and corroborated by daily journaling and a review of research work documents done by learners. The researchers were able to improve triangulation because of this (Patton, 2002; Yin, 2003).

Data analysis
The study used Quantitative Dominant mixed analysis (Kaushik and Mathur, 2014). In Stage 1 the researchers involved the use of descriptive statistics which involved data reduction to dimensions that helped learners generate their knowledge. The study used 97 learners to answer the questionnaires. It also used measures of central tendency which include the mean, while measures of variability include the standard deviation. The data codes were as follows: where a subject answered Yes (1) was used as a code where they answered No (0) was used as a code.

In Stage 2 the researchers identified emerging issues from Stage 1 that needs clarity. In Stage 3 the researchers interviewed the participants, analysed research documents and analysed the observation journals for confirmatory and data correlation. The researchers
searched for research statistics knowledge, relevance, coherence and prior knowledge. Stage 4 was the final stage the researchers identified how learners were able generate data using collaborative research supervision (Onwuegbuzie and Leech, 2007; Maree, 2019).

Data presentation and analysis
Socialisation as a dimension was mostly found when the discussion was done by learners as presented in Table 2, and this helped them to understand the content better and it also motivated them as shown by an average 0.958 which was at both aspects. This was supported by Participant 1, “My supervisor took us through step by step, she was explaining the content to us as if we were young children and this made all of us understand the concepts of research.” Collective learning satisfied the learners as they were able to cover topics as individuals from Chapter 1 to Chapter 5 and this was proved by averages of 0.947 and 0.927 respectively. This was supported by Participant 4 who said, “...having a discussion with our supervisor, forced us all to be more involved in critiquing each other’s work.” Engaging in collective learning has proved to relieve learners from work pressure as shown by an average of 0.875. This was reflected by Participant 2, who said, “The time that we had to do research was too short and, having a wider range of feedback from my classmates and my supervisor helped me complete my research on time.” The socialisation aspects on motivating learners to learn better has the least standard deviation of 0.200 followed by the need for learning satisfaction which is at 0.223 and the highest standard deviation is of relieving workload which tells that relieving workload is more spread out or dispersed out as compared to other data aspects.

Externalisation as a dimension was mostly found when learners exchanged ideas with their peers as shown in Table 3, and this enabled them to get feedback as found at an average of 1 and 0.979 respectively. This was supported by Participant 8 who echoed, “I have seen that research is a real learning process and it entails sharing your work with other learners and this enables your work corrected by other learners,” and by Participant 7 who said, “The approach used group discussions that allowed us to share ideas openly and granted us an opportunity to think together by correcting our work where it needed to be corrected.” All this encouraged them to use the language of thinking and have an equal chance of discussion which helped in balancing the structure of improvement. These are found between averages of 0.906–0.958. This was supported Participant 6 who said, “When you framed your work and other learners contributed their work, we were allowed to amend ours if it is erroneous and keep it if it was written correctly,” and Participant 5 who said, “It was done openly and it increases the understanding and makes you accountable and confident in your work.” Gaining feedback from peers had the least standard deviation meanwhile having a balanced structure of involvement in the discussion and having an opportunity to use language had the highest

<table>
<thead>
<tr>
<th>Socialisation</th>
<th>Yes</th>
<th>No</th>
<th>Mean</th>
<th>Std. deviation</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Did your supervisor cover the topics she could have taught you as an individual (Chapter1-Chapter5)?</td>
<td>90</td>
<td>7</td>
<td>0.927</td>
<td>0.261</td>
<td>97</td>
</tr>
<tr>
<td>2. Did collective discussion of the topics help you to understand the research content better?</td>
<td>93</td>
<td>4</td>
<td>0.958</td>
<td>0.261</td>
<td>97</td>
</tr>
<tr>
<td>3. Did the collective discussion motivate you to learn better?</td>
<td>93</td>
<td>4</td>
<td>0.958</td>
<td>0.200</td>
<td>97</td>
</tr>
<tr>
<td>4. Did the collective discussion relieve you of the workload pressure?</td>
<td>85</td>
<td>12</td>
<td>0.875</td>
<td>0.332</td>
<td>97</td>
</tr>
<tr>
<td>5. Did your need for collective learning satisfied?</td>
<td>92</td>
<td>5</td>
<td>0.947</td>
<td>0.223</td>
<td>97</td>
</tr>
</tbody>
</table>

Note(s): When knowledge was shared by supervisor to learners collectively
Source(s): Authors own work

Table 2. Ways on how socialisation helped learners in research
standard deviation of 0.293 which shows that their involvement in the discussion through the use of language was more spread out than in other data aspects.

