# Some is not everything? Designing an instrument that measures the clinical learning environment holistically

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## Abstract

This article describes the development as well as the face and content validation of an instrument for measuring the clinical learning environment of professional healthcare students. A methodological research design was used to develop the instrument and a Delphi technique was used to determine face and content validity. The research was conducted systematically in two phases to construct the instrument, and to establish face and content validity. Phase 1 comprised a general literature overview to identify existing instruments. The retrieved instruments were thematically analysed into the four themes of atmosphere, teamwork, workload and learning opportunities with related items, and then the first version instrument was drafted. In Phase 2, the first version instrument was evaluated for face and content validity. Thirty-six healthcare professional experts responded to the consensus Delphi study, and consensus was reached after three rounds. The Delphi study confirmed the face and content validity of 62 items. The second version of the new instrument was finalised. A new holistic clinical learning environment measuring instrument, based on existing instruments was developed. This instrument can assist educators in health professions education to gain a comprehensive view of the clinical learning environment and make informed decisions on student placements. Additionally, this instrument can monitor and promote quality student placements and highlight areas where students may need additional support for practice-based learning.

**Keywords: *Clinical learning environment, clinical placements, healthcare, students, work-based learning***

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## Introduction

Measuring the clinical learning environment (CLE) has gained much attention over the past decade. This increased focus could be due to educators in health professions education acknowledging the importance the CLE plays in students' clinical learning and professional development. However, if students' learning experience is to be enhanced, it is essential to measure all the characteristics of the CLE.

Health professions education institutions place students in the CLE for practice-based learning, which is a crucial component in training healthcare students. The CLE contributes to students' competence as they have opportunities to integrate theory in a context-specific clinical situation while providing safe and holistic people-centred care (Woo & Li, 2020). It offers an authentic platform where students can rehearse actions and be innovative in problem-solving with the necessary support of the clinical staff, clinical facilitators and managers (Mikkonen et al., 2020). For learning to transpire and for the development of competence, all characteristics of the CLE should be conducive to learning. This is needed to ensure that students are exposed to clinical experiences and learning opportunities and that they receive the necessary support from everyone involved in their clinical learning (Kamphinda & Chilemba, 2019; Thurling et al., 2017). Thus, a positive and stimulating CLE is critical in preparing the future healthcare workforce.

However, the CLE is complex and influenced by multifaceted disease profiles, the availability of human resources, the competence of clinical staff, the functioning of equipment, and the availability of consumables (Hugo & Botma, 2019). Additionally, students are often negative about their learning due to the challenges experienced in practice (Woo & Li, 2020). Students are exposed to bullying and negative attitudes from healthcare professionals who are unwilling to teach them (Cowin et al., 2019). Unethical behaviour and a lack of respect and trust among healthcare professionals, which has been reported in some CLEs, also contributes to students' negative experiences (Dimitriadou et al., 2015; Engelbrecht et al., 2017). Consequently, students are left unsupported with limited opportunities to learn due to poor interpersonal relationships and communication and a lack of resources decreasing their motivation to transfer learning (Lovecchio et al., 2015; Motsaanaka et al., 2020).

Due to the value of the CLE during practice-based learning, it is crucial to find ways to maintain, monitor and ensure the quality of students' practice-based learning. Various authors have endeavoured to measure the CLE in the past. However, on examining existing instruments, the authors found them to be inadequate as none measured all the relevant characteristics of the CLE and therefore questioned the validity of these existing instruments (Anderson et al., 2014; Dimitriadou et al., 2015; Mansutti et al., 2017). Most of the instruments were developed to measure different purposes and characteristics of the CLE, specific clinical environments and were often profession specific. These findings were similar to the findings by Mansutti et al. (2017). A standardised instrument that can measure the CLE holistically in health professions education is needed.

Therefore, the research reported in this article set out to develop and validate an instrument that measures all the characteristics to enhance a holistic measurement of a CLE in health professions education. Understanding all the characteristics of the CLE may contribute to supporting healthcare students effectively, improving the learning transfer climate, promoting good collaboration between clinical team members, and identifying limitations in clinical practice (Ekstedt et al., 2019). Furthermore, educators would be able to make informed decisions on where to place students for optimal learning experiences.

## Methods

### *Study design*

A quantitative methodological design, as described by Polit and Beck (2018) and LoBiondo-Wood and Haber (2017), was used to develop the instrument in two phases. Phase 1 referred to the process of instrument development, where a general literature review and thematic analysis were used to construct items and domains. Phase 2 comprised the Delphi study to confirm the face and content validity of the

items in the instrument. Figure 1 gives an overview of the phases followed. Ethical clearance was obtained from the university where the second author resides (UFS-HSD2019/0284/3007).

