SA Journal of Industrial Psychology
ISSN: (Online) 2071-0763, (Print) 0258-5200

The Adult Learner Self-Directedness Scale: Validity and reliability assessment

Authors:
Jo-Anne Botha[1]
Andries Masenge[2]

Affiliations:
[1]Department of Human Resource Management, Faculty of Economic and Management Sciences, University of South Africa, Pretoria, South Africa

[2]Department of Statistics, Faculty of Natural and Agriculture Science, University of Pretoria, Pretoria, South Africa

Corresponding author:
Jo-Anne Botha,
bothaj1@unisa.ac.za

Dates:
Received: 13 July 2021
Accepted: 30 Aug. 2022
Published: 23 Nov. 2022

How to cite this article:
Botha, J.-A., & Masenge, A. (2022). The Adult Learner Self-Directedness Scale: Validity and reliability assessment. *SA Journal of Industrial Psychology/SA Tydskrif vir Bedryfsielkunde, 48*(0), a1926. https://doi.org/10.4102/sajip.v48i0.1926

Copyright:
© 2022. The Authors. Licensee: AOSIS. This work is licensed under the Creative Commons Attribution License.

Read online:
Scan this QR code with your smart phone or mobile device to read online.

Orientation: The absence of a scale to assess the academic self-directedness of adult learners in South African open, distance and e-learning milieus.

Research purpose: This article describes the further validity and reliability assessment of the Adult Learner Self-Directedness Scale (ALSDS), which assesses adult learners' academic self-directedness in an open, distance and e-learning (ODeL) university in South Africa. An initial validity and reliability study yielded a four-factor scale with 35 items loading onto it, while this study reports on a three-factor scale with 15 items loading onto it.

Motivation for the study: Factors such as socio-economic conditions and past education practices make South African open, distance and e-learning higher education (ODeLHE) challenging for socio-economically disadvantaged students. The growing trend of online tuition and assessment in South African universities requires research into strategies that may improve a student's success and throughput. In ODeLHE, student self-directedness may contribute to academic success, and thus a reliable scale is needed to assess it. Currently, there is no such South African scale.

Research approach/design and method: A quantitative, cross-sectional research design was implemented, using self-report data from the students of the College of Economic and Management Sciences at a South African ODeL university. The ALSDS comprises three factors: success orientation for ODeLHE (self-efficacy beliefs), active academic behaviour (learner agency) and use of strategic resources (learning context management).

Main findings: The findings indicate that the ALSDS appears to be a valid, internally consistent and reliable scale suitable for assessing ODeLHE adult learners' academic self-directedness. Further research is, however, required to establish metric and scalar invariance.

Practical/managerial implications: The scale may provide a reliable starting point for developing a scale for assessing ODeLHE students' existing academic self-directedness. Knowledge of existing self-directedness capacity may be useful in designing and implementing holistic learner support programmes.

Contribution/value-add: The ALSDS may provide a reliable Afrocentric starting point for developing a measure for assessing the academic self-directedness of South African ODeLHE students.

Keywords: adult learner; self-directedness; open distance and e-learning; higher education; scale validation; Afrocentric.

Introduction

Following the coronavirus disease 2019 (COVID-19) pandemic starting in 2020 and the subsequent move to online tuition and assessment in many South African universities (Mphalala, Mkhasibe & Mncube, 2021; Mthethwa & Luthuli, 2021; Ontong & Mtonambi, 2021) to accommodate the COVID-19 lockdown restrictions, research into strategies that may improve student success and throughput is essential. Specifically, finding methods to design student-focused learning and assessment experiences and learner support programmes is vital. In open, distance and e-learning higher education (ODeLHE), student self-directedness is a significant potential resource that may contribute to success in learning and in future endeavours (Khiat, 2017). Since self-directedness is a metacognitive activity for students, it is important that it should be measurable (Khiat, 2017); thus, a reliable and valid scale is needed.

In South Africa, where so many ODeLHE students are geographically dispersed in rural areas far from their peers and lecturers, lack the necessary financial resources to fund their academic endeavours, are not necessarily sufficiently proficient in the language of teaching and lack the required academic preparedness to be successful in postsecondary education, it is imperative that the plight of such students should be considered in the development of learning materials and assessment (Subotzky & Prinsloo, 2011).

Adult learners are usually 24 years or older (Bourdeaux & Shoenack, 2016), are employed (part-time or full-time) and have family responsibilities in addition to their educational commitments (Bourdeaux & Schoenack, 2016). Open, distance and e-learning (ODeL) has been touted as the ideal solution for adult students since it provides a measure of flexibility and access to tertiary education that full-time study does not (Bourdeaux & Schoenack, 2016). However, the poor student throughput in South African ODeLHE indicates a need for further investigation into how students can be supported to achieve educational success. The development of self-directed learning is one such strategy that can be investigated, but the concept should also be investigated within the context of ODeLHE, where the usual support structures of peers and readily accessible academic guidance are not available in an asynchronous learning context. Open, distance and e-learning adult learners are expected to be autonomous and to self-regulate their learning (Bourdeaux & Schoenack, 2016), but the students' expectation and comprehension of what is required to achieve success as an autonomous student may differ from what the academic teachers expect or require. Furthermore, online learning contexts may not meet the expectations of adult learners in terms of the learning design, interactions with the academic teacher and/or clarity of communication (Bourdeaux & Schoenack, 2016). If the learning milieu and/or learning material are difficult to access, navigate or use, or if the academic teachers are unavailable, learners may become demotivated and disengage (Bourdeaux & Schoenack, 2016; Sumuer, 2018). The social frameworks and support adult learners have available may affect their capacity for self-directedness (Bourdeaux & Schoenack, 2016).

According to Furr (2011), psychometric scale development is an iterative four-step process: defining a construct and its context; deciding on the scale format and developing items; collecting data; and investigating the psychometric properties and quality of the scale in various iterations before a final scale is made available for use. The following elements of scale usefulness should be investigated, namely the scale's psychometric properties (reliability and validity) and its external validity. The Adult Learner Self-Directedness Scale (ALSDS) (Botha, 2018) is a new scale focused on assessing the academic self-directedness of adult learners in a South African ODeL tertiary education context. Furr (2011) believed that the psychological characteristics of diverse cultural groups require the investigation of scales for specific use. The social context within which individuals live and learn shape their perceptions and value system, forming the basis of their cultural identity (Etomes, 2020). In educational contexts in South Africa, students with diverse sociocultural backgrounds also may have different perspectives on important academic issues such as what learner self-directedness entails (Merriam, 2020). Furthermore, South African legislation prohibits unfair discrimination in psychological testing based on, *inter alia*, race and ethnic origin (Barnard, 2021). Daddow (2016) stated that adult learners' social context influences their learner identities, while Merriam (2020) indicated that adult learning can be better understood through studying the social context where the learning occurs, acknowledging that social contexts differ among and within countries and cultural groups; the cultural contexts that shaped learning should also be recognised. Although there are various scales for assessing adult learner self-directedness, which have been used in diverse cultural and ethnic settings, there is currently no such scale for use in the diverse, multicultural South African ODeLHE context (Botha, 2018). Existing scales are mostly based on the notions of learner self-directedness that stem from a European and North American perspective and may not consider the significance of sociocultural diversity in the South African ODeLHE context (Botha, 2018).

