# LEARNING STYLE PREFERENCES OF LOGISTICS LEARNERS

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ABSTRACT

The VARK model categorises learners as V (visual), A (aural), (R) (read/write) and K (kinaesthetic). The visual, aural, read/write and kinaesthetic (VARK) learning style preference of logistics students has previously not been assessed. For this study the learning style preferences of logistics final year Diploma students from Tshwane University of Technology were therefore determined. Eighty questionnaires were distributed with 78 being received back, (a response rate of 97.5%). Of which, two could not be used as they were not completed in full, giving 97.4 per cent of useful questionnaires (76 from 78). The dominant learning preference amongst the Logistics III students was a K (kinaesthetic) learning preference (21 out of 76, or 27.6%), followed by R (read/write) learning preference (15 out of 76, or 19.7%). VARK learning preference was third with 10 of 76 (13.2%). In the study 56.6 per cent of the learners preferred a unimodal learning experience, and 43.4 per cent of the learners preferred multimodal learning styles.

**Keywords:** learning styles, VARK, logistics, education, learning preferences, kinaesthetic

## INTRODUCTION

Learning is a lifelong process and it is frequently argued that education is key to growth in society: "Education is the most powerful weapon which you can use to change the world" (Mandela n.d.). Different learners approach learning in different ways. Kolb and Kolb (2010, 44) define learning as "the process whereby knowledge is created through the transformation of experience". In adult education, learners at colleges and universities develop study skills and acquire relevant learning methods to adjust their learning to the lesson and tutoring styles used by their lecturers; however not all students do this (Hallin 2014). No two students are the same. This applies to lecturers who may have a specific preference in teaching style too.

According to Khurshid (2015, 276) no learning styles (LS) exist in isolation, but they all "co-exist with each other" and are widely classified as intuition and sensing, which are opposite mental functions of perceiving as classified by Jung (1971) in his book Psychological Types (1971).

Lesmes-Anel et al. (2001), Felder and Brent (2005), Lujan and DiCarlo (2006), Vorhaus (2010), James, D'Amore and Thomas (2011) (as quoted by Alkhasawneh 2013) have identified

four areas that may influence a person's LS: (1) emotionality: persistence, structures (internally or externally imposed), responsibility (conformity/non-conformity) and motivation; (2) physiological characteristics: perceptual strengths; (3) immediate environment: furniture-seating designs, temperature, light, and sound; (4) sociological preferences: variety versus routine, working in a pair, working alone, working as part of a team, small group working, and working with either a collegial or an authoritative adult

In the past ten years there has been a concentration on student focused learning environments in undergraduate education (Goldsworthy et al. 2012; Herrington and Herrington 2006, as quoted in Ackland-Tilbrook and Warland 2015). In student focused learning the responsibility for their own learning is driven by the student (Taekman and Shelley 2010 as quoted in Ackland-Tilbrook and Warland 2015). According to Fleming and Mills (1992, 137) "... the literature from both psychology and education has supported the proposition that learners of all ages have different yet consistent ways of responding in learning situations".

By matching teaching strategies to LS preferences, academic success is promoted and enhances student engagement (Chang 2006; 2005; Dunn and Griggs 2000; Miller 2001; Stitt-Gohdes 2003; as quoted in Cekiso 2011). Research has shown a link between academic performance and LS at university level (Bailey, Onwuegbuzie and Daley 2000; Moeinikia and Zahed-Babelan 2010; Orhun 2012; Rasool and Rawaf 2008; Williams et al. 2013; as quoted in Gohar and Sadeghi 2015).

There are various definitions of LS. Stewart and Felicetti (1992) define LS "... as those educational conditions under which a student is most likely to learn" (as quoted in Asiry 2016, 13). According to Drago and Wagner (2004, 1) LS refers to "... the differences that exist between individuals in how they best learn". Keefe (1979, as quoted in Truong 2016, 1185) defines LS as "The composite of characteristic cognitive, affective, and physiological factors that serve as relatively stable indicators of how a learner perceives, interacts with, and responds to the learning environment". Othman and Amiruddin (2010, 652) define individual LS as a "... style or learning methods used in the process of learning".