The combination as a dimension was mostly found when learners used feedback from their peers to fix their problems as shown in Table 4 and this helped them to learn through observations and conversations between their peers and supervisors which was both at an average of 0.958. This was supported by Participant 11 backing up this claim by stating, “Eish during the conversations, I picked up corrections from others and my supervisor, and this enabled me to fix my research work”, and by Participant 10 saying, “We were allowed to amend our research work using feedback from our peers and from our supervisor”. This dimension also helped them to learn independently and also to carry out independent empirical investigations which were both at an average of 0.927. Participant 9 echoed this sentiment, saying, “Our supervisor and peers’ explanations enabled us to correct our work”. Using feedback from peers and supervisors to fix mistakes and learning from observation and conversation had the least standard deviation of 0.200 meanwhile learning independently and carrying out independent empirical investigations both had the highest standard deviation, and this tells that their data was spread out as compared to other aspects.

Internalisation as a dimension was mostly found when learners were able to do their independent written research report as shown in Table 5 and this helped them to reduce the workload and stress that comes up with doing research which was at an average of 0.979 and 0.916, respectively. This was supported by Participant 14 when stating that “I have learnt a lot of things through this research supervision, the criticisms from my peers and supervisor were constructive, and they helped me to write my research report with easiness,” and by Participant 12 stated, “The time allocated to do research was short, and work was too

<table>
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<th>Yes</th>
<th>No</th>
<th>Mean</th>
<th>Std. deviation</th>
<th>N</th>
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<tr>
<td>1. Did you benefit from the feedback you gained from your peers?</td>
<td>95</td>
<td>2</td>
<td>0.979</td>
<td>0.143</td>
<td>97</td>
</tr>
<tr>
<td>2. Did you have an equal chance to participate in the discussion?</td>
<td>91</td>
<td>6</td>
<td>0.937</td>
<td>0.243</td>
<td>97</td>
</tr>
<tr>
<td>3. Were you able to exchange ideas with your peers</td>
<td>97</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>97</td>
</tr>
<tr>
<td>4. Was there a balanced structure of involvement in your discussion?</td>
<td>88</td>
<td>9</td>
<td>0.906</td>
<td>0.293</td>
<td>97</td>
</tr>
<tr>
<td>5. Did the approach give you an opportunity to use the language of thinking together</td>
<td>93</td>
<td>4</td>
<td>0.958</td>
<td>0.293</td>
<td>97</td>
</tr>
</tbody>
</table>

Note(s): When knowledge was shared among group members
Source(s): Authors own work

<table>
<thead>
<tr>
<th>Combination</th>
<th>Yes</th>
<th>No</th>
<th>Mean</th>
<th>Std. deviation</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Did you use feedback from your peers and supervisor to fix your mistakes?</td>
<td>93</td>
<td>4</td>
<td>0.958</td>
<td>0.200</td>
<td>97</td>
</tr>
<tr>
<td>2. Did the approach help you meet the need for independent learning?</td>
<td>90</td>
<td>7</td>
<td>0.927</td>
<td>0.261</td>
<td>97</td>
</tr>
<tr>
<td>3. Did the approach help you carry out independent empirical investigations?</td>
<td>91</td>
<td>6</td>
<td>0.927</td>
<td>0.261</td>
<td>97</td>
</tr>
<tr>
<td>4. Did you learn through observations of conversations between peers or between peers and the supervisor?</td>
<td>93</td>
<td>4</td>
<td>0.958</td>
<td>0.200</td>
<td>97</td>
</tr>
</tbody>
</table>

Note(s): When the learner combines what she knows and what she has been taught
Source(s): Authors own work

Table 3. Ways on how externalisation helped learners doing research

Table 4. Ways on how combination helped learners doing research
demanding, the supervision approach used was the one which helped me finish the research project on time.” This also helped them complete research project on time which was at an average of 0.885. This was supported by Participant 13 backed this up when he said, “It was done openly, it offered us self-learning and self-correction, it raises our awareness of self-learning and accountability, and it strengthened our confidence,” and by Participant 2 when saying that, “Our supervisor gave us time to complete our research report independently.” Doing an independent research report had the least standard deviation at 0.143 followed by reducing workload and the stress of doing research which was at 0.277 and completing research project on time had the highest standard deviation at 0.320 which tells that is more dispersed as compared to other data aspects.

Research discussion and conclusion
The research site results from the past five years (2020–2022) were reviewed when the Collaborative Research method of supervision was used as per Table 6.