Literature review

Social and economic inequalities, poverty, low literacy rates, poor access to and quality of education all contribute to the struggles faced by South Africa in terms of global competitiveness (World Economic Forum, 2015). If South Africa wishes to remain globally competitive, adult learners need access to quality ODeLHE and should be successful in their postsecondary studies to contribute positively to a modern economy (Adekanmbi, 2015; Atkins et al., 2016). Therefore, learner competencies such as self-directedness that will facilitate academic success in tertiary education and nurture lifelong learning attitudes should be cultivated (Atkins et al., 2016; Prinsloo & Coetzee, 2013). Khiat (2017) found that self-directed learning did affect adult learner academic success; however, supporting evidence in the South African ODeLHE arena is lacking. The significance of ODeLHE was driven home by the COVID-19 pandemic that caused most universities in South Africa to offer only online tuition and assessment in 2020 (Naidoo & Cartwright, 2020). Consequently, nurturing adult learner self-directedness has become of strategic significance in South African higher education (Botha, 2018).

Adult learner self-directedness is a nebulous concept (Breed, 2016). For Knowles (1975), self-directed learning is the individual capacity to personally drive the whole learning process. Similarly, Guglielmino's (1977) and Mello's (2016) definitions focus on learners actively managing their learning processes. Brockett and Hiemstra (1991) indicated that the learning milieu (self-directed learning) and the personality characteristics (self-direction in learning) comprise self-directedness. Grow (1991) focused on how the learning facilitator should stimulate

learners' evolution from dependency to self-directedness, while Candy (1991) propounded self-directedness as an individual concern, including individual perceptions of capacity and willingness for autonomous learning. Garrison (1997) highlighted learner self-motivation, self-management and self-monitoring, and Zimmerman (2002) believed that self-directed learners are proactive, self-aware and reflective and can implement diverse learning strategies for goal achievement.

For Cassidy (2011), self-belief or autonomy comes before self-directedness, while Bowen (2011) believed that self-directedness is developed through individual autonomy but includes the awareness of personal responsibility to the broader community. This view was supported by Van Wyk (2017). According to Garrison (1997), the emphasis on external agentic management of the learning process (goal setting, learning strategy selection and so on) receives attention at the cost of the internal learning processes such as motivation, self-management and personal responsibility. This belief is supported by Hiemstra and Brockett (2012). The expansion of the concept of self-directedness to include intrapersonal, behavioural and contextual components contributes to the development of a comprehensive theory of adult learner self-directedness, which may be particularly significant in the ODeLHE milieu.

It may be difficult to produce an all-encompassing definition for adult learner self-directedness (Van Wyk, 2017; Zou, 2011), but three broad themes stand out: individual characteristics (self-motivation and belief and metacognitive management of individual learning behaviours and beliefs); proactive learning context regulation through learning behaviours and strategies; and learning context and materials design (Botha, 2018; Sumuer, 2018; Van Wyk, 2017). The individual characteristic of self-directedness relates to the inherent capacity of adult learners to drive their own learning independently (Du Toit-Brits & Van Zyl, 2017; Hiemstra & Brockett, 2012), while self-directed learning behaviour relates to goal-setting and self-regulating study actions by the student (Hiemstra & Brockett, 2012). The learning context and materials design include: culture, gender, race and power (Hiemstra & Brockett, 2012). These three themes make self-motivation and proactivity in South-African ODeLHE specifically compelling, since adult learners' capacity for individual agency, proactivity and self-motivation depends on their social frameworks and identities (McCray, 2016; Rienties & Tempelaar, 2013; Shogren & Wehmeyer, 2017). Individual learners' capacity for learner self-directedness may therefore be affected by their personal identity and social conditioning, as well as the design of the learning context.

There are various scales for assessing adult learner self-directedness. Guglielmino's (1977) self-directed learning readiness scale (SDLRS) has been used in various cultural contexts (Alghamdi, 2016; Boyer et al., 2014; Zhoc & Chen, 2016). The SDLRS assesses readiness for self-directed learning, not the existence of self-directedness (Alghamdi, 2016, Botha, 2018; Zhoc & Chen, 2016), and its validity and suitability for use in diverse cultures such Saudi Arabia and Eastern Europe have been contested (Alghamdi, 2016; Botha, 2018). The SDLRS has mostly been used in residential universities, on 'traditional' (between 18 and 23 years old) students, not in ODeLHE milieus with adult students (Alghamdi, 2016; Botha, 2018). The Oddi Continuing Learning Inventory (OCLI) (Oddi, 1986) assesses the personality characteristics of self-directed continuing learners involved in professional development (Zhoc & Chen, 2016). The Self-Directed Learning Scale (SDLS) (Gibson, 2006, cited in Lounsbury et al., 2009) focuses mainly on the personality traits of adolescent and adult learners and was widely used across the education spectrum in North America (Zhoc & Chen, 2016). The SDLS produced an acceptable internal consistency reliability (Cronbach's alpha coefficient = 0.79) for students from mainland China (Zhoc & Chen, 2016). The Personal Responsibility Orientation to Self-direction in Learning Scale (PRO-SDLS) (Stockdale & Brockett, 2011) was used on a homogenous sample (almost exclusively women approximately 23 years old) at a residential college in the United States of America. The diversity of the student profile in South African ODeLHE and the requirements that psychometric testing should be nondiscriminatory precluded the use of this instrument.

The Student Self-Directed Learning Questionnaire (SSDL) (De Bruin, 2008) is a South African scale used for measuring residential university students' self-directedness. The SSDL produced acceptable internal consistency reliabilities for samples of black students ($\alpha = 0.91$) and white students ($\alpha = 0.90$), and an acceptable Cronbach's alpha coefficient of 0.88 overall. The sample consisted of younger (between 18 and 22 years old) learners (De Bruin, 2008). The SSDL is a one-factor scale, raising concerns about its suitability for assessing adult learner self-directedness in ODeLHE, because of the apparently multidimensional nature of the construct. In the South African ODeLHE (mostly asynchronous) learning context, students should be more actively engaged in the learning process right from the start to achieve success (Bourdeaux & Schoenack, 2016). Specifically, part-time adult learners must balance their academic responsibilities with their other life roles, such as working and family duties, requiring specific behaviours related to self-directedness to facilitate success (Bourdeaux & Schoenack, 2016).

The open access policy of South African ODeLHE institutions may be particularly challenging for socio-economically disadvantaged students who struggle to cope with the diverse challenges explained earlier, both as adult learners and as users of online learning materials, as using technology in learning and online tuition can pose its own challenges (Bourdeaux & Schoenack, 2016; Geduld, 2013; Sumuer, 2018).

Consequently, it is possible that existing scales for assessing self-directedness may not be suitable for South African ODeLHE adult learners, and therefore the ALSDS (Botha,

2018) was developed. The ALSDS aims to assess adult learner self-directedness holistically by including the three broad themes of adult learner self-directedness (self-motivation, proactive regulation of the learning context and metacognitive management of individual learning beliefs, behaviours and strategies) (Botha, 2018).

