Development of the Student Teacher Research Evaluative Supervisor Survey: An Exploratory Factor Analysis

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Abstract

The aim of this study was to develop a student teacher research evaluative survey to determine supervision styles and attributes of research supervisors in Zimbabwean teachers' colleges. In the context of the Heritage-based Education 5.0 era, there is a pressing need for instruments to explore the student-supervisor relationship with a view to promoting quality research output. An exploratory factor analysis (EFA) of the underlying dimensions in the supervision and knowledge generation process is reported in this study. A total of 33 questions from a self-developed supervisor style and attributes questionnaire were used to gather data from 114 students. Following the EFA, a four-factor research supervision model consisting of "constructive expert", "supportive mentor", "active listener-communicator", and "nurturer-interactive persona" was extracted. The study concluded that students preferred supervisors who were constructive experts, perceptive, widely read, and demonstrated exceptional mastery of research. The twenty-four-item STRESS is proposed as a tool that can be used to determine supervisor attributes and styles in the knowledge creation process through research in teachers' colleges. A defining and innovative feature of our study is the adaptation of the 'ba' principle, typically associated with industrial organisational settings, to an educational environment that has not been studied before.

Keywords: *exploratory factor analysis, knowledge creation, supervisor style, supervisor attributes, research supervision*

1. Introduction and Background to the Study

This research paper aims to develop a student teacher research evaluative survey to determine supervision styles and attributes of research supervisors in Zimbabwean teachers' colleges. Research supervision is a delicate and complex process (Agricola et al., 2021). The research project is a crucial part of the Diploma in Education course offered by the University of Zimbabwe (UZ) through its associate colleges. The Centre for Teacher Education and Materials Development (UZ) requires students to pass their final exams if they have completed the research project (Para: 12.4.2.1, DTE Handbook, 2012). It is impossible to overestimate the significance of research in Zimbabwe's teachers'

colleges, especially in the era of Heritage-based Education 5.0. The primary goal of higher education in the 21st century is to create a knowledge-based economy, making the conduct of high-quality research that influences the production of goods and services essential (Herauld, 2021). In light of this, Bakokonyane and Pansiri (2024) point out that the research project forms an essential component of scientific learning. However, existing literature shows that research supervision methods used for supervising learners in most higher education institutions present challenges such as differences in the quality of supervision, unclear supervision pedagogy, unclear supervision approaches, workload, time constraints, and the quality of learners, which collectively disempower learners from creating their own knowledge (Gohar & Qouta, 2021).

Given these challenges, the interaction between students and their supervisors is a crucial factor that affects their development and success, best studied using the 'ba' concept. The 'ba' is a term popularised in the existing literature, referring to a shared social context that facilitates the generation and utilisation of knowledge (O'Neil, 2021). The deployment of communities of practice (COPs), which provide the social settings for interpersonal interactions, is a prerequisite for the operationalisation of the 'ba'. These interactions lead to the development of knowledge, and the best way to understand this process is to concentrate on the small-scale interactions between individuals and the type of feedback that students and supervisors exchange (Jakubik, 2008). Nonetheless, research indicates that students' understanding of feedback can occasionally diverge from supervisors' intentions (Van der Scaaf et al., 2011). In this paper, we define students' perceptions as the extent to which they believe supervisors' teaching methods and characteristics support their research and learning experiences in the knowledge creation process.

A defining and innovative feature of our study is the adaptation of the 'ba' principle, normally associated with industrial organisational settings, to an educational environment that has not been studied before. A study of this nature, therefore, assumes significant importance because it facilitates feedback from students, enabling supervisors to improve the quality of knowledge creation aimed at facilitating innovation in teachers' colleges.

