

Validity and reliability of the Health Professionals' Inventory of Learning Styles (H-PILS) in a rural African context

MARIA A. PAIVA^{1*}, KYLE JOHN WILBY²

¹*Sidra Medical And Research Center, Doha, Qatar*

²*College Of Pharmacy, Qatar University, Doha, Qatar*

Abstract

Background: Knowledge and skills are obtained via a range of methods and Western educational institutions are attempting to diversify instructional techniques in order to satisfy the diverse needs of learners. The Health Professionals' Inventory of Learning Styles (H-PILS) is an instrument used to assess the learning styles of health professionals and has been validated in multiple North American contexts.

Aims: To assess the validity and reliability of the H-PILS instrument in a rural African context and characterise learning styles for pharmacy staff working at Mampong Government Hospital in Ghana.

Methods: Staff members were recruited to complete the H-PILS. Face and construct validity were assessed through investigator observations. Cronbach's alpha was used to assess reliability. Learning styles were summarised descriptively

Results: Nine staff members participated. Lack of participant understanding and misinterpretation of instrument statements impacted validity. Cronbach's alpha was -2.641. One participant was deemed an accommodator, three assimilators, four convergers, and one a diverger.

Conclusions: The learning styles of health providers in rural Ghana could not be accurately characterised, as the H-PILS instrument was not valid or reliable in this context. More extensive evaluation is warranted to determine refinements needed to overcome these findings. Further research is needed to optimise learning styles and continuing education in this setting.

Keywords: *Learning Styles, Africa, Pharmacy, Teaching, Continuing Education*

Background

It is well known that individuals demonstrate great variability in the way knowledge, skills, and attitudes are learned (Grant, 2002). As such, Western educational institutions are attempting to diversify instructional methods, in order to satisfy the diverse needs of learners (Romanelli *et al.*, 2009). The literature pertaining to learning styles is rich and generally advocates for assessing learning styles within teaching settings. By doing so, targeted approaches (example teaching styles) can be developed or adapted to ensure learning needs are being met and optimal learning outcomes achieved. This is especially true for emerging learning settings that differ from Western educational norms (Ramburuth & McCormick, 2001).

For example, the concept of learning styles is greatly relevant for design of professional development programming for health workers in rural parts of Africa. Partnerships have/are been formed between these workers by both local and international organisations to increase knowledge and skills (Hongoro & McPake, 2004). In these developing regions, individuals without formal healthcare training frequently work in patient care roles,

alongside trained professionals and perform the same functions (Arhinful, 2009). This dynamic makes the design and implementation of professional development strategies very difficult, as learner needs are unclear.

In addition to diversity in learners, instructors can be local or foreign and must be prepared to teach within culturally diverse settings (Villegas, 2002). Anecdotal evidence suggests they experience various degrees of cultural immersion depending on their role and type and/or duration of interaction with local staff. They are also commonly faced with challenges assessing the background and education level of learners and ensuring knowledge has been transferred and understood. Identifying learning styles can provide guidance for instructors to optimise the learning encounter, especially for those without formal classroom training. In order to accurately identify learning styles in this context, a reliable and valid instrument must be employed.

The Health Professionals' Inventory of Learning Styles (H-PILS) is an instrument that was originally developed to assess the learning styles of pharmacists in North American settings (Austin, 2004). In recent years,

*Correspondence: Dr. Kyle John Wilby, *Assistant Professor – Clinical Pharmacy And Practice, PO Box 2713, College of Pharmacy, Qatar University, Doha, Qatar. Tel: +974 4403 5606; Fax: +974 4403 5551. Email: kjw@qu.edu.qa*

however, the instrument was adapted and validated for assessment of all health professionals. It consists of 17 items that follow the statement, “When I’m trying to learn something new”. Subjects are required to rank each item according to a four-point scale (usually, sometimes, rarely, hardly). Each ranking is associated with one of the learning styles determined by the instrument (accommodator, assimilator, converger, diverger) and assigned a unique letter that differs for each statement. Definitions of each learning style are given in Appendix A. Briefly, Accommodators enjoy dealing with people, learning by a hands on approach, are confident, and value efficiency; Assimilators prefer working by themselves, tend to avoid situations with a lot of attention, learn from their own and others’ mistakes, and value organisation and attentiveness to detail; Convergents are focused and to the point, enjoy leadership roles and are decisive, and enjoy high-performance, high-energy, fast-paced environments; Divergers prefer unique environments, enjoy keeping others entertained, are concerned how people perceive them, have little difficulty with theoretical or complex situations but struggle with practical day to day issues (Austin, 2004). Once complete, the number of each letter is tallied and the one with the largest number determines the dominant learning style. The instrument has been used in other studies (Crawford *et al.*, 2012; Robles *et al.*, 2012; Loewen & Jelescu-Bodos, 2013; Loewen *et al.*, 2014) but no study was identified outside of the North American context.