The ALSDS was developed based on a thorough literature review of the existing theoretical foundations of learner self-directedness and Knowles' (1975) description of self-directed learning as a process autonomously managed by the students, along with the usual tuition and assessment activities ODeLHE students would be involved in during the tuition period; was used as the point of departure for item development. The person–process–context model (Hiemstra & Brockett, 2012), which focuses on considering individual learner characteristics and behaviours, the learning–teaching process and the broader environmental influences on the learning process was also consulted, as was the Garrison model (1997), which concentrates on the individual processes of self-management, self-monitoring and motivations.

Hiemstra and Brockett (2012) suggested that self-directed learning consisted of the interaction of three broad elements, namely the individual (person, including metacognition, motivational orientation, self-efficacy and resilience); the learning process (planning, organising, learning facilitation and learning skills); and the learning context (comprising the sociocultural environment, race, learning climate, culture and power). Self-directed learning is possible where these three elements interact (Hiemstra & Brockett, 2012).

Garrison's (1997) model also contains three interacting dimensions, namely self-management (how students participate in learning tasks); self-monitoring (utilising specific learning strategies and thinking about the usefulness of strategies in specific situations); and motivation (for starting the learning process, which is called entering motivation, and motivation to continue the learning, which is called task motivation). Certain scale items were constructed based on the three elements, such as 'What motivates you to study?' to assess motivational orientation; 'How do you use the study guide?' to assess learning behaviour; and 'What do you do when you find you have not received all the learning material?' to assess how students interact with the learning context.

Methodology

Development of the scale items

The items to be included were discussed, based on the theoretical models, and were verbally approved by two subject matter experts in scale development and self-directed learning (Botha, 2018). Since the study aimed to focus on identifying behaviours and thought processes congruent with self-directed learning in ODeLHE, a behaviourally anchored (or descriptively anchored) scale format was used. The scale items were formulated as questions, and a five-option behaviourally anchored response item relevant to the specific question was provided. Behaviourally anchored scales provide clear descriptions of the actual learner behaviours that ODeL students engage in. Distinct descriptions engage respondents' attention and may produce more accurate reporting; however, respondents may also pay too much attention to isolated instances of the described behaviours, negatively affecting the accuracy of responses (Rosenman et al., 2016). Questions on private matters like behaviours and motivation could be difficult to understand and prone to bias, while intricate concepts and unnecessarily long descriptions can be difficult to answer (Lakens, 2013). Effort was made to reduce questions and possible response options to short sentences. Thirty-five items were generated and presented in a mixed format to the respondents. A high score (above 140) would indicate well-developed ODeL self-directedness capacities (Botha, 2018). An example of a scale item and response is provided in Figure 1.

Initial statistical analysis produced four factors with eigenvalues > 1.5. The factors identified were: strategic utilisation of officially provided resources (five items; Cronbach's alpha 0.6); engaged academic activity (five items; Cronbach's alpha 0.6); success orientation for ODeL (11 items; Cronbach's alpha 0.77); and academically motivated behaviour (14 items; Cronbach's alpha 0.71). Strategic utilisation of official resources describes when and how adult learners interact with the official learning material provided by the institution. Engaged academic activity focuses on adult learners' deliberate, decisive study behaviours to promote their learning and academic goal achievement. Success orientation for ODeL describes adult learners' self-confidence and self-efficacy beliefs to be successful in their role as learners. Academically motivated behaviours indicate the motivational orientations of adult learners in ODeL contexts (Botha, 2018). The overall scale achieved a Cronbach's alpha of 0.91.

Research design and sample

A quantitative, cross-sectional method using self-report data was implemented. Students registered in the College of Economic and Management Sciences at a South African ODeL university comprised the population. The survey was posted to the participants after the necessary ethics permission was granted. Of these surveys, 1102 were returned, on which preliminary research was conducted, producing the four-factor ALSDS described above. A random subsample (n = 747) was drawn from the original

How many hours per week do you devote to your studies?				
1 Less than one	2 One to two	3 Two to three	4 Three to four	5 More than four

Source: Botha, J.-A. (2018). *Assessing the psychometric properties of the Adult Learner Self-Directedness Scale*. Unpublished thesis. University of South Africa

FIGURE 1: Adult Learner Self-Directedness Scale: Example of a scale item and response options.

sample (n = 1102) to conduct further validation and reliability assessment using secondary data, in an attempt to mitigate possible measurement error that may occur when secondary data gathered through a self-report instrument are used.

The sample comprised 38.3% male and 61.7% female respondents; 87.4% black African, 3.4% mixed race, 2.4% Indian and 6.9% white respondents. Their ages were 18–25 (39%); 26–30 (24.9%); 31–40 (10.2%); and over 50 (1.8%). Most participants were black (African) female students between 18 and 25 years old, with a cumulative age (88%) of 18–40.

Data analysis

Data were analysed using the Statistical Package for the Social Sciences (SPSS; IBM Corporation, Armonk, New York, United States of America) to perform exploratory factor analysis (EFA) and Statistical Analysis System (SAS) version 9.4 (SAS Institute, Cary, North Carolina, United States of America) to perform confirmatory factor analysis (CFA), where the maximum likelihood method was performed to estimate the model. Scale validation requires assessment of the scale's psychometric properties, scale reliability and validity and lastly the implications of the scale reliability and validity in terms of its usefulness as a psychometric instrument. Before scale validation assessment could commence, the data were assessed for factorability using the Kaiser–Meyer–Olkin (KMO) test for sampling adequacy and Bartlett's test for sphericity, and an EFA was performed. Next, the ALSDS common method bias and construct validity were assessed.

Common method bias is a general concern with cross-sectional studies using self-report data collection and constitutes the extent of false covariance between the variables of a scale caused by the data collection method used (Salkind, 2010). Harman's one-factor test assesses common method bias (variance), either when one factor accounts for most of the variance or when the factor analysis produces only one factor (Salkind, 2010). This test was necessary because of the possible multifaceted nature of the construct self-directedness. Thirdly, confirmatory factor analyses were run on three competing models to establish the best-fitting model. The convergent and discriminant validity of the ALSDS were then investigated. Construct validity assessment (encompassing convergent and discriminant validity) confirms that a scale does assess the supposed construct (DeVellis, 2016). Discriminant validity indicates lack of correlation between scale factors, confirming that each factor is discrete (DeVellis, 2016). The Fornell and Larcker (1981) criterion was used to conduct further analysis of the convergent validity of the ALSDS model. This criterion uses the average variance extracted (AVE) and composite reliability (CR) to establish the extent of shared variance between the latent variables in a model, designating scale construct reliability and convergent validity (Hair et al., 2014). The ALSDS discriminant validity assessment focused on establishing whether the ALSDS items related better with their respective latent variables (i.e. the respective factor) than with other latent variables (intratest validity). Exceptional construct validity necessitates proof of both the discriminant and convergent validity of a scale (Salkind, 2010). Maximum shared variance (MSV), average shared variance (ASV) and AVE assess discriminant validity. When MSV < AVE and ASV < AVE, discriminant validity is established (DeVellis, 2016). Average variance extracted specifies the amount of variance related to a specific construct compared to the amount of variance due to measurement error (Hair et al., 2014). Measurement error is the dissimilarity between the value determined through data collection and the precise value of a variable (DeVellis, 2016). Poor scale construction or administration or the individual circumstances of a respondent can contribute to measurement error (DeVellis, 2016). Average variance extracted > 0.70 is good, while AVE ≥ 0.50 is acceptable. Composite reliability assesses the total reliability of a group of heterogeneous but comparable items. Discriminant validity is indicated when ASV, MSV < AVE, construct validity is indicated when CR > AVE; AVE > 0.50. Composite reliability > 0.70 indicates good fit; for the overall assessment of convergent validity, the requirements are CR > AVE and AVE > 0.50. To further establish the intradimensional discriminant validity, the AVE was matched with the squared interconstruct correlations (SIC) related to each of the three factors. When AVE > SIC for each construct, discriminant validity can be assumed (Table 4). Correlational analyses determined the magnitude and direction of any relationship between the respective variables, further proving the absence of multicollinearity (r > 0.85) (Cohen et al., 2003). The absence of multicollinearity provides additional preliminary evidence of acceptable intradimensional convergent and discriminant validity.