2. Literature review

2.1 Research and knowledge creation

Research generates new knowledge, benefits educational institutions, and impacts national development and transformation (Marongwe, Mbodila & Sibanda, 2019). Zimbabwe has adopted curriculum transformation based on Heritage-based Education 5.0 in an endeavour to move towards Society 5.0. The five pillars of Education 5.0 are research, teaching, community service, innovation, and industrialisation (Rumbidzai & Maupa, 2020), all of which require the acquisition of fundamental 21st-century skills (Rahim & Sandaran, 2020). These skills, which are crucial for knowledge generation, include critical thinking and analysis, complex problem-solving, creativity, and innovation (Rahim, 2021). In societies like Zimbabwe, which have adopted Heritage-based Education 5.0 as a guiding philosophy aimed at propelling the nation into an upper-middle-class economy by 2030 (GoZ, 2018), knowledge creation and learning are viewed as important pillars of sustainable competitive advantage (Barney & Hesterly, 2006). Therefore, fostering a culture of research as a foundation for developing innovations to industrialise the economy is essential for building a knowledge society. Teachers' colleges are ideally situated among the postsecondary educational establishments that can foster thriving innovation hubs and provide a pathway to industrialisation. Against this background, it is important to note that research on academic supervision often focuses on undergraduate, master's, and doctoral supervision, and is frequently lacking at the teachers' college level (Agricola et al., 2021).

2.2 Supervisory paradigms

Although Boehe (2016) asserts that supervisory models will differ in theoretical and methodological approaches, we propose that research models will generally describe research tasks

that can be placed on a structured to unstructured continuum, thus converging around a framework outlined by Grant (2005), which describes four models. In a structured approach, the supervisor adopts a more directive style, while in an unstructured approach, the supervisor leans towards a less directive or participative indirect style. Supervisory styles can change over the course of the research project and are therefore dynamic (Garfield, 2005). A plethora of models explicating supervisory styles and attributes have been advanced, with the framework propounded by Grant (2005) outlining four models being particularly useful in this study.

According to the psychological/pastoral paradigm, the supervisor is a professional whose role is to encourage, uplift, and show concern for the student's work. By establishing a friendly environment that motivates the student to work hard so as not to let the supervisor down, the supervisor encourages the student to discover and pursue his or her interests (Mushoriwa & Nyakutse, 2014). A conservative approach is provided by the traditional/academic model, where the supervisor is seen as a skilled discipline specialist who carefully grades the student's work while maintaining a professional distance from the student (Grant, 2005). Assessing the student's intellectual capacity is the supervisor's primary goal, and extremely high standards typify a 'ba' environment. Grant (2005) asserts that the techno-scientific paradigm views research as a structured, collaboratively planned, and executed activity in which the student receives appropriate instruction in research techniques from the supervisor. The 'ba' setting is built on a framework that is task-driven and typically provides instructions for the research with little assistance for the student. The supervisor's intimidating behaviours define the 'ba' relationship, which positions the expert against the postulant researcher. The neo-liberal model focuses on institutional practices and contractual responsibilities (Mushoriwa & Nyakutse, 2014). The 'ba' relationship between the supervisor and the student is marked by adherence to clearly defined boundaries, which causes the research environment to assume a quasi-legal nature, with a heavy emphasis on supervision contracts, agreements of rights, and grievance procedures.

2.3 Supervisory styles and attributes

In general, students have expectations regarding the styles and attributes that their supervisors should exhibit during the 'ba' and knowledge-creation process. A study by Yu and Wright (2016) revealed that students, among other things, anticipated their supervisors to be knowledgeable about the research topics they chose and to help them refine those topics. Additionally, they preferred supervisors who listened and showed interest in their personal lives, fostering positive and sympathetic relationships. These qualities enabled supervisors to understand some of the challenges that students encountered while conducting their research. Agricola et al. (2021a) found that supervisors who employed indirect supervision granted students more authority over the knowledge-creation process. Supervisors using this 'ba' made real-time decisions aimed at assessing students' comprehension by posing questions and soliciting feedback through an adaptive scaffolding teaching technique. One significant aspect of this strategy was that supervisors focused on attending to students' needs while imposing less restriction. Interestingly, a previous study (Agricola et al., 2018b) discovered that supervisors favoured direct regulation in supervisory meetings. Conversely, Yeoh and Doan (2012) found that students preferred to share a 'ba' with knowledgeable and experienced supervisors, particularly those skilled in research methodology. Furthermore, students felt that their supervisors should take the initiative in both encouraging and supporting them. This supervisory style thus necessitated that supervisors align their approach with students' expectations.

