Learning styles among nursing students, the implications for higher education institutions: A systematic review

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Abstract

Understanding the learning styles of nursing students has been highlighted as an area in the scholarship of teaching that needs attention. The aim of this review was to determine the common learning styles of nursing students and the appropriate teaching styles needed. A search was conducted using various databases and journals for the period from 2000 to 2013. Two reviewers independently evaluated the methodological quality of the studies reviewed. The results are presented in a narrative. The 11 articles included in the review represented four continents and were primarily descriptive studies. The review highlighted that nursing students prefer the kinaesthetic and multimodal learning styles. Kinaesthetic learners prefer live examples and lots of interaction. Interactive and real-life experiences as teaching methodologies are the preferred methods of nursing students and are seen as a holistic approach that incorporates all of their senses of seeing, feeling, smelling, hearing and sometimes tasting.

Keywords: learning styles, nursing, students, teaching, review, experiences

INTRODUCTION

Over the past decade, nurse educators have been faced with student populations from multiple generations which include the so-called baby boomers (born prior to 1964), generation X (born from1965–1979), millenials or generation Y (born 1980–2000) and generation Z (born from 2001 to present). Each generation tends to have its own values, beliefs and thus learning styles. According to Linares (1999), a decade ago the students entering the nursing profession were becoming more senior, which required the incorporation of adult learning principles into the approaches to teaching. However, according to Pardue and Morgan (2007), a new generation of

students is entering higher education institutions (HEIs) and this group is described as being technologically strong, optimistic and group oriented. This highlights the need for nurse educators to explore teaching methods to accommodate the different learning styles of the different generations of students. Educators who recognise and acknowledge these differences among students and how their learning styles differ will have the potential to influence the choice of teaching styles used and how the course will be designed and implemented.

In exploring different teaching methods for students, educators need to stay abreast of the continuous changes in health care and the various factors that play a role. Imparting knowledge to large numbers of students becomes a challenge especially with regard to the shift in educational pedagogy from teacher-centred learning to student-centred learning (de la Sablonnière, Taylor and Sadykova 2009). Increasing diversity in the classroom in HEIs in South Africa and thus in nursing classrooms also poses a challenge to nurse educators in that they must identify issues that may impact on effective teaching and ultimately learning. According to Bednarz, Schim and Doornbos (2011), one of the complexities affecting nursing education is the nature of nurses' training and education. The authors further define education as 'the process by which some known information and skills are transmitted to learners who need to get the information and who will turn that new knowledge into actions or behaviors' (Bednarz et al 2010, 3). Furthermore, the authors highlight that although the nursing profession has made great strides in nursing education, there is still a need to understand the changes required for a more diverse student body that must be taught.

Thus, understanding learning styles can be helpful to both the student and the educator (Lubawy 2003), as this can guide the learning process and present students with study techniques that can complement their style. Learning styles are defined as 'the manner in which individuals choose to or are inclined to approach a learning situation' (Cassidy 2004, 421). Health science students have distinctive learning needs and there is imperative to understand these needs in order to adapt the planning, implementing and evaluating of teaching activities (Zoghi et al 2010). In particular, nursing students face various situations during their training and they need to be adaptable. Thus, the nursing education environment must also adapt to the ever-increasing acuity of the patient, dynamic disease prevalence and the rapidly advancing technology while preparing students for complex clinical environments. Nursing educators must thus continuously strive to seek innovative new ways to prepare students with unique learning opportunities for the ever-changing clinical environment.

In education and training, educators and students enter into a teaching and learning relationship. In order for this relationship to be successful, the transfer of information between both parties needs to be optimal. Educators have a major role to play in building this relationship and one method of assisting in creating opportunities for adaptability is encouraging a better understanding of learning

styles. Several approaches to learning styles have been proposed in the literature and in any HEI; before implementing educational activities it would be helpful to understand the learning styles of those who must participate in specific activities. Among health science professions, there is a need to provide undergraduate students with learning opportunities that are representative of the real world and how the skills and knowledge are acquired may be influenced by the students' learning styles.