The primary objective of this study was to assess validity and reliability of the H-PILS in a rural Ghanaian context. A secondary objective was to characterise learning styles for pharmacy staff working at Mampong Government Hospital (MGH), Ashanti Region, Ghana.

Methods

Approval for this study was granted from the Ghana Health Service (Mampong District Ethics Review Committee). Study subjects were recruited from pharmacy staff working at MGH. The site was chosen as it has partnered with a non-government organisation (NGO) that provides Western trained pharmacists and pharmacy students that lead in-service sessions and provide clinical mentorship. All staff that performed pharmacist duties were eligible to participate, including pharmacists, pharmacy technicians, and other support staff without formal healthcare training. Staff members who did not perform pharmacist duties, such as a porter, were excluded, as they did not routinely attend pharmacy staff in-service training or professional development programs. Potential study subjects were informed of the objectives and procedures of the study and informed consent was obtained. Baseline demographics, including gender and professional role, were documented.

Subjects were administered a paper-based copy of the H-PILS instrument described above (Austin, 2004). They were allowed to read through the instrument and clarify instructions and terminology in the question statements prior to completion. Once complete, dominant learning styles were determined and subjects were given a verbal and written description of matching learning style traits.

Subjects were given the opportunity to provide verbal feedback regarding the outcome of the learning style assessment. Face and construct validity were assessed using post-test feedback from subjects, as well as field notes from investigators during administration of the tool. Reliability (internal consistency) was assessed using Cronbach’s alpha for all pooled responses. Descriptive statistics were used to characterise baseline demographics and H-PILS results. All statistics were completed using SPSS®v.22.

Results

Ten pharmacy staff members were eligible for participation and nine gave consent and were included in the study. The sole eligible participant not consenting was on an extended leave during the study period. Baseline demographics are summarized in Table I. The H-PILS instrument is included in Appendix A.

Table I: Baseline demographics of study subjects

Characteristic	Number (%)
Gender	
Male	6 (66.7)
Female	3 (33.3)
Training	
Pharmacist	2 (22.2)
Pharmacy technician	3 (33.3)
No healthcare training	4 (44.4)

The face and construct validity of the H-PILS instrument in the studied context is questionable as lack of subject understanding and misinterpretation of H-PILS statements were observed by investigators. Pertinent field notes and their interpretation regarding validity analysis are presented in Table II.

When tested for internal consistency, the data produced a Cronbach’s alpha of -2.641. This was unexpected as the previous study reported positive values near 1.0 (Austin, 2004). Data was checked for errors and reanalysed but the same result was yielded. This negative value indicates internal inconsistency and negative correlation within the H-PILS instrument when administered to subjects in this setting.

Overall, one participant was deemed an accommodator, three were deemed assimilators, four were deemed convergers, and one was deemed a diverger. However, on many occasions there was no outwardly dominant learning style characterised, as demonstrated by only a one to two point difference between categories. The two formally trained pharmacists did produce scores that distinctly characterised them as assimilators. Due to the small number of participants, no inter-group statistical analysis could be performed.

Table II: Pertinent field notes and interpretation

Field Note	Implications
Great variability in baseline levels of literacy and reading comprehension	<ul style="list-style-type: none"> • Misunderstanding of statements resulting in guessing or random choice • Inability to differentiate between closely related statements • Inability to differentiate between closely related descriptors (i.e. rarely and hardly)
Local culture to avoid asking questions or clarification during group sessions	<ul style="list-style-type: none"> • Likely contributed to misunderstanding of statements and increased chance of guessing or random choice • Potential introduction of social desirability bias
Use of culturally incongruent vocabulary	<ul style="list-style-type: none"> • Words used in statements such as 'hunches' and 'under pressure' may have caused confusion • Language not relevant to local context
Unfamiliarity with modes of learning outside of traditional lecture-based settings	<ul style="list-style-type: none"> • Decreased exposure to diverse learning environments may increase misunderstanding of tool statements