It should be noted that "VARK styles are not a measure of personality per se, and preferred learning styles do not necessarily correspond to personal strengths" (Fleming and Baume 2006 as quoted in Gomez-Heras and McCabe 2014, 100). According to Marcy (2001) the VARK model is useful in improving the learning of students. The literature provides information on numerous LS. Coffield, Moseley, Hall and Ecclestone (2004a) identified 71 different models.

Of the many such models, the three most common are David Kolb's, Fleming's VAK/VARK model and Honey and Mumford's (Al Shaikh 2015). Fleming (2001) reports that approximately 21 per cent of the population who have completed the online VARK

questionnaire have a preference for all four styles or quad style (VARK), 9 per cent have preference for three styles or tri style (VAR, VAK, VRK or ARK), 27 per cent a preference for two styles or bi style (VA, VR, VK, AR, AK or RK) and 41 per cent a preference for one style (V, A, R or K). Assisting our learners in identifying their specific LS preference should build their confidence and they may well become capable of managing their learning (Herod 2004).

## LITERATURE REVIEW

### Proponents of LSs

Lovelace (2005) in her study concluded that responsive instruction, matched to a learner's LS, improves their attitude and achievement levels. Chiou (2008) agrees that LS also influence academic achievement. According to Rinaldi and Gurung (2008), enhancing learning by means of diverse styles can be advantageous to satisfaction and learning outcomes.

Marek (2013) mentions that research has shown that when students' LS are utilised to form their study behaviour, their confidence increases in their test taking skills and is demonstrated in their metacognition that rises (Noble et al. 2008), increased academic achievement (Chiou 2008), self-efficacy (Shannon 2008) and their method of study (Meehan-Andrews 2009; Hardigan and Cohen 2003). In addition, there are different ways to teach, and catering for the different needs of students can enhance learning (Fleming 1995).

According to Sims et al. (1989, as quoted in Gohar and Sadeghi 2015, 755), LS is a psychological construct and is an important influence of achievement in education. Stevenson and Dunn (2001, as quoted in Gohar and Sadeghi 2015, 755) argue that students perform better when their study material is according to their learning style strength. Research has demonstrated that there is a link between academic performance and LS in university (Bailey, Onwuegbuzie and Daley 2000; Moeinikia and Zahed-Babelan 2010; Orhun 2012; Rasool and Rawaf 2008; Williams et al. 2013, as quoted in Gohar and Sadeghi 2015).

One study suggests that students make use of preferred methods to "receive, process and assimilate knowledge". (Andrassy and Torma 1982; as quoted in Kim et al. 2013, 32.) Increased learning efficiency can be attained by accommodating LS in teaching methods (Laight 2004; as quoted in Kim et al. 2013, 32). It has been pointed out that "[t]here is wide recognition of the impact of students' learning styles in education in general (e.g., Entwistle 1981; Entwistle 1991; Honey and Mumford 1992; Fleming 1995; Marriott and Marriott 2003; Goldfinch and Hughes 2007)" (as quoted in Gomez-Heras and McCabe 2014, 95) and that matching teaching style to preferred LS results in improved performance and learning (Fleming 1995; as quoted in Gomez-Heras and McCabe 2014, 95).

## Criticisms of VARK and learning style

Critics of LS mention that "Knowing one's learning style does not improve learning" (Fleming and Baume 2006, 6). They (Fleming and Baume 2006) do add, though, that knowing one's LS can be advantageous if the learner takes the next step. According to Murphy et al. (2004) matching lecturing methods to a LS does not necessarily improve learning. They (Murphy et al. 2004) proceed to emphasise that the best way to learn might not be within the preferred mode.

In a study by McKee (1995) it was found that the relationship between LS and academic achievement is imperceptible. Garton et al. (1999) established that a learners' achievement has a low positive relationship with their preferred LS. Sabeh et al. (2011) mention that there was no match between teaching style of teachers and learning of students. Coffield et al. (2004b) mentions that some of the best known LS instruments are weak with poor validity and low reliability.