The question that has been asked is whether understanding learning styles has an impact on pedagogy. According to Coffield, Moseley, Hall and Ecclestone (2004) before this question can be answered, there is a need to consolidate the use of appropriate tools per discipline in order to standardise assessment. The aim of this review and synthesis of the literature was to describe the learning styles of nursing students; the tools used to assess these styles; as well as the reliability and validity of the tools in context. The impact of understanding learning styles on nursing education was discussed.

METHODS

The review was conducted in the following three stages:

In Stage 1, articles were retrieved from health science and education data bases using terms such as 'learning styles', 'undergraduate nursing students' and 'impact on teaching'. Hand-searching of reference lists and cited reference searches were also conducted. The process of searching and final inclusion is illustrated in Figure 1. The online databases Cumulative Index to Nursing and Allied Health Literature, Ebscohost including MEDLINE, Academic Search Premier, and so on were searched. Keywords and combinations of these were used to search the databases comprehensively. The keywords included 'undergraduate students', 'nursing students', 'learning styles' and 'teaching approaches'. Articles were limited to those printed in English-language journals between 2000 and March 2013. In addition, the population in the text had to be nursing students (graduate and undergraduate) with a focus on their learning styles. The reference lists of articles retrieved for inclusion in the review were hand-searched to identify other relevant articles. Once the filters were applied, the keywords 'learning styles' yielded 4 835 articles. Once the keywords 'undergraduate nursing students' were added, the number dropped to 178 articles.

During Stage 2, the titles and abstracts of the articles ($n = 178$) were reviewed to assess eligibility for inclusion in the current review using the population, issue and outcome (PIO) as a guide. Articles were identified as relevant to the review if they were descriptive studies aiming to identify the learning styles of undergraduate nursing students. The study had to include information on the validity and reliability of the assessment tools used to determine the learning styles.

During Stage 3, all retrieved articles ($n = 65$) were independently assessed for relevance and the removal of duplications. Data that was relevant to the review was

extracted and included the study design; characteristics of participants; learning styles; and implications relevant for teaching approaches. The methodological quality appraisal tool (Table 1), using an instrument adapted from Louw, Morris and Grimmer-Somers (2007) and Roman and Frantz (2013) was used to assess the identified critical appraisal tool and was verified by the second reviewer.

Table 1: Methodological quality appraisal tool

1	Sampling method: Was it representative of the population intended for the study?	
	A. Non-probability sampling (including: purposive, quota, convenience and snowball sampling)	0
	B. Probability sampling (including: simple random, systematic, stratified g, cluster, two-stage and multi-stage sampling)	1
2	Was a response rate mentioned within the study? (Respond no if response rate is below 60)	
	A. No	0
	B. Yes	1
3	Was the measurement tool used valid and reliable?	
	A. No	0
	B. Yes	1
4	Was it a primary or secondary data source?	
	A. Primary data source	1
	B. Secondary data source (survey, not designed for the purpose)	0
5	Was learning styles a variable in the study?	
	A. No	0
	B. Yes	1
6	Was the relationship / association between learning styles and nursing students explored?	
	A. No	0
	B. Yes	1
*** Scoring: Total score divide by total number of items multiply by 100		
Methodological Appraisal Score		
Bad	Satisfactory	Good
0–33%	34–66%	67–100%