**Figure 1:**

**Phases in the development of the instrument**
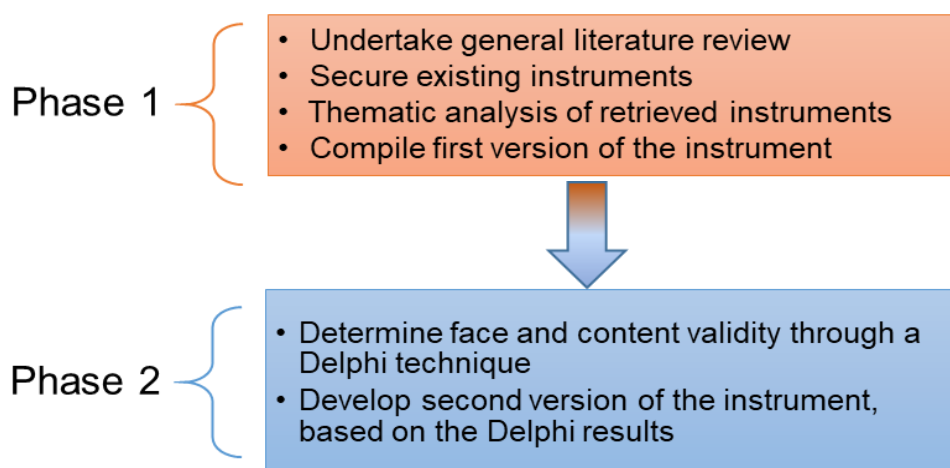


**Phases 1: Development of the instrument**

The instrument development commenced with a general literature review of existing sources. Boateng et al. (2018) argue that conceptualisation of a construct is crucial when developing new instruments. A well-developed instrument can minimise measurement error and optimise data (Polit & Beck, 2018). The authors used the first three steps in instrument development suggested by Paré and Kitsiou (2017), namely the formulation of research objectives, securing existing sources, and screening for inclusions.

The objectives for the search in Phase 1 were two-fold:
- to gain an overview of existing literature on the CLE to determine the characteristics to be included; and
- to identify existing instruments measuring the CLE.

*Securing existing sources*

The authors used Population, Concept and Context (PCC), as described by Peters et al. (2020), to formulate the Boolean search string. Table 1 illustrates the PCC elements and Boolean search string. A time frame from 1980 to 2021 was used for the data to be manageable, recent and relevant to the CLE.

Fifteen scientific databases were searched including Medline with full text, PsycINFO, Africa-Wide Information, Cumulative Index to Nursing and Allied Health (CINAHL) with full text, Educational Resources Information Centre (ERIC), Academic Search Ultimate, Education Source, PsycTESTS, Health Source: Nursing/Academic Edition, Science Direct, SocINDEX with full text, and PsycARTICLES.

**Table 1:**

**PCC and Boolean search string**

| PCC elements | Application in this study | Boolean search string |
|---|---|---|
| Population | Undergraduate healthcare students | "health science" or "healthcare professions" or "health care professions" or "health care professionals" or dietetics or paramedics or medicine or nursing or physiotherapy or optometry or "occupational therapy" or pharmacy or dentistry or biogenetics or radiography or paramedics |
| Concept | Instruments measuring the CLE | Instrument or questionnaire or tool or survey or "self-administered questionnaire" or scale or inventory or evaluation or assessment or measurement |
| Context | Clinical learning environment | "clinical learning environment" or "transfer climate" or "organisational climate" or "work-integrated learning" or "clinical learning" or "placement learning" or "organisational work climate" or "psychological climate" or "practice placement" or "transfer environment" or "learning climate" |

First, both authors independently evaluated the abstracts of the identified articles against the inclusion criteria (Figure 2). The authors then met to discuss which abstracts should be included based on the inclusion criteria. Thereafter, the full-text articles were screened, again independently, against the same inclusion criteria, after which the authors again discussed any discrepancies to reach consensus on the final set of articles to be included.

**Figure 2:**

**Inclusion criteria**

- Sources describing measuring the CLE

- Instruments used to describe the quality of the CLE

- Abstracts without full-length instruments, but which included the contents measuring the CLE

- Full-length instruments

- Articles published in English

- Instruments relevant to healthcare professions

*Data capture and analysis*

Full-length instruments were extracted from the included articles and were captured in a Microsoft Word document in a table format that included the author(s), year, article name, instrument, profession, type of instrument and gauge of validity, and reliability. Inductive thematic analysis of the items underpinned the data analysis process through a stepwise approach (Polit & Beck, 2018). Hard copies of the instrument were individually read and re-read by the authors to enhance their understanding of the focus of the items. The authors then coded the items manually by clustering items based on similarities to generate new items. The authors discussed the generated items to enhance alignment and clarity in the wording. The

final step involved identifying patterns among the items which were integrated into themes. The authors took care to ensure clarity in the wording of each item and theme. The themes were then drafted into the first version of the instrument as domains with their respective items.

### Phase 2 Face and content validity

#### Delphi technique

Polit & Beck (2018) state that a Delphi technique is used to achieve consensus among experts through repeated iterations of confidential opinions and feedback derived from earlier responses. Therefore, a consensus Delphi technique was used as a first step to enhance the validity of the instrument by exploring face and content validity to determine the degree to which the instrument measures the CLE content.

#### Selection of the expert panel

Purposive and snowball sampling were used as a two-step sampling method to select the expert panel. First, a purposive selection of potential experts was done. The second author identified potential experts based on her contacts with healthcare professionals from various higher education institutions. Experts were contacted via e-mail and asked to evaluate whether they fit the criteria and to establish their interest in participating as an expert. Experts were defined as having: 1) a bachelor's degree qualification; 2) at least five years of professional clinical experience; and, 3) specialising in education, or clinical accompaniment or supervision of students in the CLE. Experts were approached from various healthcare professions (including biokineticists, dieticians, dentists, nurses, occupational therapists, optometrists, paramedics, physiotherapists, medical physicians, pharmacists, and radiographers) to ensure that the instrument could be used in health professions education in the future.

The identified experts were asked to nominate three other members from their profession who potentially met the criteria and might be interested in participating in the study. Peer referrals were similarly contacted via e-mail and screened for eligibility in the same manner. Informed consent was obtained from the expert panellists prior to the Delphi study.