Sometimes there is a mismatch between teaching and LS (Felder and Silverman 1988) which leads to "unfortunate consequences" (Khurshid 2015): for instance, students become bored, pay less attention in class, their test performance is poor (Felder and Silverman 1988). According to Cekiso (2011) there is controversy with regard to teaching styles and LS (Poldrack 2009 and Stephenson 2006 as quoted in Cekiso 2011). Current debates about LS and teaching styles have led to this disagreement (Poldrack 2009; Stephenson 2006). According to Cekiso (2011), many people have criticised LS theories. Greenfield (2007 as quoted in Henry 2007) argues that from a neuroscientific viewpoint, LS is absurd.

## Previous research on VARK

Previous studies on VARK LS include Kumari (2013) who studied LS of high school learners in India in relation to their locus of control, gender and category. Kumari (2013) found significant differences and no significant differences between genders for Aural and Read/write LS and Visual and Kinaesthetic LS respectively. Allen, Swidler and Keiser (2013) subjected marketing communication students to the VARK questionnaire. A study of the reading achievement and LS of Saudi Arabian preparatory school learners was undertaken by Saadi (2012). Stevens, Kitterlin and Tanner (2012) assessed the LS of hospitality majors. In studies by Klement, Dostál and Marešová (2014) and Klement (2014), they requested education students to complete the VARK questionnaire. Ocepek, Bosnić, Ŝerbec, and Rugelj (2013) utilised the VAK questionnaire; their sample consisted of computer science, mathematics, primary teacher education, science, and art pedagogy students. A study by Nuzhat, Salem, Al

Hamdan and Ashour (2013) examined gender differences in LS of fourth and fifth year medical students, while Prithishkumar and Michael (2014) studied first year undergraduate medical students. Nursing students' LS (Alkhasawneh 2013; Alkhasawneh, Mrayyan, Docherty, Alashram and Yousef 2008; James, D'Amore and Thomas 2011; and Marek 2013) were also investigated. In research by Vasileva-Stojanovska, Malinovski, Vasileva, Jovevski and Trajkovik (2015) they assessed K12 learners by means of the VARK questionnaire. Bhattacharyya and Shariff (2014) studied foundation level students in the disciplines of electrical and electronic engineering, civil engineering, chemical engineering, information technology, mechanical engineering, petroleum engineering, business information systems, and petroleum geosciences. In a study by Kim et al. (2013), they examined surgical residents' LS while general surgery residency applicants were participants in a study by Kim and Gilbert (2015). All residents of a general surgery residency programme were examined by Kim, Gilbert and Ristig (2015) and caregivers at an asthma/allergy clinic were studied by Dinakar, Adams, Brimer and Silva (2005). The Arabic version of the VARK questionnaire was administered to undergraduate dental male students in first to fifth years to determine their preferred LS (Asiry 2016. The VAK questionnaire was used to determine the LS profile and whether gender exerts any influence on the LS of the BEd I students, specialising in Economics and Management Sciences (Cekiso 2011). Gomez-Heras and McCabe's (2014) study involved geography students whereas sports therapy students were respondents in Wright, Duncan and Savin-Baden's (2015) study.

## METHODOLOGY

This study was conducted at Tshwane University of Technology (Pretoria, South Africa) in 2015. The structured, quantitative, VARK questionnaire was administered to third (final) year National Diploma: Logistics undergraduate students. The learners could choose more than one option for identifying their preferences for multiple LS. The study was approved by the institution's Central Ethics Committee. The questionnaires were distributed during class. It would take the learners about 20 minutes to complete the questionnaire. The options selected per student were read into the VARK questionnaire website page and the results were analysed and printed out.

Eighty (80) questionnaires were distributed to one group of Logistics III learners at Tshwane University of Technology. Logistics III is a major third year National Diploma: Logistics subject. During the year in question (2015) a cohort of 203 students were split into two groups of Logistics III students. Of the 80 questionnaires distributed, two were not received back, resulting in a response rate of 98 per cent (78 out of 80). Of the 78 questionnaires returned,

two could not be used as not all the questions had been answered (a total of 76 useful questionnaires). From the VARK website (www.vark-learn.com), at least 12 of the 16 questions must be completed in order to provide an analysis response. Of the 78 respondents, 28 were male, 36 were female, while 14 provided no gender. The age distribution consisted of 56 in the 20–24 year age group, whereas 6 respondents were aged older than 25, and 16 respondents did not provide their age. Furthermore, the majority of these learners spoke a mother tongue other than English. These included Zulu, Afrikaans, Xhosa, Ndebele, Venda, Northern Sotho, Tsonga, Sotho, Tswana, and/or Swazi, with English sometimes being their second, third or fourth language. There are a number of international students as well, whose first language may be French.