Following the methodological appraisal of the 15 articles assessed in Table 2, four were excluded based on poor methodological quality. The data extracted from the studies was tabled (Table 3) and then combined into a narrative summary to make sense of the findings.
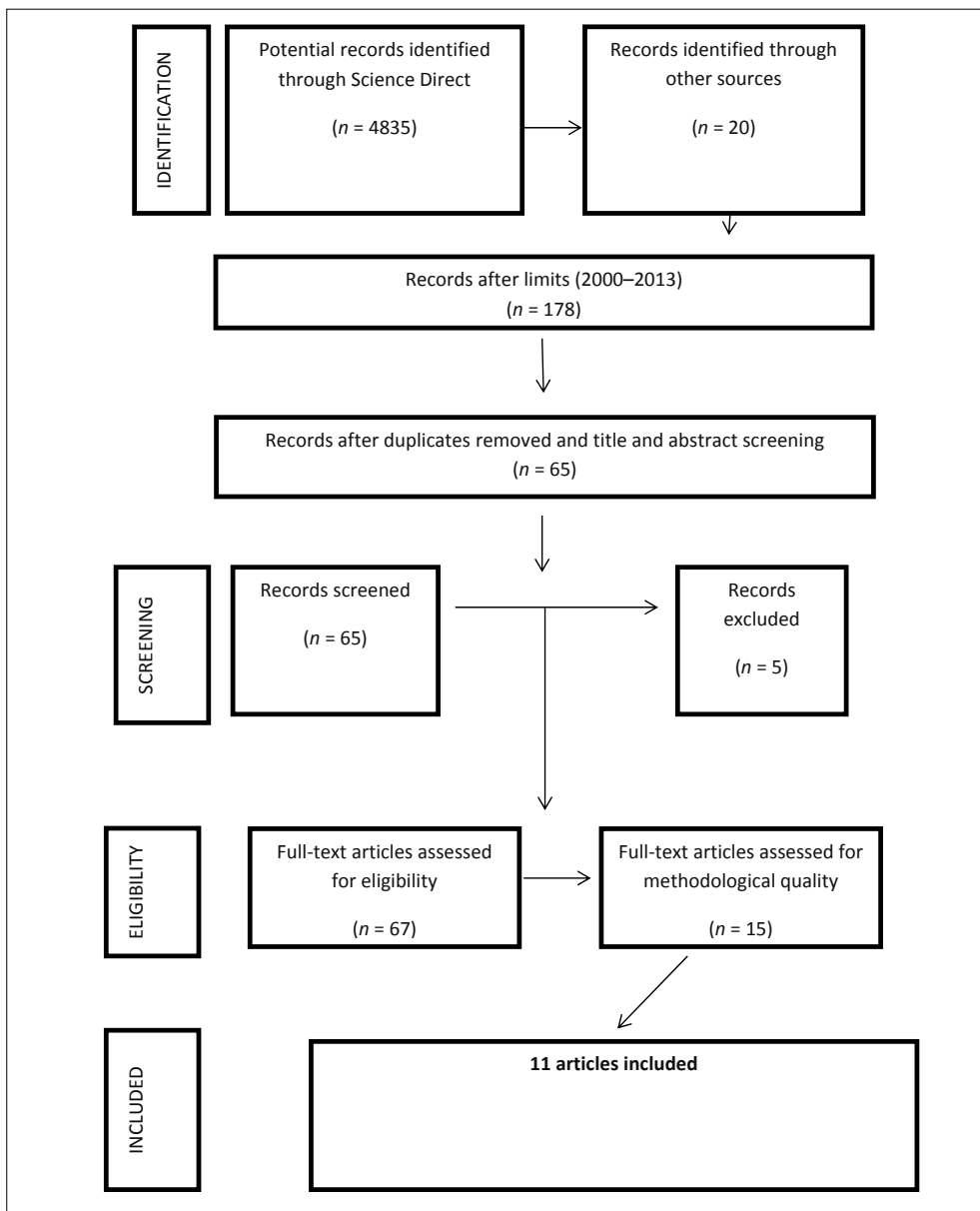
Figure 1: Screening of articles included