In addition, the ALSDS means, standard deviations (SD), skewness, kurtosis and Pearson correlations were assessed.

Ethical considerations

Ethical clearance and permission to conduct the research (using secondary data) for the study as part of a more comprehensive research project that entailed the development of the ALSDS and preliminary factor structure (master's study – Botha, 2014 – see Figure 4.1) and the advanced assessment of the psychometric properties of the ALSDS (doctoral study) were provided by the College of Economic and Management Sciences Research Ethics Committee of University of South Africa (Unisa) as well as the Senate Research Ethics Subcommittee of Unisa. Ethical clearance to conduct this study was obtained from the University of South Africa Research Permission Sub-Committee of SRIPDC (reference number: 2016_RPSC_036).

The ethical guidelines and standards of the university as outlined in the Research Ethics Policy formed the basis on which this research study was conducted. As the research was conducted within the ambit of the ethical requirements and procedures of Unisa, the research ethics procedures of

the institution were followed strictly. Informed and voluntary consent was obtained from the participants in the original study and appropriate permission was requested from the relevant Senate Subcommittee to utilise the secondary data gathered in the initial study by Botha (2014). The data were anonymised before use, and since this study relied on secondary data, no identification of individuals was possible. At the time of gathering the data for this study, no additional ethical requirements were made for the use of secondary data. The data remain in a password-protected electronic file. An extension of the ethical clearance was provided for the period for which ethics clearance was provided in 2020 for an additional 9 years to allow thorough analysis of the data.

TABLE 1: Adult Learner Self-Directedness Scale factor loadings.

Item	Factor 1	Factor 2	Factor 3	Variance explained (%) 1–3 factors
				52%
18	0.79	-	-	-
17	0.75	-	-	-
16	0.72	-	-	-
15	0.63	-	-	-
14	0.51	-	-	-
19	0.48	-	-	-
20	0.46	-	-	-
28	-	0.61	-	-
29	-	0.60	-	-
33	-	0.47	-	-
22	-	0.41	-	-
25	-	0.33	-	-
07	-	-	0.66	-
08	-	-	0.58	-
09	-	-	0.54	-
Cronbach's alpha	0.77	0.60	0.60	-

Source: Botha, J.-A. (2018). *Assessing the psychometric properties of the Adult Leazrner Self-Directedness Scale*. Unpublished thesis. University of South Africa

Results

Three factors with eigenvalues > 1 were extracted using principal axis factoring (oblimin rotation with Kaiser normalisation) (see Table 1).

Factors 1–3 cumulatively explained 52% of the total variance, while KMO = 0.829 and Bartlett's test (Sig. = $p < 0.001$) confirmed the data's suitability for factor analysis. Fifteen items loaded on the three factors, which were: success orientation for ODeL (seven items); active academic behaviour (five items); and strategic resource utilisation (three items). Success orientation for ODeL relates to adult learners' self-beliefs in their ability to achieve success in ODeL contexts; active academic behaviour relates to the engaged and proactive behaviours of adult learners in ODeL contexts; and strategic resource utilisation relates to how and when adult learners utilise the resources provided by the ODeL institution.

The extracted sum of squared loadings (Harman's one-factor test) confirmed that Factor 1 ('success orientation for ODeLHE') accounts for only 26% of the total variance of the model. This was a vital step when considering the multidimensional nature of the construct of adult learner self-directedness. Next, the ALSDS models were assessed for fit (see Table 2a and Table 2b).

Model 1: In the one-factor model, all items of the ALSDS were loaded on one overall factor. Model 2: Items of each of the three factors were loaded on their respective factors. Model 3: All items are loading on their respective factors, and the three factors are loading on the overall construct.

Loading the items of the three factors onto a single construct in the CFA one-factor Model 1 produced a model that did

TABLE 2a: Goodness-of-fit indices: Adult Learner Self-Directedness Scale.

Models	%	Chi-squared	*df*	*p*	RSMEA	SRMR	CFI	NNI	AIC
Harman's one-factor model	26.26	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
One-factor CFA model 1	-	271.49	90	< 0.0001	0.11	0.09	0.71	0.66	781.49
Three-factor CFA model 2	-	309.40	87	< 0.0001	0.06	0.05	0.89	0.87	375.40
Three-factor CFA optimised model 3	-	175.48	81	< 0.0001	0.04	0.04	0.95	0.94	253.48
Final structural model: CFA model 4. Three factors loading onto self-directedness	-	175.48	81	< 0.0001	0.04	0.04	0.95	0.94	253.48

Source: (Acceptable model fit indices) Bentler, P.M., & Bonnet, D.G. (1980). Significance tests and goodness-of-fit in the analysis of covariance structures. *Psychological Bulletin, 88*(3), 588–606. https://doi.org/10.1037/0033-2909.88.3.588; Hair, J.F., Sarstedt, M., Hopkins, L. & Kuppelwieser, V.G. (2014). Partial least squares structural equation modeling (PLS-SEM): An emerging tool in business research. *European Business Review, 26*(2), 106–121. https://doi.org/10.1108/EBR-10-2013-0128; Schreiber, J.B., Nora, A., Stage, F.K., Barlow, E.A., & King, J. (2006). Reporting structural equation modeling and confirmatory factor analysis results: A review. *The Journal of Educational Research, 99*(6), 323–338. https://doi.org/10.3200/JOER.99.6.323-338

Note: $n = 747$; $p < 0.0001$.

df, degrees of freedom; CFI, comparative fit index; RMSEA, root mean square error of approximation; NNI, non-normed index; SRMR, Standardized Root Mean Square Residual; N/A, not applicable.