Table 1 reports the gender distribution of the respondents. Thirty-six (36) (46.2%) of the respondents were female and 28 (35.9%) were male. Fourteen 14 (17.9%) of the respondents did not select any gender.

**Table 1:** Research sample structure – Gender

| Gender | Number | Percentage |
|---|---|---|
| Men | 28 | 35.9 |
| Women | 36 | 46.2 |
| No gender given | 14 | 17.9 |
| Total* | 78 | 100 |

*Total = 78, as two questionnaires were not received back.

Table 2 depicts the age distribution of the students. Fifty-six (56) (71.8%) of the respondents are aged between 20–24 years of age. Those of 25 and above years of age numbered 6 (7.7%). 16 (20.5%) of the respondents did not complete the age field.

**Table 2:** Research sample structure – age

| Age | Number | Percentage |
|---|---|---|
| 20-24 years | 56 | 71.8 |
| >25 years | 6 | 7.7 |
| No age given | 16 | 20.5 |
| Total* | 78 | 100 |

*Total = 78, as two questionnaires were not received back.

Learning approaches for the VARK LS include:

1) Visual learners prefer graphs, maps, brochures, charts, diagrams, highlighters, pictures, word pictures, flow charts, various colours and fonts, written texts and designs, and different spatial arrangements.
2) Learners who are dominantly Aural prefer to discuss topics with their teachers and other

students, explain new information to others, enter into debates/arguments, use a tape recorder, drama, music, use jokes and stories, and attend discussion groups and lectures.

3) Read/Write learners prefer lists, essays, definitions, Web pages, printed handouts, readings, reports, textbooks, manuals, written feedback, multiple choice, note taking, and bibliographies.

4) Kinaesthetic learners like trial and error, role play, field trips, doing things in order to understand them, guest lecturers, laboratories, working models, recipes, using their senses, solutions to problems, real-life examples, hands-on approaches, collections of samples, construction, and demonstrations (Hawk and Shah 2007; Fleming 2001).

## RESULTS

Figure 1 illustrates the prevalence of the different LS preferences. The predominant learning preference amongst the Logistics III students was the K (kinaesthetic) (21 out of 76, 27.6%), followed by the R (read/write) LS (15 out of 76, 19.7%). The VARK learning preference was third with 10 out of 76 (13.2%).

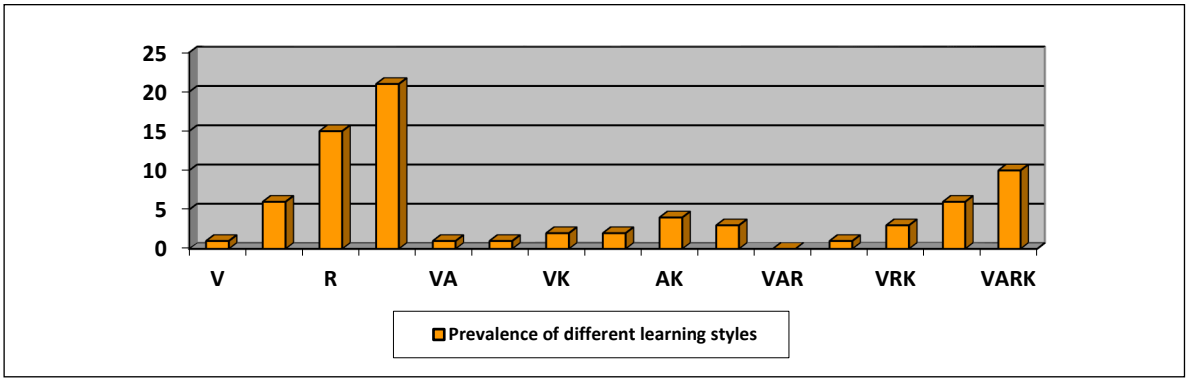


**Figure 1:** Prevalence of different learning styles

Table 3 provides the frequency and percentages of each gender categorised according to LS preference. Males were dominant in K (kinaesthetic) and tri-modal. Females were dominant in K (kinaesthetic) and R (read/write).