Table 2: Methodological appraisal

No.	Author(s)	Q1	Q2	Q3	Q4	Q5	Q6	%	Outcome
1	Abu-Moghli et al (2005)	0	1	1	1	1	1	83	Include
2	Alkhasawneh (2013)	0	1	1	1	1	1	83	Include
3	An and Yoo (2008)	0	1	1	1	1	1	83	Include
4	D'Amore et al (2012)	0	1	1	1	1	1	83	Include
5	El-Gilany and El Sayed Abusaad (2012)	0	1	1	1	1	1	83	Include
6	Fleming et al (2011)	0	0	0	1	1	1	50	Exclude
7	James et al (2011)	0	1	1	1	1	1	83	Include
8	Kock et al (2011)	0	1	1	1	1	1	83	Include
9	Kostovich et al (2007)	0	0	1	1	1	1	66	Exclude
10	Li et al (2008)	1	1	1	1	1	1	100	Include
11	Li et al (2011)	1	1	1	1	1	1	100	Include
12	Rassool and Rawaf (2007)	0	1	1	1	1	1	83	Include
13	Snelgrove (2004)	0	1	1	0	0	0	33	Exclude
14	Suliman (2006)	0	1	1	1	1	1	83	Include
15	Zhang and Lambert (2008)	0	0	1	1	1	1	66	Exclude

RESULTS

Of the final 11 studies included (Table 3), four were conducted in Asia, three in Australia, three in North Africa and one in the United States. The final one did not mention the country. The majority of the studies included in the review used convenience sampling. The common tools used to measure learning styles (Table 4) included the Visual, Aural, Read/Write and Kinesthetic (VARK) questionnaire (Alkhasawneh 2013; James et al 2011; Koch et al 2011) and the Kolb Learning Style Inventory (K-LSI) (An and Yoo 2008; D'Amore et al 2012; El-Gilany and El Sayed Abusaad 2012; Suliman 2006). The Autonomous Learner Index and Honey and Mumford's Learning Styles Questionnaire (LSQ) (Rassool and Rawaf 2007) were used once and the Myers Briggs Type Indicator (MBTI) questionnaire was used twice, but these articles shared common authors (Li, Chen and Tsai 2008; Li, Chen, Yang and Liu 2011). Understanding each questionnaire is important and this is explained in the next section.

LEARNING STYLES

The most common learning styles were determined using the VARK questionnaire, the K-LSI and the MBTI.

Table 3: Data extraction from articles

No	Author	Study Design	Population and sample size	Country	Aim	Tools	Learning styles identified	Impact for teaching
1	Abu-Moghli F et al (2005)	Descriptive	420 U/G nursing students from four Jordanian universities (226 males and 194 females) were targeted with a response rate of 62%	Israel	To determine perceptions of learning styles	Autonomous Learner Index	Independent learners	Design learning experiences that encourage co-operative learning. Match teaching styles and learning styles
2	Alkhasawneh E (2013)	Cross-sectional survey	250 nursing students were targeted with a response rate of 75% (n = 197)	Jordan, Israel	Learning preferences of nursing students	VARK questionnaire (Fleming 2008)	The kinaesthetic preference was the most dominant (45%) but with 55% having a multimodal preference	Instructors must provide different learning activities for learning to occur. Kinaesthetic learners prefer live examples and lots of interaction
3	An and Yoo (2008)	Correlational study	724 undergraduate nursing students	Korea	To determine the differences in learning styles per grade	Learning style inventory	Most of the students used diverging learning styles (43.5%) and accommodating learning styles (30.4%)	Educators should assist and motivate learners to understand by exploring ideas and thinking and by allowing students to practically apply
4	D'Amore et al (2012)	Cross-sectional survey	443 were distributed, With a 78% response rate (n = 345)	Australia	To determine learning styles of students	Kolb Learning Style Inventory (version 3.1)	The majority of the respondents were found in the diverging learning style	Educators need to be aware of the different learning styles and should aim to encourage a balanced learning style