Some studies have identified undesirable attributes in supervisors. These studies indicate that supervisors have been perceived as either absentees or busy ghosts who overlook their studentsin favour of institutional administration (Almusaed, 2020; Bazrafkan et al., 2016). Such supervisors often carelessly misplace students' manuscripts or focus solely on correcting errors rather than on the accuracy of ideas. Other supervisors have been described as abrasive and controlling (Hultman & Eadens, 2019). These supervisors frequently treat their students rudely, divert students' ideas, and hold students accountable for mistakes made by supervisors. Additionally, these supervisors are often

characterised as discouraging, frequently burdening students by revising their writings to reflect their own preferred viewpoints. By imposing their own topics, concepts, and research methods, which lean toward the techno-scientific paradigm, this supervisory style inhibits students' creativity. In our study, it was therefore critical to assess the most prevalent supervisory styles used by teachers' college supervisors and how these were perceived by the students.

2.4 Feedback and research supervision

While attempting to shed light on the relationship between students and supervisors, we kept in mind that students' perceptions of their supervisors' attitudes may significantly influence how they respond to supervisory comments (Bestola & Hu, 2021). We argue that feedback is only useful and meaningful if it helps students become more independent, self-reliant, metacognitive, and enthusiastic about lifelong learning. This, in turn, changes the way students think, interact with others, and approach their work (Henderson et al., 2019). We therefore constructed the knowledge creation process, through research, as a dynamic yet subjective 'ba' experience for each student. Supervision is not only associated with the supervisor, student, the nature of the research project, and the learning and teaching process (Coutinho, 2019), but also with the relationship that is established between the supervisor and student (Katikireddi & Reilly, 2017). The 'ba' principle, anchored in knowledge sharing, is a relational interactive process dependent on feedback. Feedback is thus an important variable that can ensure that tacit knowledge is developed into explicit knowledge.

It is therefore critical that supervisors become aware that individual differences shape students' views of the supervisory feedback process (Mulliner & Tucker, 2017). Research has demonstrated that the quality of feedback is often mediated by whether the nature of the feedback process is authoritative or dialogic (Hylland & Hylland, 2019a) and that students derive value from positive feedback that mainly focuses on their strengths and has an encouraging tone, which evokes a sense of care from the supervisors (Hylland & Hylland, 2019b; Sopina & McNeill, 2015). Feedback should therefore be less authoritative (Jonson, 2013) and use non-judgmental language (Schartel, 2012). It is also important to acknowledge that students prefer feedback that is timely, specific, and constructive (Poulos & Mahong, 2008; Yu & Wright, 2016), as well as personalised and structured around clear guidance on how to improve their work (Ferguson, 2011). It is equally important to recognise that some supervisors experience challenges. For example, Hounsel et al. (2008) found that students often do not find supervisor input to be beneficial. Orsmond and Merry (2011) also discovered a misalignment between the supervisor, who provides the feedback, and the student, who receives it. This suggests that supervisors should adjust their feedback to better meet the needs of their students. The purpose of this study was to design and validate a measure that would illuminate how students perceived their supervisors' supervision styles and attributes in an endeavour to improve research supervision in teachers' colleges. The study was informed by the research question: How do student teachers in Zimbabwean teachers' colleges perceive the supervision styles and attributes of their research supervisors, and what factors influence these perceptions?

3. Theoretical framework

The theoretical lens underpinning this study draws from literature on research supervision and our personal experiences as lecturers at a teachers' college in Zimbabwe. Recognising that knowledge creation is central to the production of knowledge-based economies (Fullwood, Rowley & McLean, 2018), our study is anchored in the Theory of Knowledge Creation (Nonaka & Takeuchi, 1995). Nonaka and Takeuchi (1995) base their theory on the 'ba' principle, which is seen as the context within which knowledge is shared and created through face-to-face and/or online platforms (Ngulube, 2021). In the current study, 'ba' is viewed as a space where research information is ascribed meaning through interpretation by the student and the supervisor, resulting in new knowledge through the conversion of meanings and contexts (Wei & Correa, 2010). Knowledge is created through the conversion between tacit and explicit knowledge (Nonaka et al., 1994). Tacit knowledge has a personalised quality that