**Table 3:** Frequency and percentage of each gender categorised according to learning styles preference

| Gender | | Learning style preferences | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | V | A | R | K | Bi | Tri | Quad | S | M |
| Males | f | 0 | 1 | 5 | 6 | 4 | 6 | 5 | 12 | 15 |
| | % | 0 | 3.7 | 18.5 | 22.2 | 14.8 | 22.2 | 18.5 | 44.4 | 55.5 |
| Females | f | 0 | 4 | 7 | 12 | 6 | 4 | 2 | 23 | 12 |
| | % | 0 | 11.4 | 20 | 34.3 | 17.1 | 11.4 | 5.7 | 65.7 | 34.3 |

| Gender | | Learning style preferences | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | V | A | R | K | Bi | Tri | Quad | S | M |
| No gender | f | 1 | 1 | 3 | 3 | 3 | 0 | 3 | 8 | 6 |
| | % | 7.1 | 7.1 | 21.4 | 21.4 | 21.4 | 0 | 21.4 | 57.1 | 42.9 |
| Total | f | 1 | 6 | 15 | 21 | 13 | 10 | 10 | 43 | 33 |
| | % | 1.3 | 7.9 | 19.7 | 27.6 | 17.1 | 13.2 | 13.2 | 56.6 | 43.4 |

Abbreviations note: S = single style, Bi = bi style, Tri = tri style, Quad = quad style, M = multimodal style, R = read/write, A = aural, V = visual, K = kinaesthetic
Male total is 27, since one respondent did not complete the necessary number of questions. Females total is 35, as one respondent did not complete the necessary number of questions.

Table 4 records the frequency and percentages of each age group categorised according to LS preference. In the 20–24 age group the dominant mode was K (kinaesthetic) followed by bi-modal and R (read/write). For the above 25 age group the dominant styles were A (aural), R (read/write) and quad style.

**Table 4:** Frequency and percentage of each age group categorised according to learning styles preference

| Age group | | Learning style preferences | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | V | A | R | K | Bi | Tri | Quad | S | M |
| 20–24 | f | 0 | 3 | 10 | 18 | 10 | 8 | 5 | 31 | 23 |
| | % | 0 | 5.6 | 18.5 | 33.3 | 18.5 | 14.8 | 9.3 | 57.4 | 42.6 |
| >25 | f | 0 | 2 | 2 | 0 | 0 | 1 | 2 | 4 | 3 |
| | % | 0 | 28.6 | 28.6 | 0 | 0 | 14.3 | 28.6 | 57.1 | 42.9 |
| No age | f | 1 | 1 | 3 | 3 | 3 | 1 | 3 | 8 | 7 |
| | % | 6.7 | 6.7 | 20 | 20 | 20 | 6.7 | 20 | 53.3 | 46.7 |
| Total | f | 1 | 6 | 15 | 21 | 13 | 10 | 10 | 43 | 33 |
| | % | 1.3 | 7.9 | 19.7 | 27.6 | 17.1 | 13.2 | 13.2 | 56.6 | 43.4 |

Abbreviations note: S = single style, Bi = bi style, Tri = tri style, Quad = quad style, M = multimodal style, R = read/write, A = aural, V = visual, K = kinaesthetic.
Age group of 20–24 total is 54, since two respondents did not complete the necessary number of questions. Age group of >25 years total is 6. No age provided total is 16.

In the study 56.6 per cent and 43.4 per cent of the learners preferred unimodal (V, A, R or K) learning and multimodal (AR, AK, RK, VR, VA, VK, VAK, VAR, ARK, VRK, or VARK) LS respectively (Figure 2).