No	Author	Study Design	Population and sample size	Country	Aim	Tools	Learning styles identified	Impact for teaching
5	El-Gilany and El Sayed Abusaad (2012)	Cross-sectional descriptive study	275 nursing students	Egypt	Determine Saudi nursing students' readiness for self-directed learning and learning styles	Kolb Learning Style Inventory (version 3.1)	The majority of the students were converges which rely primarily on the abilities of abstract conceptualisation and active experimentation	Self-directed learning was not directly associated with learning styles and thus needs to be considered when thinking of SDL
6	James et al (2011)	Cross-sectional survey	443 nursing students were targeted with a response rate of 78% (n = 334). 90% of the participants were female	Australia	Profile first-year nursing/midwifery students at two campuses of Australian Catholic University, to investigate their learning preferences and the effect demographic background has on these preferences	VARK questionnaire	The majority were multimodal with the common mode being the kinaesthetic mode of learning	The high kinaesthetic mode of learning indicates that teaching should be more hands-on with skills labs
7	Koch et al (2011)	Prospective correlational design	61 graduate nursing students studying in Australia of which 90% were female and 85% were international to Australia	Australia	To assess the impact of learning preferences on performance	VARK questionnaire in conjunction with the Perceived Academic Control Scale and English Language Acculturation Scale	The dominant learning preference was read/write followed by aural, kinaesthetic and visual. However, kinaesthetic learners were positively correlated to performance	Curriculum development should focus on incorporating practically based activities

No	Author	Study Design	Population and sample size	Country	Aim	Tools	Learning styles identified	Impact for teaching
8	Li et al (2008)	Descriptive design	425 nursing students	Taiwan	To determine the learning styles of nursing students	Myers-Briggs Type Indicator	Of this group, 12.7% were ISTJ and 10.8% were ISFJ	As nursing education aims to prepare students to care for people, understanding their learning styles could help direct the learning outcomes
9	Li et al (2011)	Descriptive and exploratory design	331 nursing students	Taiwan	To determine the relationship between learning styles and age	Myers-Briggs Type Indicator (McCauley, 1990)	Of this group, 14.5% were ISTJ	The MBTI can be used by educators to develop teaching methods that meet the needs of the students
10	Rassool and Rawaf (2007)	Survey design	136 respondents	Not clear	To determine the learning style preferences of nursing students	Honey and Mumford's (2000) Learning Style Questionnaire	The preferred learning style was reflective with a high percentage of dual learning styles	Dual learning styles have an impact on development of skills
11	Suliman (2006)	Descriptive correlational study	200 students targeted with a 65% response rate of 130 students	Saudi Arabia	To determine the relationship between learning styles and critical thinking	Kolb Learning Style Inventory in conjunction with the California Critical Thinking Disposition Inventory	This group of participants has diverges and converges. Primarily they relied more on doing in order to learn. Critical thinking in the group was low	If the learning styles of students are understood then it can be used to assist critical thinking

Table 4: Summary of tools used to measure learning styles

Authors	Tool	Aim	Reliability and Validity	Administered
Abu-Moghili et al 2005	Autonomous Learner Index	Determines independent vs dependent learning styles	Content validity was tested and reliability yielded an alpha co-efficient of 0.89	Self-administered questionnaire which takes 15 min to complete
Alkhasawneh E (2013) James et al (2011) Koch et al (2011)	VARK questionnaire	Identifies the learning preference of students. The four areas that can be identified include visual, aural, read/write and kinaesthetic	Internal consistency of this tool was found to be 0.85	Self-administered questionnaire which takes 30 min to complete
An and Yoo (2008) D'Amore (2012) El-Gilany and El Sayed Abusaad (2012) Suliman (2006)	Kolb Learning Style Inventory (K-LSI)	Focuses on the experiential learning model which highlights the involvement of the learner in the process of learning and divides them into converges, diverges, assimilators and accommodators	Internal reliability ranged from 0.76–0.85	Not indicated
Rassool and Rawaf (2007)	Honey and Mumford's Learning Styles Questionnaire (LSQ) (2000)	This model is directly derived from Kolb's theory. Identifies learners as activists, reflectors, theorists and pragmatists.	Not clear. They indicate that the authors of the questionnaire have created norms	Self-administered
Li et al (2008) Li et al (2011)	Myers Briggs Type Indicator (MBTI)	According to the MBTI there are four dichotomies which are extroversion/introversion; sensing/intuition; thinking/feeling and judging/perceiving	Reliability ranging from 0.82 to 0.98 and it has been translated into several languages	Self-administered questionnaire which takes 15–20 min