includes both cognitive and technical components. The former refers to mental models, schemata, or paradigms that shape perspectives, enabling individuals to perceive and define their world, while the latter encompasses concrete know-how and skills applicable in specific contexts (Nonaka et al., 1994). Explicit knowledge refers to codified knowledge that can be transmitted in formal and systematic language (Nonaka & Takeuchi, 1995). In research supervision, the process of knowledge creation follows a conversion process based on four pillars, namely socialization, externalization, combination, and internalization (SECI), as explicated in Figure 1
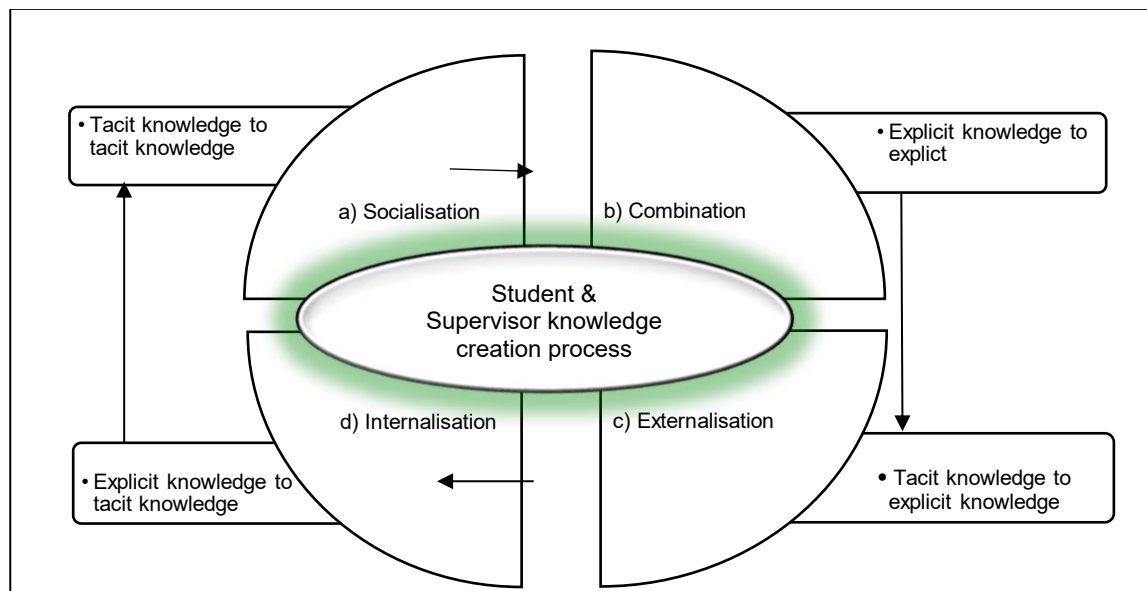

Figure 1: Knowledge creation process

Adapted from: Nonaka, et al., Organizational Knowledge Creation Theory: A first comprehensive test. *International Business Review, 3*(4) 337-351. Copyright 1994 by authors Permission not sought.

In Figure 1, socialization is the interaction between individuals, which can occur through observational learning. The student is taken on as an apprentice by the supervisor, who inducts them into the research writing process based on institutional requirements. Combination is a process that involves bringing together different bodies of explicit knowledge held by both the student and the supervisor, facilitated through arranged consultations, whether face-to-face or ICT-mediated meetings. The purpose of such interactions is to exchange and combine the knowledge possessed by either the student or the supervisor. The nature and outcome of this exchange are critical in the context of our study, as they either confirm or disconfirm the creation of productive research knowledge in the form of an authentic and innovative report for assessment. Externalization refers to the patterns of conversion involving both tacit and explicit knowledge, while internalization encompasses the amount of learning that occurs as a consequence of the social interaction between the student and the supervisor. In this regard, new tacit knowledge emerges from the explicit knowledge that has been shared. In light of this, Choo and Neto (2020) opine that 'ba' offers an integrating metaphor for the four processes that have been illuminated.