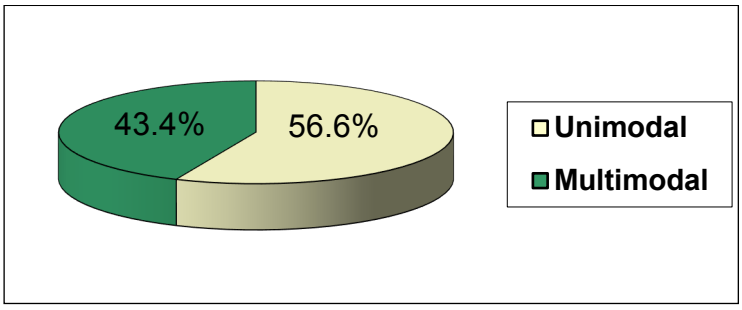


**Figure 2:** Distribution of unimodal and multimodal learning styles

Of those learners who preferred a multimodal LS, 39.4 per cent were bimodal (VA, VK, VR, AK, AR, or RK), 30.3 per cent were trimodal (ARK, VAK, VAR, or VRK) and 30.3 per cent were quadmodal (VARK) (figure 3). For multimodal learnersm the preferred style is bimodal.

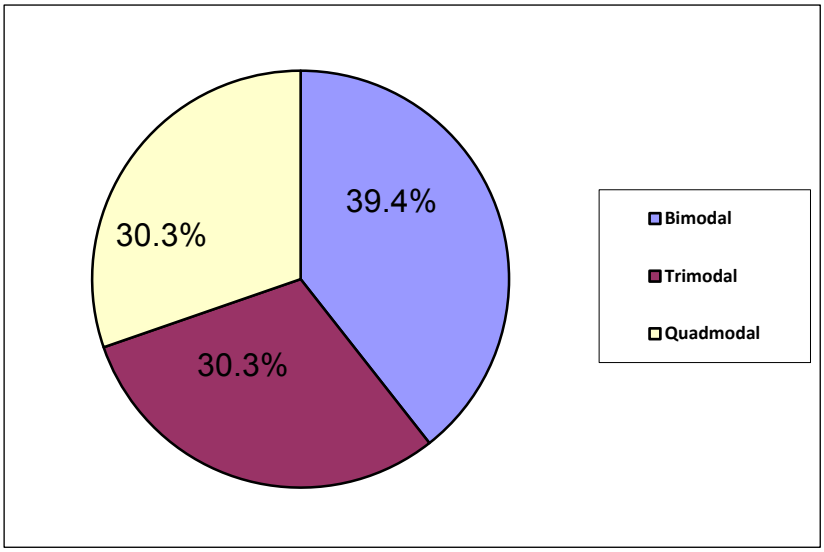


**Figure 3:** Distribution of multimodal learning styles

Of the unimodal (V, A, R or K) students, 2.33 per cent of the learners preferred V, 13.95 per cent preferred A, 34.88 per cent preferred R while 48.84 per cent of the learners preferred K (Figure 4). Therefore the kinaesthetic learning preference is the dominant among unimodal students, followed by read/write.

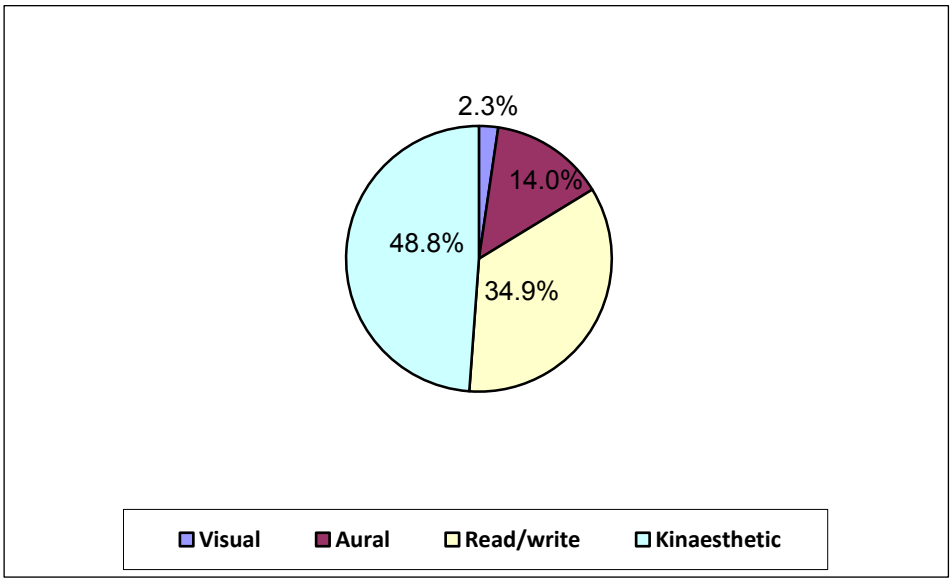


**Figure 4:** Distribution of unimodal learning styles

On further analysis the predominant learning preference of the bimodal learners was AK (30.8%), followed by RK (23.1%), VK and AR (15.4% each) and VA and VR (7.7% each) preferences (Figure 5). Amongst those learners who preferred tri-modal LS, 10 per cent were VAK, 60 per cent were ARK, and 30 per cent were VRK (Figure 6). No learners were VAR.