The VARK questionnaire

The VARK questionnaire provides users with a profile of their learning preferences. These preferences are about the ways in which they want to take in and give out information. From the acronym VARK, the visual learner prefers pictures and diagrams compared to the aural learner who prefers lectures and listening to the spoken word and thus does well in group discussions. The learner's preference for read/write is a desire for information displayed as words, thus these learners often prefers power point presentations as their teaching and learning modality. The kinesthetic learner prefers real experiences and will benefit from simulations.

According to James et al (2011), the majority of the learners were multimodal with the highest score for kinaesthetic learning. In the current study, age and gender did not significantly impact on the learning styles of the group. The study by Koch et al (2011) also indicated that learners had more than a single mode of learning with the most dominant being read/write and kinaesthetic being third highest. However, when compared to academic performance, the kinaesthetic learners tended to perform better. In the current study, learning style was also not related to age. In the study by Alkhasawneh (2013), the most dominant learning style overall was kinaesthetic with a larger percentage of learners being multimodal. According to year levels, however, the more senior students were kinaesthetic with the more junior students being read/write learners.

The K-LSI

The K-LSI emphasises the important role that experience plays in the learning process. The K-LSI characterises individuals into one of four learning styles, namely: a convergent learner (AC and AE); a divergent learner (CE and RO); an assimilator (AC and RO); or an accommodator (CE and AE). Kolb (2009) highlights various characteristics for the different learning styles which include: converges having the ability to practically apply ideas; diverges being more aware of meanings and values; assimilators who create theoretical ideas and like to reason inductively; and accommodators who actively engage in new experiences.

According to Sulliman (2006), active experimentation (AC and AE) was more dominant than reflection and abstractness was more dominant than concreteness. Although the study had two groups of students, the dominant style was found to be convergent. This indicated that the learners learnt more by thinking and doing. This group thus relied on seeking the best knowledge and evidence to solve problems. The study by El-Gilany and El Sayed Abusaad (2012) had similar findings which highlighted that the learners were primarily AC and AE learners thus classifying them as converges. In the study by D'Amore et al (2012), the diverger learning style was the most dominant. According to Kolb (1984), diverges have value competencies and are sensitive to people's feelings and listen with an open mind. They also tend to be more introverted and have a feeling personality type.

The MBTI

The MBTI is a theoretically based psychological instrument designed by Myers and Briggs. It can be used to measure learning preferences associated with personality types (Anderson 1998). The MBTI classifies the individual in four scales (Table 5) and is then grouped into 16 groups such as Introvert/Sensing/Thinking/Judgemental (ISTJ) or Extrovert/Intuitive/Feeling/Perceiving (ENFP).

According to Li et al (2008), the most common learning styles are ISTJ and ISFJ. Students in the ISTJ group primarily rely on sensing for purposes of perception and thinking for purposes of judgement. They focus primarily on facts and make their decisions through an impersonal analysis. The 2011 study by Li et al found similar results to the 2008 study but also highlighted that the students needed experience and facts were needed for the students to learn effectively.