#### Data collection

The panel of experts was invited via e-mail to evaluate the domain and items of the first version of the instrument. To ensure the panel represented the full range of healthcare professions listed above, the first version of the instrument included a biographical section where experts had to indicate their profession, highest qualification, the number of years of experience and the total number of hours spent with students per week.

Additionally, during Round 1, a three-point Likert-type questionnaire was used. Experts had to choose between "essential", "uncertain" and "not needed" for each item included in each Delphi round. Spaces were provided to allow new items to be added and for comments. Feedback from experts and the results of the first round was added in summary to the following rounds. After Round 1, the researchers used a dichotomous instrument with a choice between "yes" or "no" for the inclusion of items in Rounds 2 and 3 where item consensus was not obtained. The Delphi process was concluded with Round 3. Data collection occurred over a three-month period.

#### Data analysis

Biographical data were captured in a Microsoft Word table and frequencies and percentages were calculated. To validate which items would be included in the next round, a 70% consensus was used, as suggested by Humphrey-Murto et al. (2017). Each item was statistically analysed and captured as percentages (Sekayi & Kennedy, 2017) to determine if a consensus was reached. The experts received feedback per round on the items that reached consensus and those items with less than 70% agreement. Experts were then asked to review items for the next round that did not meet consensus. A biostatistician at the authors' institution verified data analysis results for correctness.

*Rigour of the study*

The authors aligned the design and execution of this study with the methodological studies approach as described by Polit and Beck (2018) and LoBiondo-Wood and Haber (2017). Consensus of the items and domains by the expert panel contributed to the trustworthiness of the draft instrument. The validation of Delphi results by a biostatistician minimised the development of any possible errors.

## Results

### Phase 1 Instrument development

The search rendered a total of 306 abstracts. Figure 3 illustrates the flow diagram for the screening and selection process.

**Figure 3:**

**Flow diagram showing the selection procedure**
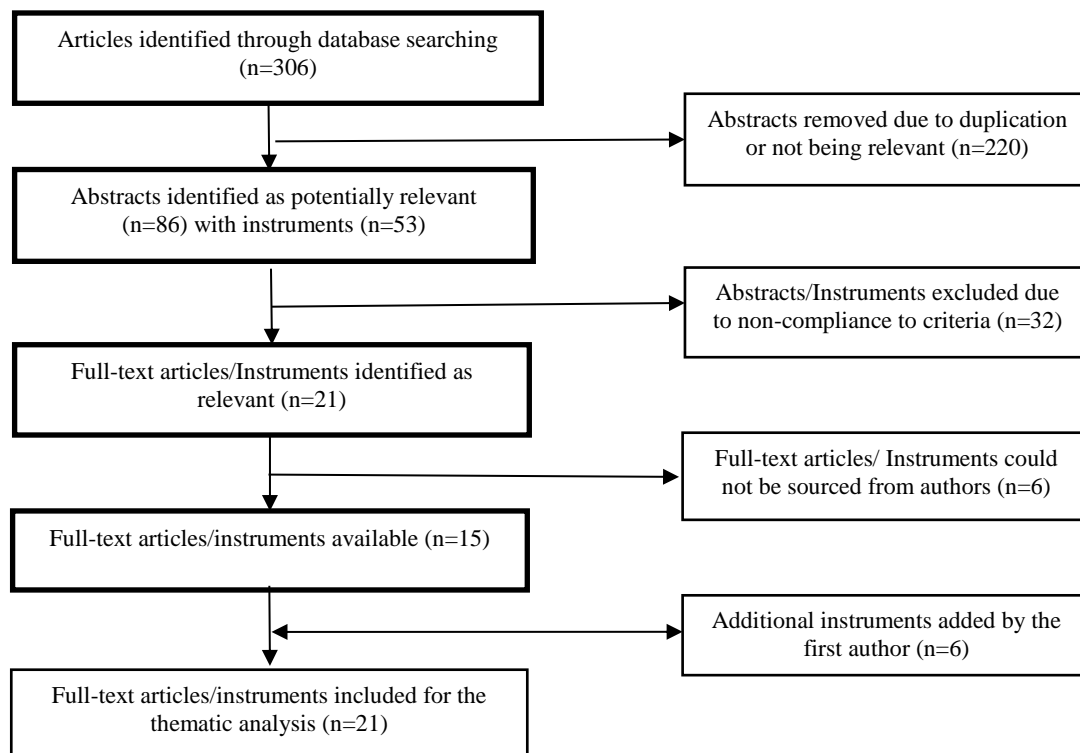


Of the 306 abstracts, 220 were excluded after de-duplication or removal of articles that were not relevant. Eighty-six abstracts were included with 53 instruments, but 32 full-text articles/instruments were excluded due to non-compliance. From the remaining 21 full-text articles/instruments, six could not be retrieved, and only 15 had full-texts available. Six additional instruments were identified through a literature overview by a post-graduate student. Hence, twenty-one existing instruments served as a qualitative dataset. After removing duplicated items, open-ended and biographical questions, the dataset consisted of 497 items. After the analysis process, 66 new items were formulated. The generated 66 items were discussed by the authors to enhance alignment and clarity in the wording. The final step involved identifying patterns among the 66 items, which were integrated into four main domains when items were grouped together, forming the first version of the questionnaire. They include:

- atmosphere and physical environment (18 items);
- teamwork (9 items);
- workload of students and clinical staff (5 items); and
- learning outcomes and opportunities in clinical practice (34 items), which formed the first version of the instrument with 66 items.