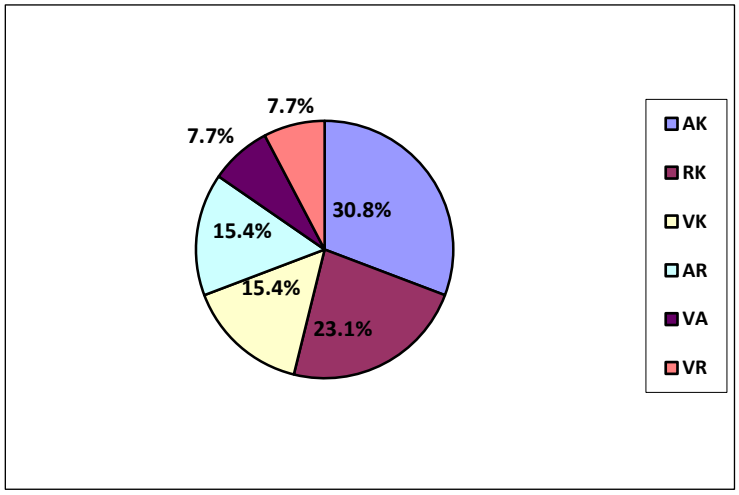


**Figure 5:** Distribution of bi-modal learning styles

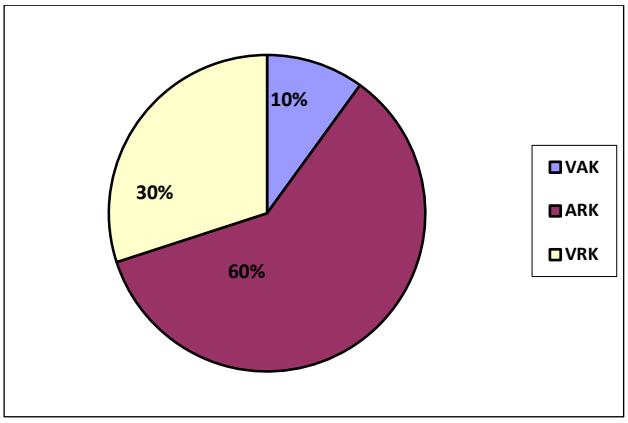


**Figure 6:** Distribution of tri-modal learning styles

In Figure 7 the student LS preferences with regards to individual learning modalities is shown. This indicates the number of learners who had each modality as a component of their overall LS preference. The sum of the students for the four modalities exceeds 78 (number of questionnaires received back) because students with multimodal preferences are counted more than once. Overall, 50 learners had a K learning preference. Only 19 had a V learning preference.