4. Method

4.1 Design and participants

We adopted an exploratory factor analysis (EFA) research design to develop the Student Teacher Research Evaluative Supervisor Survey. The study employed a quantitative approach, involving numerical data analysis to identify underlying factors or dimensions within a dataset (Sürücü, Beydoğan & Maslakçı, 2024). This analysis helped uncover the structure of the survey instrument and

inform effective research supervision strategies (Sürücü et al., 2024; Bollen, Gates & Lou, 2024). The study was thus situated within a positivist paradigm, which assumes that reality can be objectively measured and quantified (Bryman & Bell, 2022). We surveyed third-year students in the 2023 General and Early Childhood Development Diploma in Education cohort. A sample of 114 participants was obtained through convenient-purposive stratified sampling. Permission to access the research site was granted by the Ministry of Higher and Tertiary Education, Innovation, Science and Technology Development, as well as the college principal. Informed written consent was sought from the students.

4.2 Instrumentation

Two Likert-type self-report measures were used for data collection. The measures were hand-distributed to students prior to their SWOT break before the final examinations. Both measures were scored using the following key: 1) Strongly disagree, 2) Disagree, 3) Unsure, 4) Agree, and 5) Strongly agree. For both measures, students indicated their responses by placing ticks against items they deemed indicative of particular levels of supervisory styles and supervisor attributes. A twelve-item Supervisory Style Questionnaire (SSQ) was developed from a framework of four styles (Anderson, 1988), namely: direct active, indirect active, indirect passive, and passive. The measure contained an equal number of positively and negatively cued items, with the negatively cued items being reverse-coded for scoring purposes. A twenty-one-item Supervisor Attributes Questionnaire (SAQ) with seven sub-scales was developed from the Students' Perception of Supervisory Attributes Meta Categories (Davis, 2019).

4.3 Data analysis

Quantitative data were recorded and analysed using IBM SPSS Version 23 software. This study employed exploratory factor analysis (EFA). Given that our measures were self-developed, we preferred EFA because this form of factor analysis provides information about reliability, item quality, and construct validity. In EFA, inter-item correlations reflect greater overlap in what the items measure; therefore, higher inter-item correlations indicate higher internal reliability (Portland State University, 2017). The general goal of EFA was to understand whether and to what extent the items in our measures would reflect underlying hypothetical constructs, which would indicate the styles and attributes lecturers used in their interactions with research students. EFA was carried out in three stages: extraction, rotation, and interpretation. The extraction process aimed to determine the fewest number of factors that explained the largest amount of variation among the observed variables. We used the maximum likelihood extraction method to extract factors, specifying the retention of four factors due to the nature of the study attributes instead of the common eigenvalue approach. Generally, eigenvalues represent the amount of variance accounted for by each component, but they are not in a standardised metric (Portland State University, 2017).

5. Results

5.1 Supervisory attitudes and supervisor style quantitative data analysis

A total of 114 SSQ and SAQ questionnaires were used to collect data from 36 ECD students (31 female and 5 male) and 78 General students (68 female and 10 male). The response rate was 100%. An independent samples t-test revealed that the responses obtained were independent of gender and course programme (p-value > .05). We conducted an initial reliability test using the two measures, with the Item-Total Statistics presented in Table 1.

Table1: Reliability statistics

Cronbach's alpha	Cronbach's alpha based on standardized items	No of items
.885	.884	11

Table 1 reveals that the first reliability test yielded an overall Cronbach's alpha of .885. Univariate descriptive statistics were subsequently used to determine the means of the variables.

Table 2: Univariate descriptive statistics

	Mean	Std. Deviation	No of participants
Indirect Active	4.2047	.57566	114
Indirect Passive	3.8158	.77077	114
Passive	4.3743	.63978	114
Direct Active	3.3012	.55383	114
Affective	4.2719	.70615	114
Cognitive	4.3012	.67832	114
Time Related	3.9532	.85747	114
Feedback	4.2398	.79762	114
Supervisory Expertise	4.2368	.70915	114
Student Orientation	3.9942	.80312	114
Communication	4.4211	.63811	114

Table 2 shows that univariate descriptive statistics yielded means for all the variables ranging from 3.30 to 4.42. This result indicates that the means fall within our Likert scale measures, which range from 1 to 5. We then examined the variable selection statistics to determine whether any items had a Cronbach's alpha above our initial threshold of .885. Table 3 presents the variable selection statistics.