The 217 learners from (2020–2022) who completed research reports had a quality pass rate that included distinction (80–100%) and merit (70–79%) that was captioned at an average of 49.3%. This tertiary institution’s learners were able to create useful and original research, which could later be used to address educational issues, as evidenced by the percentage average mark. Due to learners’ excellent research practices, strong performance and high-caliber research, this CRSA produced more competitive, productive and innovative results that can have an impact on education. Good enough, the research site’s tertiary institution was able to manage more learners with one supervisor. The supervision enabled the supervisor for research to publish three articles required for the annual appraisal systems. This study, therefore, showed that the applicability of the CRSA is useful and can help the learners do research in an effective and efficient way and can be a reliving tool for supervisors who are faced with an overload of work demands.

The findings of this research were found to have some bearing to Nonaka (1994) theory of knowledge creation. This CRSA was found to be effective in preparing learners in a higher education institution for knowledge creation and transfer (Nonaka, 1994). In some way, then regression to the mean suggested the controlled group showed improvement of the academic performance because of the intervention when compared to the other cohorts who used the traditional research supervision. These SECI theoretical dimensions have proved to have some bearing on certain research findings, including enhanced performance, inventiveness and collaborative efficacy, all of which are essential for knowledge creation in research. The SECI theory has also actualised and given empirical consistency through the Collaborative Research supervision. Additionally, it enabled the supervision of the research supervisor’s and supervisees’ capacity to direct the growth of knowledge creation and transfer. It was also identified that the success of this approach depends mostly on the willingness of learners and the supervisor to participate actively in the discussion processes. From the findings of the questionnaires and the interviews, it was clear that learners highly valued collaborative processes.

<table>
<thead>
<tr>
<th>Internalisation</th>
<th>Yes</th>
<th>No</th>
<th>Mean</th>
<th>Std. deviation</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Did the approach help you to reduce workload and the stress that comes with doing research</td>
<td>89</td>
<td>8</td>
<td>0.916</td>
<td>0.277</td>
<td>97</td>
</tr>
<tr>
<td>2. Did the approach help you complete your research project on time</td>
<td>87</td>
<td>10</td>
<td>0.885</td>
<td>0.320</td>
<td>97</td>
</tr>
<tr>
<td>3. Were you able to do an independent written research report?</td>
<td>96</td>
<td>1</td>
<td>0.0979</td>
<td>0.143</td>
<td>97</td>
</tr>
</tbody>
</table>

**Note(s):** When the learners' wraps up what she knows and come up with his or her own work document

**Source(s):** Authors own work

Table 5. Ways on how internalisation helped learners doing research
Table 6.
The research marks when the collaborative method of supervision was used (2020–2022)

<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
<th>D</th>
<th>M</th>
<th>C</th>
<th>P</th>
<th>Total</th>
<th>S</th>
<th>F</th>
<th>T</th>
<th>D</th>
<th>M</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>2020</td>
<td>41</td>
<td>5</td>
<td>12</td>
<td>21</td>
<td>3</td>
<td>41</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>12</td>
<td>17</td>
<td>49.3%</td>
</tr>
<tr>
<td>2021</td>
<td>65</td>
<td>3</td>
<td>29</td>
<td>21</td>
<td>12</td>
<td>65</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>29</td>
<td>32</td>
<td>53</td>
</tr>
<tr>
<td>2022</td>
<td>111</td>
<td>11</td>
<td>48</td>
<td>39</td>
<td>13</td>
<td>111</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>11</td>
<td>48</td>
<td>59</td>
<td>53</td>
</tr>
</tbody>
</table>

Source(s): Authors own work
**Recommendations and implications**

The results of this study could affect how knowledge is generated and transferred. When choosing this desired research supervision approach, either in terms of policy or in actual practice, it is important to take the potential for information exchange into account. This might result in improved research supervision efficacy in higher education and hence higher-quality graduate learners being produced. This research supervision approach is recommended for learners in higher education, more especially undergraduate learners. However, this study recommends that another study could be conducted to test if the study could be used for graduate learners. This study, therefore, recommends that yet another study could be conducted to check if the approach could be used as a supervisory approach that could provide prospects for knowledge sharing and creating learning in an organisation.

Finally, it is important to recognise the methodological limitations of this study. The study used a mixed method and a single case. As a result, the results’ significance cannot be justified. Additionally, the context and methodology restrict the findings’ generalisability. There is obviously potential for additional cases since this article only offers a preliminary analysis of the single case issue. The study discovered that when properly implemented, collaborative research supervision arrangements may fill up any gaps in generating research knowledge and reduce the workload of both the supervisor and the learner.

**References**


Further reading


Corresponding author
Kaone Bakokonyane can be contacted at: bakokonyanek@gmail.com

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