The four domains were used to develop the first draft version of the instrument to measure the CLE (see Appendix 1 for the first draft version of the instrument with domains and items per domain).

### *Phase 2 Face and content validity*

A total of 54 experts were invited to participate. Eighteen of those invited did not consider themselves experts, resulting in 36 experts indicating their interest to participate.

### *Biographical characteristics*

Twenty-two experts from nine healthcare professions participated in Round 1, 16 experts from 7 professions in Round 2, and 10 experts from 6 professions in Round 3. The highest representation was occupational therapists (22.7%). The representation of other professions was fairly distributed between the different healthcare professions. The attrition rate was evident from Round 1 to 3, which is often associated with Delphi techniques (Green, 2014). Paramedics and biokinetics professionals did not respond in any rounds, despite indicating their interest in participating in the study.

More than half of the expert's held master's degrees (54.5%), while 40.9% had a Ph.D. degree. The experts had a mean of 15.7 years' experience in the CLE and spent more than 6 hours per week with students in the CLE, contributing to their credibility as experts. Results from the biographical characteristics of the expert panel confirmed that all experts conformed to the inclusion criteria for experts as depicted in Appendix 2.

### *Face and content validity*

During Round 1, the panel reached a consensus on 55 items. Items 16 "the unit is all about getting the job done" (32%) and 44 "we are competing with each other to practice clinical skills" (50%) were excluded. When the totality of the essential and uncertain was calculated to ≥ 70%, the item(s) were labelled as "unsure" and sent for another round. Nine items (3, 13, 15, 17, 31, 32, 33, 43 and 59) did not achieve consensus and were sent for a second round. See Appendix 3 for agreement per item after each round.

In Round 2, four of the nine items (3, 13, 15 and 59) reached consensus for inclusion in the instrument. Five items (17, 31, 32, 33 and 43) were sent for a third round due to uncertainty.

During Round 3, consensus for inclusion was reached on items 17, 32 and 33. Experts concurred that items 31 "the workload in this unit is too heavy" and 43 "I was allowed to work at my own pace" should be excluded as they failed to reach consensus. No new items were added during any of the rounds. The second version instrument comprised 62 items with the domains of learning outcomes and opportunities in clinical practice (32 items), atmosphere and physical environment (17 items), teamwork (9 items) and workload of students and clinical staff (4 items).

## Discussion

The aim of the study was to develop an instrument to measure all the characteristics of a CLE holistically through a systematically phased approach. Of the four domains, learning opportunities in clinical practice were the largest and covered 32 items. As students need to be prepared academically for clinical placements (Ekstedt et al., 2019), in a favourable CLE, the academic learning outcomes should correspond with what is found in clinical practice. Educators should prepare students in terms of a favourable expectation of their clinical placement and the outcomes to be achieved (Woo & Li, 2020). A CLE is beneficial for students' transfer of learning to occur when multiple learning opportunities and

support from clinical staff and supervisors are provided for students to achieve their learning outcomes (Ekstedt et al., 2019; Hugo et al., 2018). Student support refers to the healthcare team directing students to potential learning opportunities and guiding them to obtain new skills and improve existing skills (Ekstedt et al., 2019). Students are therefore allowed to practice independently as their skills improve, and they gain self-confidence (Van Lankveld et al., 2019). Arpanantikul and Pratoomwan (2017) confirm that students want to be involved in patient care and partake in clinical discussions to learn. Students perform better when they receive individual attention and when sufficient time is spent on their learning outcomes (Flott & Linden, 2016). Performance also improves when students receive the necessary support to link theory with practice (Woo & Li, 2020). Students indicate a sense of satisfaction with their supervisors when supervisors use innovative learning activities, challenge students' reasoning skills, demonstrate expert patient management skills, are positive role models in clinical practice, and support students emotionally (Woo & Li, 2020). Student clinical performance should be evaluated to facilitate the achievement of learning outcomes and enable mastery in learning opportunities (Mantzourani et al., 2019). Students also need to receive continuous feedback on their performance (Ekstedt et al., 2019). Continuous feedback creates a sense of satisfaction for students, enabling them to flourish (van Rooyen et al., 2018). This feedback should be constructive, and students should have the opportunity to reflect on their clinical performance (Mantzourani et al., 2019). The success of accomplishing learning outcomes could be measured against the opportunity students have to develop professionally (Woo & Li, 2020) and the sense of satisfaction with their learning experience (Ekstedt et al., 2019).

The atmosphere in the clinical practice (17 items) formed the second-largest domain. Contributors to a favourable atmosphere include the availability of physical resources, such as functional equipment and sufficient consumables (Atakro & Gross, 2016), while skilled human resources are essential to support students' learning (Naidoo et al., 2017). A well-organised clinical setting where students are expected and welcomed to the new environment also contributes to a favourable atmosphere. Students who are well-orientated are confident and contribute to people-centred care (Eastland et al., 2018). Supervisors who are approachable and exhibit a positive attitude towards students while acting professionally enhance a positive atmosphere in clinical practice (Woo & Li, 2020). Students experience the atmosphere to be conducive to learning when quality people-centred care is delivered to the healthcare consumer (Ekstedt et al., 2019). The atmosphere is positively influenced when innovation is shown towards clinical learning using a variety of activities in the environment to support students' learning (Ekstedt et al., 2019). In addition, meaningful interpersonal relationships are built on mutual trust and respect between role players (Lee & Doran, 2017). These positive relationships with healthcare professionals and the opportunity to participate in the discussions on patient management are important factors to promote a favourable atmosphere (Ekstedt et al., 2019). However, interpersonal relationships are negatively affected when the environment is not conducive to students' clinical learning (Aktas & Karabulut, 2016). Unity among healthcare professionals can be damaged if healthcare professionals neglect their leadership and educational roles (Woo & Li, 2020). Poor leadership thus contributes to healthcare professionals' adverse feelings about extra responsibilities in an already complex environment (Ekstedt et al., 2019). Negative relationships can also contribute to bullying in clinical practice (Engelbrecht et al., 2017) as bullying affects the atmosphere negatively.