THE IMPACT OF LEARNING STYLES ON TEACHING

Using the VARK questionnaire to determine learning styles it is evident that nursing students tend to learn effectively with different learning activities as they are multimodal. With the studies indicating a high prevalence of kinaesthetic learners, there is a need for more hands-on laboratory work, demonstrations and interactive simulations in order to involve all the learning senses of the group (James et al 2011). This is supported by the study of Alkhasawneh (2013) which highlighted the need for lectures that use real-life examples to stimulate the students' learning. In the study by Koch et al (2011), although read/write was the most dominant learning style, it was not a significant predictor of academic performance. However, the cohort of students assessed was not indigenous to the country where the study was conducted but was international and this could have contributed to the emphasis being placed on read/write as a learning style.

According to the K-LSI, converging learners are more self-directed learners. They have the ability to do problem solving and deductive reasoning. In comparison, the divergent learner enjoys brainstorming and small group discussions. In addition, the accommodative learner learns best from hands-on experience. As a nursing educator, understanding these different learning styles highlights the need for variation in teaching and assessment methods.

As nursing education focuses on developing the knowledge, skills and attitudes of students to provide a caring service, the use of the MBTI can assist in determining the type of students being trained and gearing educational experiences towards enhancing their goals. Accordingly, understanding the MBTI classification could contribute to assisting educators in developing clinical and classroom experiences that could enhance this. Li et al (2011) highlighted the need for educators to be aware of the students' needs for direct, hands-on experience.

DISCUSSION

The aim of the review and synthesis of the literature was to describe the learning styles of nursing students; the tools used to assess these styles; as well as the reliability and validity of the tools in context, and to discuss the impact of understanding learning styles on nursing education.

Learning styles of nursing students

Understanding the various learning preferences of students is an important indicator for educators. Based on the articles included in the review the most common learning styles are multimodal thus emphasising the need for different instructional designs and teaching as well as assessment methods. In understanding the various learning styles, the links between learners and interaction with others tend to be emphasised. According to Kolb (1984), divergent learners have valuing competencies which include being sensitive to people's feelings and to values. It also includes listening with an open mind and gathering information. According to Fountain and Alfred (2009), social learners benefit from comparing, listening, networking and interacting with others.

Tools used to determine nursing styles

There are different types of frameworks for describing students' learning styles due to the varying tools identified. Most of the tools included in the review define a learning style as some description of the student's perception, attitude and behaviour. From the current review there is little information for the use of the identified tools in the South African context and thus would indicate the need for studies in this area. Based on the ease of administering the tools, they are primarily self-administered and take on average 15–20 minutes to complete. The identified tools also assist in highlighting the need for interactive and real-life experiences as a teaching method and generally nursing students prefer a learning style that is holistic and incorporates the senses of sight, touch and hearing.

Impact of learning styles on nursing education

The review has highlighted that there is a need to place an emphasis on student learning styles and their impact on the educational process. An understanding and incorporation of learning styles in the education of health care providers could have a positive impact not only on the teaching and learning process but also on the effectiveness of interdisciplinary team interactions and the patient educational process. As the study by Christou and Dinov (2010, 11) highlighted, 'students' learning styles and attitudes towards a discipline are important confounds of their final quantitative performance'. This, in turn, highlights the need to look at students' learning styles and their attitudes as this was indicated as a clear link. In addition, a need for more practical and interactive teaching methods could also highlight a resource issue of additional lecturers per class group.

CONCLUSION

At present, the strength and extent of the evidence base for the inclusion of learning styles in the undergraduate setting is positive. Although varying tools are used to evaluate the students' learning styles, there are positive relations to understanding students' learning preferences and the teaching methods employed. However, there is limited evidence on the impact of understanding learning styles and a specific outcome such as academic performance. Thus, further research is needed to strengthen the evidence base for the understanding of learning styles and their impact on influencing changes in educational teaching methods by educators with a specific focus on the South African context. Considering the type of nursing students of today, who are mainly generation Z, it is envisaged that a study that will investigate the relationship between students' learning styles and their personalities is needed.

LIMITATIONS

All of the studies included in the review are descriptive studies describing a cohort of students and may not be generalisable; however, the information can be applied in cohorts where similar results are found.

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