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Table 3: Variable selection statistics

Item	Scale mean if item deleted	Scale variance if item deleted	Corrected if item-total correlation	Squared multiple correlation	Cronbach's alpha if item deleted
Indirect Active	40.9094	24.760	.566	.503	.878
Indirect Passive	41.2982	24.626	.407	.254	**.889**
Passive	40.7398	24.216	.589	.376	.876
Direct Active	41.8129	26.283	.307	.156	**.890**
Affective	40.8421	23.521	.630	.521	.874
Cognitive	40.8129	23.843	.608	.505	.875
Time Related	41.1608	22.347	.648	.512	.873
Feedback	40.8743	22.298	.717	.668	.867
Supervisory Expertise	40.8772	22.856	.733	.663	.867
Student Orientation	41.1199	21.827	.781	.660	.863
Communication	40.6930	23.939	.638	.510	.873

The highlighted variables in Table 3 (indirect passive and direct active) have a Cronbach's alpha greater than the overall alpha of 0.885. Consequently, these variables were deleted to increase the reliability of our measures. Table 4 displays the revised reliability statistics.

Table 4: Reliability statistics

Cronbach's alpha	Cronbach's alpha based on standardized items	No of Items
.895	.895	9

Table 4 shows that after running the reliability test and deleting the indirect passive and direct active items, an overall Cronbach's alpha of 0.895 was obtained for the remaining 9 items. This indicates high reliability, allowing us to proceed with factor analysis using the 9 variables. Table 5 presents the final variable selection statistics for the exploratory factor analysis (EFA).

Table 5: Final variable selection statistics

Item	Scale mean if item deleted	Scale variance if item deleted	Corrected item-total correlation	Squared multiple correlation	Cronbach's alpha if item deleted
Indirect Active	33.7924	19.509	.551	.485	.891
Passive	33.6228	19.100	.560	.337	.891
Affective	33.7251	18.398	.619	.510	.886
Cognitive	33.6959	18.503	.631	.504	.886
Time Related	34.0439	17.338	.640	.504	.886
Feedback	33.7573	17.086	.746	.662	.876
Supervisory Expertise	33.7602	17.716	.741	.659	.877
Student Orientation	34.0029	16.870	.777	.653	.873
Communication	33.5760	18.614	.658	.502	.884

Table 5 shows that after item deletion, all the remaining variables had a Cronbach's alpha lower than the overall value of 0.895, which meant that we could proceed with exploratory factor analysis.

5.2 Exploratory Factor Analysis

Table 6 reveals the proportion of variance of each variable that is explained by the factors in the initial and extraction stage.

Table 6: Communalities

Variable	Initial	Extraction
Indirect Active	.485	.791
Passive	.337	.331
Affective	.510	.866
Cognitive	.504	.578
Time Related	.504	.536
Feedback	.662	.800
Supervisory Expertise	.659	.724
Student Orientation	.653	.860
Communication	.502	.555

The communalities table indicates that the extracted factors explained approximately 33.1% to 86.6% of the variance in the nine working variables. The passive variable accounted for the lowest

variance at 33.1%, while the affective variable explained the highest variance at 88.6%. We proceeded with the extraction, as shown in Table 7.

Table 7: Total variance explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.934	54.818	54.818	4.581	50.899	50.899	2.159	23.994	23.994
2	.993	11.038	65.857	.781	8.673	59.572	1.581	17.564	41.558
3	.751	8.342	74.198	.389	4.317	63.889	1.329	14.763	56.321
4	.606	6.737	80.935	.292	3.240	67.129	.973	10.808	67.129
5	.545	6.051	86.987						
6	.358	3.972	90.959						
7	.317	3.527	94.486						
8	.293	3.258	97.745						
9	.203	2.255	100.000						

Table 7 reveals that four factors were extracted (indicated in bold). Factor 1 had an eigenvalue greater than 1, explaining 54.82% of the variance, while Factor 2, Factor 3, and Factor 4 explained 11.08%, 8.34%, and 6.74% of the variance, respectively. This accounted for a total variation of 80.94% explained by the four factors. Upon assessing the scree plot, only one factor had an eigenvalue greater than 1, accounting for 54.8% of the variation. However, the other three factors were included through a fixed number of factors approach to ensure that a total of 80.94% of the variation among the variables was accounted for, thereby explaining as much variation as possible in the observed indicators.We then used the goodness of fit test to determine whether the sample data correlations were likely to have arisen from the four model factors. The goodness of fit test showed a probability value of the Chi-Square statistic of 0.631, which is greater than 0.05. This indicated that the four-factor model is a good description of the collected data. To specify the nature of the relationship between the factors and the variables, factor rotation was conducted. The Varimax rotation method with Kaiser Normalisation was employed, with rotation convergence achieved in 8 iterations. Table 8 shows the rotated factor matrix.