Teamwork in clinical practice as a domain of the CLE contained nine items. Students want to be part of the team and valued as team members (Phillips et al., 2017). Woo and Li (2020) indicate that students who feel that they are part of the team are likely to communicate with one another, participate in decision-making on patient care, and are inclined to ask questions should they identify knowledge gaps. Ekstedt et al. (2019) highlight that teamwork also affects students' sense of belonging, being valued in the team, collaboration between role players, shared expertise and having an influence on peer support. The importance of these items in the CLE was underlined by the experts' level of agreement after only one round for inclusion in the instrument.

The workload in clinical practice contained the least number of items in the instrument. It thus seems that the workload in clinical practice differed between the various health professions represented in this study. Shivers et al. (2017) state that it is often expected that students need to play two roles in clinical practice - that of basic worker and that of practice-based learning. Furthermore, people-centred care is seen to be the first priority of healthcare professionals, while the accompaniment of students is often viewed as a

secondary function and less of a priority. Students, therefore, find it difficult to obtain help when they need it (Ekstedt et al., 2019). Liu et al. (2015) state that students feel overwhelmed by the amount of work to be done in clinical practice. It might also be that students are not prepared and do not receive the support they need to manage their workload. Health sciences education institutions, therefore, should be mindful of the characteristics of the CLE when placing their students for practice-based learning in all clinical facilities.

Limitations of this study are that not all healthcare professions (paramedics and biokinetics) were represented in the Delphi panel despite the researchers striving to include all healthcare professions. Additionally, the attrition rate of the experts during the application of the Delphi method was high.

Further research should focus on a description of additional psychometric properties of the instrument. Therefore, this instrument should be used with caution until further testing is done. The authors suggest administering this instrument to students in all health professions education programmes.

## Conclusion

The complexity of the CLE and the adversity students experience necessitate a holistic evaluation of CLEs to identify optimal placements where students can gain the required skills and confidence. The authors aimed to develop and validate an instrument that can measure all of the characteristics of a CLE in health professions education. Existing instruments relevant to health professions education that measured different characteristics of CLEs were utilised to develop a comprehensive instrument to measure the CLE holistically. The instrument contains items relating to the four domains of CLEs (the clinical atmosphere and physical environment, teamwork, workload of students and clinical staff, and learning outcomes and opportunities in clinical practice) which may contribute to a more holistic evaluation of CLEs. The use of an inter-professional expert panel enhanced the possibility of using the instrument across professions. Such an evaluation could contribute to the focused selection and monitoring of placements and could guide educators and clinical facilitators regarding the support that needs to be offered to students during practice-based learning. Using the instrument across healthcare professions could act as a catalyst for inter-professional education.

## Acknowledgements

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## Appendix 1

### *First version of questionnaire*

**Participant no.**_____

By completing this questionnaire, you are consenting to participate in the research. Please evaluate the clinical learning environment where you were placed during this month. Your participation is voluntary and anonymous.

| Biographic data | | | |
|---|---|---|---|
| Indicate your profession by ticking of the following: | Biokineticist | Dentist | Dietitian |
| | Nursing | Occupational therapist | Optometrist |
| | Paramedic | Physiotherapist | Medical physician |
| | Pharmacist | Radiographist | Other |
| | Other: | | |

| | | | | |
|---|---|---|---|---|
| Indicate your highest professional qualification | Bachelors | Honours | Masters | PhD |

| | |
|---|---|
| Indicate the number of years' experience in the clinical learning environment. | |

| | | | |
|---|---|---|---|
| Total number of hours spent with students per week. | 30 min - 2 hours | 2 - 6 hours | > 6 hours |
| | | | |

**Read each statement and indicate with a X your chosen option**

**Atmosphere in the clinical setting**

| In your expert opinion, indicate which of the following items should be included in an instrument on the clinical learning environment (CLE) – regarding the atmosphere in the clinical setting? | | ESSENTIAL | UN-CERTAIN | NOT NEEDED |
|---|---|---|---|---|
| Item 1 | I was welcomed to this unit. | | | |
| Item 2 | I was orientated to the physical environment. | | | |
| Item 3 | Facility / Equipment were well maintained. | | | |
| Item 4 | Necessary resources were available to perform tasks well. | | | |
| Item 5 | The unit was well organised. | | | |
| Item 6 | Supervisors were approachable. | | | |
| Item 7 | There was a reciprocal respectful relationship between the supervisors and myself. | | | |
| Item 8 | There was unity between healthcare professionals in the unit. | | | |

| Item 9 | There was a sense of trust among healthcare professionals. | | | |
|---|---|---|---|---|
| Item 10 | Health science professionals had a positive attitude towards me. | | | |
| Item 11 | I was able to build positive relationships with all the healthcare professionals. | | | |
| Item 12 | I freely participated in discussions on patient management. | | | |
| Item 13 | Health science professionals considered innovative ideas regarding patient care. | | | |
| Item 14 | Health science professionals were professional in their actions. | | | |
| Item 15 | Health science professionals demonstrated a person-centred care approach. | | | |
| Item 16 | The unit is all about getting the job done. | | | |
| Item 17 | I experience bullying in this unit. | | | |
| Item 18 | I have a sense of work satisfaction after this clinical rotation. | | | |