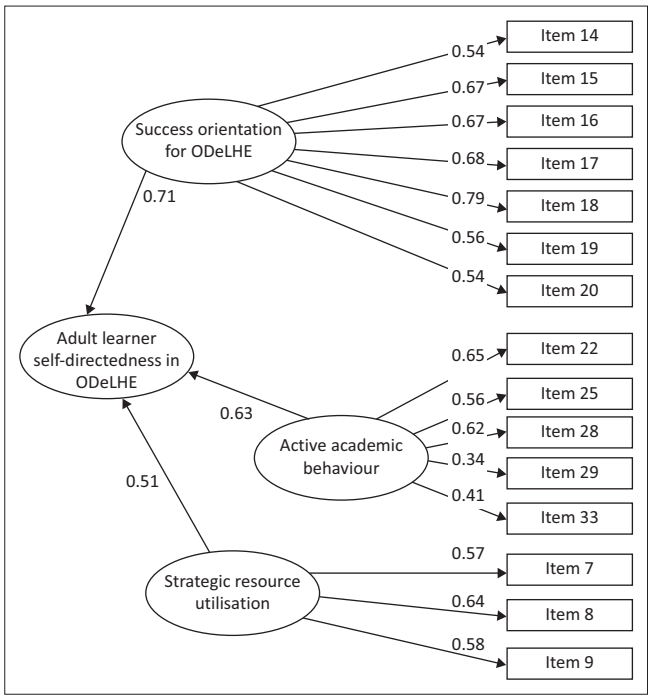
TABLE 2b: Summary statistics of the two competing models – Model 2 and Model 3.

Statistical measure	Model 2 (three-factor)	Model 3 (three-factor)	diff	*p*
Chi-square	309.4019	175.4546	133.9473	0.0000
df	87	81	6	-
AIC	375.4019	253.4846	-	-
CAIC	559.0557	470.0053	-	-
BIC	526.0557	431.0053	-	-

Source: (Acceptable model fit indices) Bentler, P.M., & Bonnet, D.G. (1980). Significance tests and goodness-of-fit in the analysis of covariance structures. *Psychological Bulletin, 88*(3), 588–606. https://doi.org/10.1037/0033-2909.88.3.588; Hair, J.F., Sarstedt, M., Hopkins, L. & Kuppelwieser, V.G. (2014). Partial least squares structural equation modeling (PLS-SEM): An emerging tool in business research. *European Business Review, 26*(2), 106–121. https://doi.org/10.1108/EBR-10-2013-0128; Schreiber, J.B., Nora, A., Stage, F.K., Barlow, E.A., & King, J. (2006). Reporting structural equation modeling and confirmatory factor analysis results: A review. *The Journal of Educational Research, 99*(6), 323–338. https://doi.org/10.3200/JOER.99.6.323-338

Note: $n = 747$; $p < 0.0001$.

df, degrees of freedom; AIC, Akaike's Information Criterion; CAIC, Consistent Akaike Information Criterion; BIC, Bayesian information criterion.



Source: Botha, J.-A. (2018). *Assessing the psychometric properties of the Adult Learner Self-Directedness Scale*. Unpublished thesis. University of South Africa

FIGURE 2: Adult Learner Self-Directedness Scale structural equation model (best-fitting model).

TABLE 3: Adult learner self-directedness scale: Standardised factor coefficients best-fitting model.

Observed variable	Latent variable	Estimate	Standard error	*t*
1. Understanding material	Success orientation for ODeLHE	0.54	0.03	16.74
2. Learning outcomes	Success orientation for ODeLHE	0.67	0.03	23.08
3. Complete qualification	Success orientation for ODeLHE	0.67	0.03	24.90
4. Able to solve problems	Success orientation for ODeLHE	0.68	0.03	26.51
5. Possess skills	Success orientation for ODeLHE	0.79	0.02	36.73
6. Information collected	Success orientation for ODeLHE	0.51	0.03	16.51
7. Studying in ODeL	Success orientation for ODeLHE	0.54	0.03	17.45
8. Struggle to understand	Active academic behaviour	0.65	0.04	15.98
9. Required assignment	Active academic behaviour	0.55	0.04	13.45
10. Why use study guide	Active academic behaviour	0.32	0.04	7.30
11. How to use study guide	Active academic behaviour	0.34	0.04	7.70
12. How to prepare for exams	Active academic behaviour	0.41	0.04	9.62
13. When to read tutorial letters	Strategic resource use	0.57	0.04	14.54
14. When to use study guide	Strategic resource use	0.64	0.04	16.11
15. Read feedback	Strategic resource use	0.58	0.04	14.68
Self-directedness	Success orientation for ODeLHE	0.71	0.07	9.59
Self-directedness	Active academic behaviour	0.63	0.07	8.72
	Strategic resource use	0.51	0.06	7.80

Source: Botha, J.-A. (2018). *Assessing the psychometric properties of the Adult Learner Self-Directedness Scale*. Unpublished thesis. University of South Africa

Note: *t*-values > 2.56 ($p \leq 0.01$); *t*-values > 1.96 ($p \leq 0.05$).

ODeLHE, open, distance and e-learning higher education; ODeL, open, distance and *e*-learning.

not fit the data well. For the one-factor CFA, the RMSEA = 0.11 (poor fit); SRMR = 0.09 (moderately good fit); CFI = 0.71 (poor fit); NNI = 0.66 (poor fit); and AIC = 781.49 (poor fit). The three-factor Model 2 fit indices indicated that overall, the model did not fit the data well. Chi-squared/*df* = 3.56 (within the range of 1–5). RMSEA = 0.06 and SRMR = 0.05, both indicating acceptable fit; CFI = 0.89 and NNI = 0.87, both indicting poor fit with AIC = 375.40. The model fit indices for the three-factor Model 3 (optimised model-modification indices were applied where additional parameters where estimated by correlating the error terms to improve the model) produced a good fit: chi-squared (175.48)/*df* (81) = 2.17; RMSEA = 0.04 and SRMR = 0.04 (good fit); CFI = 0.95 (excellent fit); and NNI = 0.94 (good fit > 0.95). The AIC = 253.48, lower than for Model 2. The Model 3 fit indices represented the best-suited model for further statistical analysis. Fit indices for Model 4 (three ALSDS factors loading onto the latent factor [self-directedness]) (see Figure 2 for the model): Chi-squared (175.48)/*df* (81) = 2.17 (good fit); RMSEA = 0.04 (good fit); SRMR = 0.04 (good fit); CFI = 0.95 (excellent fit); and NNI = 0.94 (good fit). AIC = 253.48 (lower than Model 2). See Table 3 for the standardised factor loadings of the best-fit ALSDS model. Factor loadings > 0.30 indicate average convergence; > 0.50 good convergence and > 0.70 excellent convergence, while *t*-values should be > 2.56 ($p \leq 0.01$) or $t > 1.96$ ($p \leq 0.05$) (Kelly, 2014). The estimates for all items loading on the factors indicated a convergence estimate of > 0.30 (average) to > 0.70 (excellent), indicating acceptable GFI. The significance level was set at $p \leq 01$, thus the *t*-values indicated significant loadings. Factor loadings of > 0.30 were considered acceptable. Lower loadings < 0.50 suggest that more of the variance in these subfactor indicators was due to error variance than explained variance. However, the items with lower loadings (< 0.50) were retained because the three-factor solution contained only 15 items and fewer items could negatively influence the reliability of the ALSDS. The fewer items there are on a subscale, the lower the reliability of that subscale; therefore, it is important to have a similar number of items loading onto each subscale to make an initial assessment of reliability. All loadings were significant at $p \leq 0.01$ (*t*-values > 2.56).