Discussion

To our knowledge, this is the first study designed to assess the validity and reliability of the H-PILS tool and characterise learning styles outside North America. Pharmacy staff members were recruited with a variety of backgrounds, including those with no formal healthcare training at MGH. This strategy was utilised for two reasons. First, to investigate if the tool could be generalised outside of pharmacists in this setting, as at the time of the study, there were only three pharmacists providing services for the entire Mampong Municipality, a community of over 88,000 residents, covering a total land area of 449km² (Mampong Municipal Assembly, 2013). Secondly, even though there is legislation stating dispensaries should have a pharmacist on site during operational hours, it is not enforced, especially in rural communities where human resources are limited. It is common that pharmacy technicians or untrained staff members function as pharmacists in both hospital and community settings (Arhinful, 2009).

The validity of the instrument in this context was not established and the negative Cronbach's alpha finding suggests that not only is internal consistency of the instrument in this context very poor, but it is also demonstrating negative correlation. Participants were likely answering similar questions differently, which is congruent with the lack of dominant learning styles being identified. As such, and field notes of investigator's observations during the administration and debriefing sessions were consulted for possible explanations.

There could be many contributing factors for these findings, but the most likely is subject misunderstanding of questionnaire items. Review of field notes revealed a potential lack of understanding on multiple levels.

Although all staff spoke English, literacy and comprehension of text amongst staff was variable. The concept of learning styles was new to participants. Introducing an abstract concept is challenging and learners can over-generalise (Smith and Ragan, 2005). Learners who over-generalise do not or cannot differentiate between examples. In the case of H-PILS, subjects may not have been able to differentiate between "rarely" and "hardly," resulting in inconsistent selection throughout the assessment. Despite providing an opportunity for clarification of how to complete the instrument and vocabulary, no participant asked questions. This was common practice as staff typically did not ask questions in group settings, largely due to embarrassment of appearing ignorant. Some subjects may have thought that the assessment was an examination and selected their answers based on what they believed to be the "correct" answer, not what they would do in the described scenarios. Lastly, the vocabulary used throughout the survey may have been culturally out of context. Culture plays a significant role in the learning process (Voltz *et al.*, 2010). Some participants did not know what software or a barbecue was or what the sayings "under pressure" or "trust my hunches" meant.

The methods Austin utilised to create the original PILS tool was a "multistage development process... to optimise the integrity of the instrument," and included recruitment of study participants, focus groups to identify core constructs, development and validation of theoretical model, development and validation of instrument, field testing of instrument and revision, and reliability and validity assessment of instrument (Austin, 2004). Based on these comprehensive methods and validation in other healthcare professionals, investigators hypothesised that reliability and validity would survive cross-culture testing. Based on survey results and statistical analysis, reliability and validity in this context appears to be lacking. Due to insufficient resources including time, technology, and finances, a small sample size, and geography, face and construct validity of the tool in rural Ghana could not be assessed with the same rigour as done in North American settings.

Since we implemented the H-PILS instrument in its native form, it is unknown if modifying it to be more culturally relevant and sensitive is enough to improve reliability and face and construct validity, such as translating key words into the local language (if not the whole instrument), or if the same rigorous methods carried out by Austin (Austin, 2004) is required to ensure reliability and validity when used in cultures that differ from North America. It may also be beneficial to administer surveys to individuals independently, rather than in group settings. This may be a starting point for future studies that wish to assess learning styles in culturally diverse environments.

Most subjects were assimilators or convergers. This is consistent with findings from other studies involving pharmacists and pharmacy students; including the original article that described the development and validation by Austin (Austin, 2004). However, in this study, there was no outwardly dominant learning style

characterised, as demonstrated by only a one to two point difference between categories.