Table 8: Rotated factor matrix[a]

Variable	Factor			
	1	2	3	4
Feedback	.798	.320	.148	.194
Cognitive	.683	.180	.232	.162
Supervisory Expertise	.681	.464	.202	
Student Orientation	.354	.778	.289	.215
Time Related	.382	.548		.289
Passive	.303	.316	.288	.238

Indirect Active	.166	.132	.811	.298
Communication	.406	.367	.497	
Affective	.195	.270	.366	.788

Extraction Method: Maximum Likelihood.

Rotation Method: Varimax with Kaiser Normalization.[a]

Rotation converged in 8 iterations.

Three variables loaded on factor 1, namely feedback, cognitive expertise, and supervisory expertise. Feedback had the highest loading (.798). The items associated with this loading were: 'gives constructive feedback', 'gives feedback on time', and 'pays attention to editing issues and corrections'. Cognitive expertise had the second highest loading (.683). The items for this loading were: 'has a sharp and focused mind', 'shows exceptional mastery of concepts and issues', and 'is widely read on research issues'. Supervisory expertise had the third highest loading (.681). The items associated with this loading were: 'clearly understands the research processes', 'evidences wide research supervision experience', and 'offers extensive guidance at all times'. All items on factor 1 relate to expert and constructive advice; thus, the factor was labelled "constructive expert".

Three variables loaded on factor 2, namely student orientation, time-related factors, and passivity. Student orientation had the highest loading (.778). The items that loaded on this variable were: 'offers me social support all the time', 'has trust in me', and 'creates a strong professional working environment'. Time-related factors had the second highest loading (.548). Items on this loading were: 'is always readily available', 'can be accessed easily', and 'observes timelines for research consultations'. The passive variable had a loading of .316. The items under this variable were: 'has no input into my work', 'is very unresponsive', and 'is never available to me'.Items on the first two highest loadings concerned attributes focusing on relational and availability issues between the student and the supervisor; thus, the factor was labelled 'supportive mentor'. The passive variable, which loaded third on factor 2, appeared to be a confounding variable as it was opposite the 'supportive mentor' label, indicating supervisory insensitivity and lack of support for the student and their work. It was therefore excluded from factor 2.

Two variables loaded on factor 3, namely indirect active and communication. Indirect active had the highest loading (.811), followed by communication (.497). Items under the former variable were: 'seeks my opinions and suggestions', 'asks for explanations and justifications', and 'allows me to be open-minded about issues'. Items under the latter variable were: 'uses clear language to communicate and listens attentively', 'shows interest in my research topic and shares additional information', and 'has strong interpersonal skills'. Items on these two loadings focused mainly on the attributes of listening and clarity in communication; thus, the factor was labelled 'active listener-communicator'. Factor 4 explained most of the variation contained in the variable affective (.788). The items under this variable were: 'creates an interactive sharing environment', 'is a nurturing person', and 'has good personal judgement'. The items under this factor largely focused on a supervision style that promoted interaction and nurturing. This factor was therefore labelled 'Nurturer-interactive persona'.

6. Discussion

The aim of the study was to develop a student teacher research evaluative survey to determine supervision styles and attributes of research supervisors in Zimbabwean teachers' colleges. The most

prevalent expectation expressed by the participants regarding the 'ba' was the need to be under the tutelage of a constructive expert. This finding is hardly surprising, given studies that have confirmed students prefer to engage with dialogic supervisors who are both knowledgeable and able to assist them in developing into competent aspiring researchers (Hylland & Hylland, 2019b; Sopina & McNeill, 2015). This factor suggests that students preferred the use of the Psychological/Pastoral Model. Our findings confirm other studies (Mushoriwa & Nyakutse, 2014; Yeoh & Doan, 2012) which found that the role of the supervisor centred on creating a 'ba' characterised by professional and cordial interactions, which motivated students to become independent and confident researchers who explored their research interests unhindered.