Estimates for all three factor loadings indicated a convergence estimate of > 0.50 to > 0.70, implying respectable convergence of the three factors onto the overall construct of self-directedness. The indicators (items) of each subfactor had an average (> 0.30) to excellent (> 0.70) convergence onto the respective subfactors. All loadings were significant at $p \leq 0.01$ (*t*-values > 2.56).

For the ALSDS, a significant standardised regression estimate (path coefficient from an indicator to its construct) of 0.30 or above shows that a variable sufficiently contributes to the construct it was intended to measure. The ALSDS items were used as indicators of each of the relevant factors and each factor as an indicator of the overall construct of self-directedness (see Figure 2).

TABLE 4: Adult Learner Self-Directedness Scale intradimensional discriminant validity using average variance extracted and squared interconstruct correlations.

Scale dimensions	CR	AVE	MSV	ASV	SIC (squared)		
					Success orientation for ODeLHE	Active academic behaviour	Strategic resource use
Success orientation for ODeLHE	0.82	0.40	0.2	0.16	-	0.20	0.13
Active academic behaviour	0.57	0.22	0.20	0.15	0.20	-	0.10
Strategic resource use	0.63	0.36	0.13	0.11	0.13	0.10	-

Source: Botha, J-A. (2018). *Assessing the psychometric properties of the Adult Learner Self-Directedness Scale*. Unpublished thesis. University of South Africa

CR, composite reliability; AVE, average variance extracted; MSV, maximum shared variance; ASV, average shared variance; SIC, squared inter-construct correlations; ODeLHE, open, distance and e-learning higher education.

TABLE 5: Adult learner self-directedness scale: Means, standard deviations, skewness, kurtosis and Pearson correlations.

Scale dimensions	Means	SD	Skewness	Kurtosis	1	2	3	Overall
Success orientation for ODeLHE	3.69	0.75	-0.4	-0.53	1	-	-	-
Active academic behaviour	3.56	0.77	-0.41	-0.41	0.27**	1	-	-
Strategic resource utilisation	4.12	0.86	-0.9	-0.17	0.26**	0.16**	1	-
Overall	3.78	0.55	-0.43	-0.44	0.71**	0.67**	0.71**	1

Source: Botha, J-A. (2018). *Assessing the psychometric properties of the Adult Learner Self-Directedness Scale*. Unpublished thesis. University of South Africa

SD, standard deviations.

**, correlation is significant at the $p = 0.000$ level (2-tailed).

The next step was to assess intradimensional discriminant validity (see Table 4).

Success orientation for ODeLHE CR = 0.82; active academic behaviour CR = 0.57; and strategic resource use CR = 0.63. The last two scale dimensions' convergent and discriminant validity requires further investigation. None of the three scale dimensions yielded AVE of > 0.50. Success orientation for ODeLHE AVE = 0.40; active academic behaviour AVE = 0.22; and strategic resource use AVE = 0.36. For all three subscales, CR > AVE but AVE < 0.50, which highlights concern about the convergent validity for the ALSDS and the need for scale refinement. Overall, the CFA path loadings and CRs support convergent validity. Table 4 provides evidence supporting discriminant validity for all three ALSDS scale dimensions. Success orientation for ODeLHE, AVE (0.40) > SIC (0.20); active academic behaviour, AVE (0.22) > SIC (0.20); and strategic resource use, AVE (0.36) > SIC (0.13). Average variance extracted > SIC for all scale dimensions, supporting discriminant validity. Comparing the scale dimensions with each other shows the following:

- success orientation for ODeLHE (AVE = 0.40); active academic behaviour (SIC = 0.20); and strategic resource use (SIC = 0.13)
- active academic behaviour (AVE = 0.22); success orientation for ODeLHE (SIC = 0.20); and strategic resource use (SIC = 0.10)
- strategic resource use (AVE = 0.36); success orientation for ODeLHE (SIC = 0.13); and active academic behaviour (SIC = 0.10).

The correlations between the factors (r) were as follows. Success orientation for ODeLHE: active academic behaviour ($r = 0.28$); strategic resource utilisation ($r = 0.37$). Active academic behaviour: strategic resource utilisation ($r = 0.19$); all < 0.80.

In Table 5, the ALSDS means, SD, skewness, kurtosis and Pearson correlations are reported.

The data were negatively skewed for all the ALSDS factors. Overall scale skewness = −0.43, with most of the data points on the higher end of the scale. The overall scale mean = 3.78 and SD = 0.55. The factor 'strategic resource use' mean = 4.12 and SD = 0.86 were the highest, and the factor 'active academic behaviour' mean = 3.56 and SD = 77 were the lowest. All correlation coefficients (r-values) were positive, confirming positive overall correlations among the ALSDS subscales ($r = 0.16$ and $r = \leq 0.71$; $p < 0.01$; small, moderate to large practical effect) and the subscales with the overall scale ($r \geq 0.67$ and $r = 0.71$; $p < 0.01$; large practical effect). The correlation results supported the assumption of convergent and discriminant validity for the ALSDS and the absence of multicollinearity in the scale ($r = 0.80$).

Discussion of results

The Harman's one-factor solution and the CFAs conducted on the three competing models confirmed the absence of common method bias, affirming that additional statistical analyses could be performed. Further analyses provided initial support of the construct validity of the ALSDS. The CFA (path coefficients per item and factor loadings), CR, AVE, MSV and ASV analyses, including the AVE-SIC and correlation analyses, indicated partial support for the assumption of the construct (convergent and discriminant) validity of the ALSDS. The low AVE indicated the need for further scale item refinement. The Pearson's correlation coefficients of all three scale dimensions supported the assumption of convergent validity, while also confirming the absence of multicollinearity between the scale items. The means, SD, skewness and kurtosis of the ALSDS (overall) data indicate that the data are not normally distributed and negatively skewed and that the kurtosis is sufficiently rounded, although high, with few outliers in the data. Negative skewness is an indication of asymmetry of the data around the mean, while the mean and median are less than the mode of the data set. Kurtosis identifies extreme measures in the tails of a data set.

The data indicate that the ALSDS items covary and may provide a suitable starting point for developing a valid, internally consistent and reliable scale for assessing adult learners' self-directedness in South African ODeLHE. Further investigation of the metric and scalar invariance with respect to race is required, specifically focusing on improving the reliabilities of the factors 'active academic behaviour' and 'strategic resource use' to improve the overall scale reliability.

Self-efficacy beliefs (success orientation in ODeLHE) are apparently significant in the South African adult learners' view of self-directedness, while time-sensitive study activities (items 13 and 14) appear to be noteworthy, but apparently the planning of studies and study time (possibly goal setting) are not important in this context. Items related to comprehension of the learning material and dealing with difficulties while studying appear to be unimportant, which denotes a need for further research, since self-directed students should be able to identify their own lack of comprehension and implement strategies to improve it (Du Toit-Brits, 2020).

The ALSDS may be a good starting point to explore the development of a useful scale for assessing adult ODeLHE learners' academic self-directedness, but it needs to be improved to include more items so that further validation studies can be completed. The ALSDS is not currently a better scale than existing ones, but may indicate that the notion of adult learner self-directedness in South African ODeLHE students differs from what is currently accepted, because of the lack of items related to planning, goal-setting and time management, all of which are important in self-directedness.