The H-PILS results are interpreted with caution due to the lack of validity and reliability of the instrument. Some may argue that they are void, but due to the lack of data in the studied setting, we feel there is value in cautiously hypothesising their implications. It would be inappropriate to make specific recommendations of appropriate teaching styles to match the identified learning styles in rural Ghana. However, the need for knowledge and skill development in these resource-limited areas cannot be denied. Some important professional development programming points were learned. Literacy in the instructional language must be assessed and confirmed. Instructors must be open to adapting their teaching styles to meet learners' needs as they are revealed, whether formally through an instrument or informally in the classroom with "blank looks". Lessons should generally include specific, measurable, attainable, relevant, timely (SMART) objectives that align with learning outcomes, a component that links new content to learners' background experience, comprehension assessment, practice and application (Voltz *et al.*, 2010). Lesson delivery is vital, ensuring appropriate content, pace, and duration, and engagement. Instructors independent of teaching experience, including volunteers, students, and healthcare professionals, can implement these suggestions.

Limitations of this study should be addressed. First, the sample size was limited to only 9 participants. However, the sample was likely representative of the target population, as few pharmacy staff members exist in this region. Secondly, due to the resource-constrained environment, much of the data analysis for face and construct validity relied on field notes of observations during the data collection process. Future studies should attempt to diversify data collection and explore qualitative research methods relating to validity assessment. Lastly, recommendations for professional development programming are largely based on anecdotal evidence or field notes of the investigators.

Characterisation of learning styles and subsequent refinement of instructional methods is important for continuing education in healthcare in rural African contexts. This study found that the use of H-PILS was not valid or reliable within the setting tested and future studies could be implemented to adapt the tool based on a more extensive evaluation. It is evident, however, that a knowledge gap exists within this learning environment and educators and researchers should be encouraged to explore further, in order to create impactful learning experiences.

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References

- Arhinful, D.K. (2009). WHO Pharmaceutical Situation Assessment – Level II – Health Facilities Survey in Ghana. Ministry of Health, Ghana (online). Available at: http://www.mohghana.org/UploadFiles/Publications/Ghana_baseline_WHO_level_II_Health_Facility_Survey_140204075637.pdf. Accessed 25th October, 2014.
- Austin, Z. (2004). Development and validation of the pharmacists' inventory of learning styles (PILS). *American Journal of Pharmacy Education*, **68**, Article 37.
- Crawford, S.Y., Alhreish, S.K. & Popovich, N.G. (2012). Comparison of learning styles of pharmacy students and faculty members. *American Journal of Pharmacy Education*, **76**, Article 192.
- Grant, J. (2002). Learning needs assessment: assessing the need. *British Medical Journal*, **324**, 156-159.
- Hongoro, C. & McPake, B. (2004). How to bridge the gap in human resources for health. *Lancet*, **364**, 16-22.
- Loewen, P.S. & Jelescu-Bodos, A. (2013). Learning styles and teaching perspectives of Canadian pharmacy practice residents and faculty preceptors. *American Journal of Pharmacy Education*, **77**, Article 163.
- Loewen, P.S., Jelescu-Bodos, A., Yeung, J. & Lau, T. (2014). The effect of transitioning from residency to pharmacy practice on learning style. *American Journal of Pharmacy Education*, **78**, Article 147.
- Mampong Municipal Assembly. (2013). The composite budget of the Mampong municipal assembly for the 2013 fiscal year. Ministry of Finance (online). Available at: <http://www.mofep.gov.gh>. Accessed 25th October, 2014.
- Ramburuth, P. & McCormick, J. (2001). Learning diversity in higher education: a comparative study of Asian international and Australian students. *Higher Education*, **42**, 333-350.
- Robles, J., Cox, C.D. & Seifert, C.F. (2012). The impact of preceptor and student learning styles on experiential performance measures. *American Journal of Pharmacy Education*, **76**, Article 128.
- Romanelli, F., Bird, E. & Ryan, M. (2009). Learning styles: a review of theory, application, and best practices. *American Journal of Pharmacy Education*, **73**, 9.
- Smith, P.L. & Ragan, T.J. (2005). *Instructional Design*. Hoboken, NJ: John Wiley & Sons.
- Villegas, A.M. (2002). Preparing culturally responsive teachers: rethinking the curriculum. *Journal of Teacher Education*, **53**, 20-32.
- Voltz, D.L., Sims, M.J. & Nelson, B. (2010). Connecting teachers, students, and standards. Association for Supervision and Curriculum Development (online). Available at: http://www.ascd.org/publications/books/109011/chapters/Introduction@_Teaching_in_Diverse_Standards-Based_Classrooms.aspx. Accessed 25th October, 2014.