**Any additional comments:**



| **Teamwork in the clinical setting** | | | | |
|---|---|---|---|---|
| **In your expert opinion, indicate which of the following items should be included in an instrument on the clinical learning environment (CLE) – regarding teamwork in the clinical setting.** | | **ESSENTIAL** | **UN-CERTAIN** | **NOT NEEDED** |
| Item 19 | Various health science professionals valued each other. | | | |
| Item 20 | There was good communication among healthcare professionals. | | | |
| Item 21 | There was shared decision making among the health science professionals. | | | |
| Item 22 | I had a good working relationship with all the healthcare professionals. | | | |
| Item 23 | I felt part of the health science professional team. | | | |
| Item 24 | I was valued as a health science professional team member. | | | |
| Item 25 | Health science professionals collaborated to support my learning. | | | |
| Item 26 | Clinical facilitators shared their educational expertise with the team. | | | |

| **In your expert opinion, indicate which of the following items should be included in an instrument on the clinical learning environment (CLE) – regarding teamwork in the clinical setting.** | | **ESSENTIAL** | **UN-CERTAIN** | **NOT NEEDED** |
|---|---|---|---|---|
| Item 27 | My peers supported me during this clinical rotation. | | | |

| **Any additional comments:** | | | | |
|---|---|---|---|---|
| | | | | |

| **Workload in the clinical setting** | | | | |
|---|---|---|---|---|

| **In your expert opinion, indicate which of the following items should be included in an instrument on the clinical learning environment (CLE) – regarding workload in the clinical setting.** | | **ESSENTIAL** | **UN-CERTAIN** | **NOT NEEDED** |
|---|---|---|---|---|
| Item 28 | I was treated like a student and not as a worker. | | | |
| Item 29 | It was difficult to find help when needed. | | | |
| Item 30 | I was overwhelmed with the amount of work to be done in the unit. | | | |
| Item 31 | The workload in this unit is too heavy. | | | |
| Item 32 | I was able to negotiate my workload. | | | |

| **Any additional comments:** | | | | |
|---|---|---|---|---|
| | | | | |

| **Learning opportunities in the clinical setting** | | | | |
|---|---|---|---|---|

| **In your expert opinion, indicate which of the following items should be included in an instrument on the clinical learning environment (CLE) – learning opportunities in the clinical setting.** | | **ESSENTIAL** | **UN-CERTAIN** | **NOT NEEDED** |
|---|---|---|---|---|
| Item 33 | I was excited about this clinical rotation. | | | |
| Item 34 | I knew what was expected from me in this unit. | | | |
| Item 35 | This unit offered multiple learning opportunities. | | | |
| Item 36 | It was clear which of my clinical learning outcomes could be achieved in this unit. | | | |
| Item 37 | I could achieve most of my clinical learning outcomes. | | | |
| Item 38 | I was encouraged to optimise my learning opportunities. | | | |
| Item 39 | Clinical meetings were a valuable learning opportunities. | | | |
| Item 40 | Health science professionals directed me towards learning opportunities. | | | |
| Item 41 | The health science professionals guided me in acquiring new skills. | | | |

| Item 42 | I was allowed more independence as my skills increased. | | | |
|---------|---------|---|---|---|
| Item 43 | I was allowed to work at my own pace. | | | |
| Item 44 | We were competing with each other to practice clinical skills. | | | |
| Item 45 | I became more confident during this rotation. | | | |
| **In your expert opinion, indicate which of the following items should be included in an instrument on the clinical learning environment (CLE) – learning opportunities in the clinical setting.** | | **ESSENTIAL** | **UN-CERTAIN** | **NOT NEEDED** |
| Item 46 | I received individual attention. | | | |
| Item 47 | My supervisors were aware of my learning outcome needs. | | | |
| Item 48 | Supervisors spent sufficient time with me. | | | |
| Item 49 | My supervisors assisted me to link theory to practice. | | | |
| Item 50 | Supervisors facilitated my reasoning regarding patient management. | | | |
| Item 51 | Supervisors applied innovative learning activities. | | | |
| Item 52 | The supervisors considered my emotional responses to the clinical experiences. | | | |
| Item 53 | I am satisfied with the supervision I received. | | | |
| Item 54 | Supervisors demonstrated expert patient management skills. | | | |
| Item 55 | I was actively involved in managing patients. | | | |
| Item 56 | I managed patients under supervision. | | | |
| Item 57 | I was encouraged to ask questions regarding patient management. | | | |
| Item 58 | I was theoretically prepared for this rotation. | | | |
| Item 59 | There was a mismatch between what was taught in class and experiences during the clinical rotation. | | | |
| **In your expert opinion, indicate which of the following items should be included in an instrument on the clinical learning environment (CLE) – learning opportunities in the clinical setting.** | | **ESSENTIAL** | **UN-CERTAIN** | **NOT NEEDED** |
| Item 60 | I was evaluated on my clinical performance. | | | |
| Item 61 | I received constructive feedback on my performance. | | | |
| Item 62 | I continuously received constructive feedback on my performance. | | | |

| Item 63 | I was encouraged to reflect on my clinical experiences. | | | |
|---------|---------------------------------------------------------|--|--|--|
| Item 64 | My professional identity were developed | | | |
| Item 65 | I am satisfied with my learning experience in this unit. | | | |
| Item 66 | Health science professionals were good role models. | | | |
| **Any additional comments:** | | | | |