In ODeLHE, the students should take the initiative to interact, particularly where difficulties arise, but according to the results reported this may not happen, either because the students cannot identify their own difficulties or because the institution does not provide enough opportunities for successful interaction, which may indicate a need for revised design of ODeL offerings and possibly revised student support programmes that focus on assisting students to develop their own voice in the academic context. Open, distance and e-learning learning materials should create opportunities for interaction to nurture self-directedness.

Furthermore, time management, information literacy, monitoring their own learning and using problem-solving arrangements are key competencies for adult learners (Khiat, 2015). If these elements are absent in the South African ODeLHE learners, care should be taken to provide specialised support to students and development to academic learning material developers so that self-directedness can be fully developed via the learning material and assessment strategies. The information gathered through the ALSDS is Afrocentric, enabling academic educators to focus on developing aspects of self-directedness that may be unique to South African ODeLHE.

Limitations of the study and recommendations for future research

Cross-sectional studies, self-report methods and the use of secondary data limit the findings of the study to the sample (Salkind, 2010). The sample size (n = 747) was sufficient for analysis of the ALSDS validity and reliability, but the sample was limited to adult learners in ODeLHE. Additional research involving adult learners from various populations and diverse higher education contexts is recommended and would facilitate more meaningful intergroup comparisons. Meaningful intergroup comparisons are important in a country with a diverse population where it is important to avoid discriminatory practices in the assessment of a construct such as adult learner academic self-directedness. The factors of the current version of the ALSDS exclude important elements of self-directedness in academic contexts such as time management, necessitating further research to refine the scale to comprehensively assess adult learner self-directedness in South African ODeLHE.

Acknowledgements

Competing interests

The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

Authors' contributions

J.B. was responsible for the conceptualisation, methodology, funding acquisition and writing the original draft of the article. A.M. contributed to the methodology, formal analysis and software, as well as reviewing and editing the article. Both J.B. and A.M. contributed equally to the completion of the article.

Funding information

This research is based on a DCom postgraduate study conducted by the author J.-A. Botha, in 2018 at the University of South Africa that was funded through an internal bursary by University of South Africa (Unisa) for postgraduate studies by academic employees.

Data availability

This data is not available in the public domain since it concerns information on Unisa students. The ethics clearance for the study was provided on condition that data remains protected.

Disclaimer

The views and opinions expressed in this article are those of the authors and do not necessarily reflect the official policy or position of any affiliated agency of the authors and the publisher.

References

Adekanmbi, G. (2015). Tackling inequalities through tertiary distance education in sub-Saharan Africa: A general overview. *International Journal of Continuing Education and Lifelong Learning, 8*(1), 1–23. Retrieved from http://www.acdeafrica.org/international-journal-continuing-education-and-lifelong-learning-ijcell

Alghamdi, F.M.A. (2016). Self-directed learning in preparatory-year university students: Comparing successful and less-successful English language learners. *English Language Teaching, 9*(7), 59–69. https://doi.org/10.5539/elt.v9n7p59

Atkins, S., Yan, W., Meragia, E., Mahomed, H., Rosales-Klintz, S., Skinner, D., & Zwarenstein, M. (2016). Student experiences of participating in five collaborative blended learning courses in Africa and Asia: A survey for the ARCADE consortium. *Global Health Action, 2016*(9), 8145. https://doi.org/10.3402/gha.v9.28145

Barnard, A. (2021). Psychological assessment: Predictors of human behaviour. In M. Coetzee, E. Botha, & L. De Beer (Eds.), *Personnel psychology an applied perspective* (3rd ed., pp. 159–200). Oxford University Press.

Bentler, P.M., & Bonnet, D.G. (1980). Significance tests and goodness-of-fit in the analysis of covariance structures. *Psychological Bulletin, 88*(3), 588–606. https://doi.org/10.1037/0033-2909.88.3.588

Botha, J. (2014). The relationship between adult learner self-directedness and employability attributes: An open-distance learning perspective. Unpublished dissertation. University of South Africa.

Botha, J.-A. (2018). *Assessing the psychometric properties of the adult learner self-directedness scale*. Unpublished thesis. University of South Africa.

Bourdeaux, R., & Schoenack, L. (2016). Adult student expectations and experiences in an online learning environment. *Journal of Continuing Higher Education, 64*(3), 152–161. https://doi.org/10.1080/07377363.2016.1229072

Bowen, T. (2011). Examining undergraduate student learning journals for indicators of developing autonomy and professional capacity in an internship course. *Higher Education Research & Development, 30*(4), 463–475. https://doi.org/10.1080/07294360.2010.527927

Boyer, S.L., Edmondson, D.R., Artis, A.B., & Fleming, D. (2014). Self-directed learning: A tool for lifelong learning. *Journal of Marketing Education, 36*(1), 20–32. https://doi.org/10.1177/0273475313494010

Breed, B. (2016). Exploring a cooperative learning approach to improve self-directed learning in higher education. *Journal for New Generation Sciences, 14*(3), 1–21.

Brockett, R.G., & Hiemstra, R. (1991). *Self-direction in adult learning: Perspectives on theory, research, and practice*. Routledge.

Candy, P.C. (1991). *Self-direction for lifelong learning*. Jossey-Bass.

Cassidy, S. (2011). Self-regulated learning in higher education: Identifying key component processes. *Studies in Higher Education, 36*(8), 989–1000. https://doi.org/10.1080/03075079.2010.503269

Cohen, J., Cohen, P., West, S.G., & Aiken, L.S. (2003). *Applied multiple regression/correlation analysis for the behavioral sciences* (3rd ed.). Erlbaum.

Daddow, A. (2016). Curricula and pedagogic potentials when educating diverse students in higher education: Students' funds of knowledge as a bridge to disciplinary learning. *Teaching in Higher Education, 21*(7), 741–758. https://doi.org/10.1080/13562517.2016.1183619

De Bruin, K. (2008). *Assessing self-directedness in learning: A cross-cultural study among South African students.* Poster session presented at the 19th International Congress of Cross-Cultural Psychology, Bremen.

DeVellis, R.F. (2016). *Scale development: Theory and application* (4th ed.). Sage.

Du Toit-Brits, C. (2020). Unleashing the power of self-directed learning: Criteria for structuring self-directed learning within the learning environments of higher education institutions. *Africa Education Review, 17*(2), 20–32. https://doi.org/10.1080/18146627.2018.1494507

Du Toit-Brits, C. & Van Zyl, C. (2017). Self-directed learning characteristics: making learning personal, empowering and successful. *Africa Education Review, 14*(3–4), 122–141. https://doi.org/10.1080/18146627.2016.1267576

Etomes, S.E. (2020). Leadership approach to cultural diversity: Need for a productive administration in the University of Buea, Cameroon. *Journal of African Education, 1*(1), 65–98. https://doi.org/10.31920/2633-2930/2020/S1n1a4

Fornell, C.G. & Larcker, D.F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research, 18*(1), 39–50. https://doi.org/10.1177/002224378101800104

Furr, R.M. (2011). *Scale construction and psychometrics for social and personality psychology*. Sage.