The second factor focused on supportive mentorship. The study found that supportive mentors were easily accessible and provided professional support, which hinged on trust between the student and the supervisor. It was evident that supportive mentorship was based on an apprenticeship relationship between the supervisor and the student. In the Theory of Knowledge Creation (Nonaka & Takeuchi, 1995), socialisation imports observational learning, in which the student is an apprentice who is inducted into academic writing by the knowledgeable other. While we excluded the passive variable under the second factor in our model, it is critical to note that this variable raised a dimension that cannot be overlooked. Supervisor insensitivity and lack of support for the student and their work is a reality in the supervision process. This finding confirms studies (Almusaed, 2020; Bazrafkan et al., 2016) which have found that some supervisors are perceived as either absentees or busy ghosts who neglect their students.

The third factor described a supervisor labelled as an active listener-communicator. This variable confirmed the importance of combination as enunciated in the Theory of Knowledge Creation (Nonaka & Takeuchi, 1995). Students exposed to an active listener-communicator are able to share explicit knowledge with supervisors through combination—a process that entails putting together different bodies of explicit knowledge held by the student and the supervisor. This finding reveals that by evidencing interest in the work of students and seeking their clarifications and opinions, active listener-communicators facilitate a 'ba' characterised by good and empathetic relationships with students. This study confirms findings by Yu and Wright (2016), which revealed that students preferred supervisors with strong interpersonal skills who appreciated some of the problems the students encountered while doing research. The final factor was the nurturer-interactive persona, which loaded under the affective variable. The emerging finding was that students preferred supervisors who possessed good personal judgement and had a nurturing personality style. This finding converges with previous studies which have shown that a nurturing style revolves around giving constant support and reassurance to the student (Haksever & Manisali, 2000) and keeping students' morale high (Philips & Pugh, 2000).

7. Conclusion

Supervisors play a very important role in the knowledge creation process of research students. It is imperative that supervisors possess certain attributes and styles relevant to the interests of students conducting research. Based on our data analysis, the following four conclusions can be drawn regarding the attributes and styles preferred by research students. First, supervisors should be constructive experts who not only pay attention to the quality of the students' work but also offer constructive and timely feedback. At the cognitive level, such supervisors should be perceptive, widely read, and possess exceptional mastery of research, allowing them to provide relevant guidance to students. Second, supervisors should act as supportive mentors who create a professional relational environment based on trust and genuine empathy for their students at the psychosocial level. This implies that they should not only be easily accessible to their students but also work within reasonable timelines. Third, supervisors should have strong interpersonal abilities, enabling them to be active listeners and good communicators who are sensitive to students' ideas. Furthermore, they should use clear language to communicate issues to their students and consistently show interest in their work.

Finally, supervisors should present a nurturing and interactive persona, characterised by sound personal judgment, which functions in an interactive 'ba' designed to nurture the student into an independent researcher. A combination of the aforementioned styles and attributes will create a highly fertile research 'ba' for students in teachers' colleges. In light of this study, we therefore recommend the adoption of the twenty-four item Student Teacher Research Evaluative Supervisor Survey (STRESS). We propose this survey as a tool that can be used to determine supervisor attributes and styles in the knowledge creation process through research in teachers' colleges (refer to Appendix A).

8. Limitations

The most noteworthy limitation of this study was the size and composition of the sample used in the analysis. As noted in the description of the participants, the sample was disproportionately female and primarily comprised the Early Childhood Development cohort drawn from only one teachers' college. This limited the generalisability of the findings. Although factor 2 appeared interpretable, the relatively small percentage variation of items on the passive variable somewhat restricts their interpretability. Furthermore, the method of data collection through convenient purposive stratified sampling may have contributed to the small number of participants. Despite this limitation, the comparatively strong communalities somewhat alleviate this concern.

9. Directions for Future Research

The development of the Student Teacher Research Evaluative Supervisor Survey (STRESS) is still in its early stages, and therefore its technical adequacy needs to be assessed. Evidence of both divergent and convergent validity could be collected by comparing STRESS results from various studies. The survey will also need to be administered to a wider and more diverse sample of teachers' college students across several institutions. Once the technical adequacy of the survey is established, the measure can be used in studies involving teachers' college research students.

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