**Appendix 2**

*Delphi panel*

| Expert panel members | Criteria to qualify as an expert panel member | | | | Profession | Country | Highest profess-sional qualify-cation | Number of years' experience in the CLE | The total number of hours spent per week with students in the CLE. |
|---|---|---|---|---|---|---|---|---|---|
| | Health Science Bachelor or higher degree | Years of profes-sional clinical experien-ce (min. 5 years) | Clinical accom-paniment or supervi-sion of students in the CLE | Willing-ness to participa-te in all rounds | | | | | |
| Panel member 1 | X | X | X | X | Biokineticist | South Africa. | | | |
| Panel member 2 | X | X | X | X | Biokineticist | South Africa | | | |
| Panel member 3 | X | X | X | X | Biokineticist | South Africa | | | |
| Panel member 4 | X | X | X | X | Dentist | Nigeria | PhD | 5 | >6 hours |
| Panel member 5 | X | X | X | X | Dentist | South Africa | PhD | 15 | >6 hours |
| Panel member 6 | X | X | X | X | Dentist | South Africa | | | |
| Panel member 7 | X | X | X | X | Dietitian | Lesotho | | | |
| Panel member 8 | X | X | X | X | Dietitian | South Africa | Masters | 14 | >6 hours |
| Panel member 9 | X | X | X | X | Dietitian | South Africa | PhD | 22 | 2-6 hours |
| Panel member 10 | X | X | X | X | Nursing | South Africa | Masters | 11 | >6 hours |

| Expert panel members | Criteria to qualify as an expert panel member | | | | Profession | Country | Highest professsional qualify-cation | Number of years' experience in the CLE | The total number of hours spent per week with students in the CLE. |
|---|---|---|---|---|---|---|---|---|---|
| | Health Science Bachelor or higher degree | Years of profes-sional clinical experien-ce (min. 5 years) | Clinical accom-paniment or supervi-sion of students in the CLE | Willing-ness to participa-te in all rounds | | | | | |
| Panel member 11 | X | X | X | X | Nursing | Uganda | | | |
| Panel member 12 | X | X | X | X | Nursing | South Africa | | | |
| Panel member 13 | X | X | X | X | Nursing | South Africa | Masters | 8 | >6 hours |
| Panel member 14 | X | X | X | X | Nursing | South Africa | | | |
| Panel member 15 | X | X | X | X | Occupational therapist | South Africa | Masters | 16 | 30 min-2 hours |
| Panel member 16 | X | X | X | X | Occupational therapist | South Africa | Masters | 14 | >6 hours |
| Panel member 17 | X | X | X | X | Occupational therapist | Nigeria | PhD | 11 | >6 hours |
| Panel member 18 | X | X | X | X | Occupational therapist | South Africa | PhD | 24 | >6 hours |
| Panel member 22 | X | X | X | X | Optometrist | South Africa | PhD | 15 | 2-6 hours |
| Panel member 19 | X | X | X | X | Paramedic | South Africa | | | |
| Panel member 20 | X | X | X | X | Paramedic | South Africa | | | |

| Expert panel members | Criteria to qualify as an expert panel member | | | | Profession | Country | Highest profess-sional qualify-cation | Number of years' experience in the CLE | The total number of hours spent per week with students in the CLE. |
|---|---|---|---|---|---|---|---|---|---|
| | Health Science Bachelor or higher degree | Years of profes-sional clinical experien-ce (min. 5 years) | Clinical accom-paniment or supervi-sion of students in the CLE | Willing-ness to participa-te in all rounds | | | | | |
| Panel member 21 | X | X | X | X | Paramedic | South Africa | | | |
| Panel member 23 | X | X | X | X | Physiothe-rapist | Rwanda | PhD | | >6 hours |
| Panel member 24 | X | X | X | X | Physiothe-rapist | South Africa | Masters | 10 | 30 min-2 hours |
| Panel member 25 | X | X | X | X | Physiothe-rapist | South Africa | Masters | 34 | >6 hours |
| Panel member 26 | X | X | X | X | Physiothe-rapist | South Africa | Masters | 14 | >6 hours |
| Panel member 27 | X | X | X | X | Medical physician | South Africa | | | |
| Panel member 28 | X | X | X | X | Medical physician | Uganda | | | |
| Panel member 29 | X | X | X | X | Medical Physician | South Africa | | | |
| Panel member 30 | X | X | X | X | Nursing working with medical physician students | South Africa | Masters | 40 | >6 hours |
| Panel member 31 | X | X | X | X | Medical Physician | Uganda | PhD | 16 | >6 hours |

| Expert panel members | Criteria to qualify as an expert panel member | | | | Profession | Country | Highest profess-sional qualify-cation | Number of years' experience in the CLE | The total number of hours spent per week with students in the CLE. |
|---|---|---|---|---|---|---|---|---|---|
| | Health Science Bachelor or higher degree | Years of profes-sional clinical experien-ce (min. 5 years) | Clinical accom-paniment or supervi-sion of students in the CLE | Willing-ness to participa-te in all rounds | | | | | |
| Panel member 32 | X | X | X | X | Pharmacist | South Africa | Bachelors | 3 | 30 min-2 hours |
| Panel member 33 | X | X | X | X | Pharmacist | South Africa | Masters | 3 | 2-6 hours |
| Panel member 34 | X | X | X | X | Pharmacist | South Africa | Masters | 13 | >6 hours |
| Panel member 35 | X | X | X | X | Radiographer | South Africa | PhD | 30 | 2-6 hours |
| Panel member 36 | X | X | X | X | Occupational therapist | South Africa | Masters | 12 | >6 hours |