Garrison, D.R. (1997). Self-directed learning: Toward a comprehensive model. *Adult Education Quarterly, 48*(1), 18–33. https://doi.org/10.1177/074171369704800103

Geduld, B. (2013). Students' experiences of demands and challenges in open distance education: A South African case. *Progressio, 35*(2), 102–125.

Grow, G.O. (1991). Teaching learners to be self-directed. *Adult Education Quarterly, 41*(3), 125–149. https://doi.org/10.1177/0001848191041003001

Guglielmino, L.M. (1977). *Development of the self-directed learning readiness scale*. Doctoral thesis. University of Georgia.

Hair, J.F., Sarstedt, M., Hopkins, L. & Kuppelwieser, V.G. (2014). Partial least squares structural equation modeling (PLS-SEM): An emerging tool in business research. *European Business Review, 26*(2), 106–121. https://doi.org/10.1108/EBR-10-2013-0128

Hiemstra, R. & Brockett, R.G. (2012). Reframing the meaning of self-directed learning: An updated model. In *Proceedings of the Adult Education Research Conference* (pp. 154–161). Saratoga Springs.

Kelly, H. (2014). A path analysis of educator perceptions of open educational resources using the technology acceptance model. *International Review of Open and Distributed Learning, 15*(2), 26–42. https://doi.org/10.19173/irrodl.v15i2.1715

Khiat, H. (2015). Measuring self-directed learning: a diagnostic tool for adult learners. *Journal of University Teaching & Learning Practice, 12*(2), 19. https://doi.org/10.53761/1.12.2.2

Khiat, H. (2017). Academic performance and the practice of self-directed learning: The adult student perspective. *Journal of Further and Higher Education, 4*(1), 44–59. https://doi.org/10.1080/0309877X.2015.1062849

Knowles, M. (1975). *Self-directed learning: A guide for learners and teachers*. Cambridge Adult Education.

Lakens, D. (2013). Calculating and reporting effect sizes to facilitate cumulative science: A practical primer for *t*-tests and ANOVAs. *Frontiers in Psychology, 4*, 863. https://doi.org/10.3389/fpsyg.2013.00863

Lounsbury, J.W., Levy, J.J., Park, S.H., Gibson, L.W., & Smith, R. (2009). An investigation of the construct validity of the personality trait of self-directed learning. *Learning and Individual Differences, 19*(4), 411–418. https://doi.org/10.1016/j.lindif.2009.03.001

Maphalala, M.C., Mkhasibe, R.G., & Mncube, D.W. (2021). Online Learning as a Catalyst for Self-directed Learning in Universities during the COVID-19 Pandemic. *Research in Social Sciences and Technology, 6*(2), 233–248. https://doi.org/10.46303/ressat.2021.25

McCray, K.H. (2016). Gallery educators as adult learners: The active application of adult learning theory. *Journal of Museum Education, 41*(1), 10–21. https://doi.org/10.1080/10598650.2015.1126058

Mello, L.V. (2016). Fostering postgraduate student engagement: Online resources supporting self-directed learning in a diverse cohort. *Research in Learning Technology, 24*, 29366. https://doi.org/10.3402/rlt.v24.29366

Merriam, S.B. (2020). *Learning in adulthood: A comprehensive guide*. John Wiley & Sons.

Mthethwa, R.M. & Luthuli, C. (2021). The Impact of COVID-19 Pandemic on Teaching and Learning at Tertiary Institutions. Opportunities and Challenges. *African Journal of Public Affairs, 12*(3), 91–103.

Naidoo, P., & Cartwright, D. (2020). Where to from here? Contemplating the impact of COVID-19 on South African students and student counselling services in higher education. *Journal of College Student Psychotherapy*. https://doi.org/10.1080/87568225.2020.1842279

Oddi, L.F. (1986). Development and validation of an instrument to identify self-directed continuing learners. *Adult Education Quarterly, 36*(2), 97–107. https://doi.org/10.1177/0001848186036002004

Ontong, J.M., & Mbonambi, S. (2021). An exploratory study of first-year accounting students' perceptions on the socio-economic challenges of the transition to emergency remote teaching at a residential university. *South African Journal of Higher Education, 35*(5), 256–276. https://doi.org/10.20853/35-5-4174

Prinsloo, P. & Coetzee, M. (2013). Initiating the debate: Perspectives on teaching, learning and assessment in ODL contexts. *South African Journal of Higher Education, 27*(6), 1355–1365.

Rienties, B. & Tempelaar, D. (2013). The role of cultural dimensions of international and Dutch students on academic and social integration and academic performance in the Netherlands. *International Journal of Intercultural Relations, 37*(2), 188–201. https://doi.org/10.1016/j.ijintrel.2012.11.004

Rosenman, E.D., Branzetti, J.B., & Fernandez, R. (2016). Assessing team leadership in emergency medicine: The milestones and beyond. *Journal of Graduate Medical Education, 8*(3), 332–340. https://doi.org/10.4300/JGME-D-15-00400.1

Salkind, J. (Ed.). (2010). *Encyclopedia of research design.* Sage.

SAS. (2013). *SAS software version 9.4 of the SAS system for windows*. SAS Institute.

Schreiber, J.B., Nora, A., Stage, F.K., Barlow, E.A., & King, J. (2006). Reporting structural equation modeling and confirmatory factor analysis results: A review. *The Journal of Educational Research, 99*(6), 323–338. https://doi.org/10.3200/JOER.99.6.323-338

Shogren, K.A., & Wehmeyer, M.L. (2017). Culture and self-determination. In M. Wehmeyer, K. Shogren, T. Little, & S. Lopez (Eds.), *Development of self-determination through the life course* (pp. 159–168). Springer.

Stockdale, S.L., & Brockett, R.G. (2011). Development of the PRO-SDLS: A measure of self- direction in learning based on the personal responsibility orientation model. *Adult Education Quarterly, 61*(2), 161–180. https://doi.org/10.1177/0741713610380447

Subotzky, G., & Prinsloo, P. (2011). Turning the tide: A socio-critical model and framework for improving student success in open distance learning at the University of South Africa. *Distance Education, 21*(2), 177–193. https://doi.org/10.1080/01587919.2011.584846

Sumuer, E. (2018). Factors related to college students' self-directed learning with technology. *Australasian Journal of Educational Technology, 34*(4), 29–43. https://doi.org/10.14742/ajet.3142

Van Wyk, M.M. (2017). Exploring student teachers' views on e-Portfolios as an empowering tool to enhance self-directed learning in an online teacher education course. *Australian Journal of Teacher Education, 42*(6), 1–21. https://doi.org/10.14221/ajte.2017v42n6.1

World Economic Forum. (2015). *The Africa competitiveness report: 2015*. World Economic Forum.

Zhoc, K.C.H., & Chen, G. (2016). Reliability and validity evidence for the self-directed learning scale (SDLS). *Learning and Individual Differences, 49*, 245–250. https://doi.org/10.1016/j.lindif.2016.06.013

Zimmerman, B.J. (2002). Becoming a self-regulated learner: An overview. *Theory Into Practice, 41*(2), 64–70. https://doi.org/10.1207/s15430421tip4102_2

Zou, X. (2011). What happens in different contexts and how to do learner autonomy better? *Teacher Development, 15*(4), 421–433. https://doi.org/10.1080/13664530.2011.635268