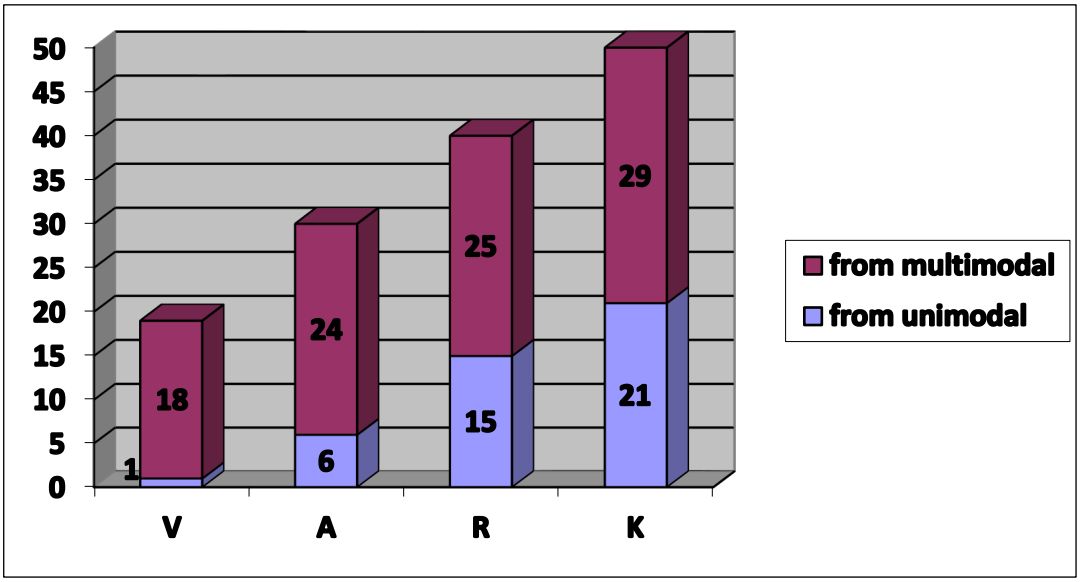


**Figure 7:** Prevalence of individual learning modalities among student learning style preference

Of the 78 questionnaires received back, 76 were useful in that the VARK website could analyse the responses. The remaining two questionnaires had insufficient boxes ticked (missing data) and could not be analysed. In Figure 8 below, the prevalence of LS modalities percentages is portrayed. Note that the total is more than 100 per cent since students with multimodal preferences are counted more than once. Sixty-six percent of the students (50 of 76) had some degree of kinaesthetic (K) learning preference, while 25 per cent (19 of 76) were visual (V) learners.

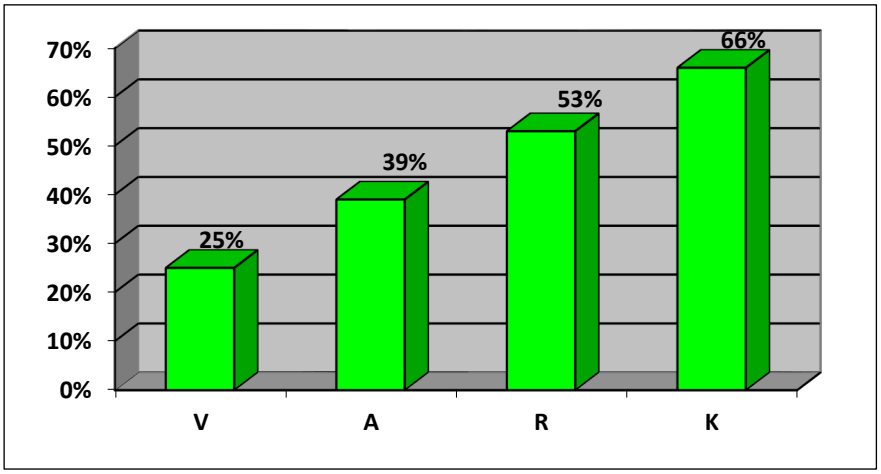


**Figure 8:** Prevalence of individual learning modalities percentages among student learning style preference

## LIMITATIONS

This study has a limitation. Firstly it was conducted at one institution involving one group of

final year Diploma: Logistics students. The participating number of students does not necessarily represent all Logistics students in South Africa; hence the results should not be generalised.

## CONCLUDING THOUGHTS AND RECOMMENDATIONS

Future research in this field could comprise employing the questionnaire with a cohort of Logistics Diploma (first, second and third year) students. Also it might include Logistics Foundation (extended programme: pre-first year) and BTech (Baccalaureus Technologiae) students and possibly postgraduate students. Further research involving many more Logistics students from various universities and at different year of study is needed. In addition, other management sciences subjects/qualifications could also be included. Furthermore, a comparative study could be carried out, requesting the students to complete the questionnaire in January, then altering the researcher's class teaching style to suit their LS preference and putting them through the questionnaire in October to see if there will be any significant differences in their LS.

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Author contribution: the author contributed to the study's conception, design, acquisition; the analysis and interpretation of the data as well as undertaking the drafting and critical revision of this article. A thank you to his students for completing the questionnaire.

## DISCLOSURE

The VARK questionnaire was used with permission. The VARK copyright is held by Neil D. Fleming, Christchurch, New Zealand. The author has no conflicts of interest related to this work.

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