**Appendix 3**

*Table showing levels of agreement per item after each round.*

| Item no. | Item description | Consensus value | | |
|---|---|---|---|---|
| | | **Round 1** **N=22** | **Round 2** **N=16** | **Round 3** **N=10** |
| | **Atmosphere in clinical practice** | | | |
| 1 | I was welcomed to this unit | 77% | | |
| 2 | I was orientated to the physical environment | 95.5% | | |
| 3 | Facility/Equipment was well maintained | Unsure | 94% | |
| 4 | Necessary resources were available to perform tasks well | 91% | | |
| 5 | The unit was well organised | 90% | | |
| 6 | Supervisors were approachable | 100% | | |
| 7 | There was a reciprocal respectful relationship between the supervisors and myself | 100% | | |
| 8 | There was unity between healthcare professionals in the unit. | 77% | | |
| 9 | There was a sense of trust among healthcare professionals | 82% | | |
| 10 | Health science professionals had a positive attitude toward me | 91% | | |
| 11 | I was able to build positive relationships with all healthcare professionals | 91% | | |
| 12 | I freely participated in discussions on patient management | 91% | | |
| 13 | Health science professionals considered innovative ideas regarding patient care | Unsure | 88% | |
| 14 | Health science professionals were professional in their actions | 95% | | |
| 15 | Health science professionals demonstrated a person-centred care approach | Unsure | 94% | |
| 16 | This unit is all about getting the job done | 32% exclude | | |
| 17 | I experienced bullying in this unit | Unsure | unsure | 90% |
| 18 | I have a sense of work satisfaction after this clinical rotation | 82% | | |
| | **Teamwork in clinical practice** | | | |
| 19 | Various health science professionals value each other | 91% | | |
| 20 | There was good communication among healthcare professionals | 100% | | |
| 21 | There was shared decision-making among health science professionals | 82% | | |
| 22 | I had a good working relationship with all healthcare professionals | 82% | | |

| | | | | |
|---|---|---|---|---|
| 23 | I felt like part of the health science professional team | 91% | | |
| 24 | I was valued as a health science professional team member | 91% | | |
| 25 | Health science professionals collaborated to support my learning | 91% | | |
| 26 | Clinical facilitators shared their educational expertise with the team | 95.5% | | |
| 27 | My peers supported me during this clinical rotation | 86% | | |
| **Workload in the clinical practice** | | | | |
| 28 | I was treated like a student and not as a worker | 73% | | |
| 29 | It was difficult to find help when needed | 72% | | |
| 30 | I was overwhelmed with the amount of work to be done in the unit | 73% | | |
| 31 | The workload in this unit is too heavy | Unsure | unsure | 50% exclude |
| 32 | I was able to negotiate my workload | Unsure | unsure | 80% |
| **Learning opportunities in clinical practice** | | | | |
| 33 | I was excited about this clinical rotation | Unsure | unsure | 90% |
| 34 | I knew what was expected of me in this unit | 82% | | |
| 35 | This unit offered multiple learning opportunities | 95.5% | | |
| 36 | It was clear which of my clinical learning outcomes could be achieved in this unit | 86% | | |
| 37 | I could achieve most of my clinical learning outcomes | 82% | | |
| 38 | I was encouraged to optimise my learning opportunities | 95.5% | | |
| 39 | Clinical meetings were valuable learning opportunities | 86% | | |
| 40 | Health science professionals directed me toward learning opportunities | 86% | | |
| 41 | The health science professionals guided me in acquiring new skills | 91% | | |
| 42 | I was allowed more independence as my skills increased | 100% | | |
| 43 | I was allowed to work at my own pace | Unsure | unsure | 60% exclude |
| 44 | We were competing with each other to practice clinical skills | 50% exclude | | |
| 45 | I became more confident during this rotation | 82% | | |
| 46 | I received individual attention | 73% | | |
| 47 | My supervisors were aware of my learning outcome needs | 91% | | |
| 48 | Supervisors spent sufficient time with me | 82% | | |

| 49 | My supervisors assisted me to link theory to practice | 95.5% | | |
|----|----|----|----|----|
| 50 | Supervisors facilitated my reasoning regarding patient management | 95.5% | | |
| 51 | Supervisors applied innovative learning activities | 77% | | |
| 52 | The supervisors considered my emotional responses to clinical experiences | 77% | | |
| 53 | I am satisfied with the supervision I received | 73% | | |
| 54 | Supervisors demonstrated expert patient management skills | 91% | | |
| 55 | I was actively involved in managing patients | 86% | | |
| 56 | I managed patients under supervision | 91% | | |
| 57 | I was encouraged to ask questions regarding patient management | 100% | | |
| 58 | I was prepared theoretically for this rotation | 82% | | |
| 59 | There was a mismatch between what was taught in class and my experiences during the clinical rotation | Unsure | 94% | |
| 60 | I was evaluated on my clinical performance | 91% | | |
| 61 | I received constructive feedback on my performance | 82% | | |
| 62 | I continuously received constructive feedback on my performance | 86% | | |
| 63 | I was encouraged to reflect on my clinical experiences | 100% | | |
| 64 | My professional identity was developed | 91% | | |
| 65 | I am satisfied with my learning experience in this unit | 91% | | |
| 66 | Health science professionals were good role models | 82% | | |