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An adult learner's learning style should inform but not limit educational choices

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Abstract Adult learners are attracted to learning opportunities (e.g. course offers) which seem promising in terms of allowing them to match their choices to their own perceived predispositions. To find out more about their personal learning style, some adult learners may fill in a questionnaire designed by researchers who aim (and claim) to enable both course providers and learners to optimise learning outcomes. The evaluation of these questionnaires measures learning styles using indicators developed for this purpose, but the results are not conclusive and their utility is therefore questionable. This narrative review critically examines some of the research which explores the usefulness of considering students' learning styles in adult education. The authors present a discussion – which remains hypothetical – on why the use of learning styles measures continues to be popular despite the absence of rigorous research findings to support this practice. Factors discussed by the authors include *confirmation bias* (making choices which confirm our prejudices) and *user qualification* (limiting availability to trained users, e.g. psychologists) as well as limited resources and skills in evaluating research, paired with educators' quest to implement evidence-focused techniques. The authors conclude that while learning styles assessments *can* be useful for the purpose of reflection on strengths and weaknesses, they should play a limited role in educational choices.

Keywords Learning styles · Adult education · Evidence-based education · Experiential learning

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Résumé Le style d'apprentissage d'un adulte doit éclairer et non pas limiter ses choix éducatifs – Les apprenants adultes sont attirés par les opportunités d'apprentissage (par exemple les cours proposés) qui leur semblent prometteuses en ce qu'elles leur permettent de faire correspondre leur choix à leurs prédispositions ressenties. Pour en savoir davantage sur le style d'apprentissage individuel, les adultes sont parfois invités à remplir un questionnaire conçu par des chercheurs qui entendent (et prétendent) permettre à la fois aux prestataires et aux apprenants d'optimiser les résultats d'apprentissage. Le traitement de ces questionnaires évalue les styles d'apprentissage au moyen d'indicateurs élaborés dans ce but, mais les résultats ne sont pas concluants et leur utilité est par conséquent contestable. Le présent examen narratif jette un regard critique sur plusieurs études qui examinent l'utilité d'explorer les styles d'apprentissage dans l'éducation et la formation des adultes. Les auteurs soumettent une analyse – qui demeure hypothétique – sur les raisons pour lesquelles l'évaluation des styles d'apprentissage continue à être répandue, malgré l'absence de résultats scientifiques rigoureux à la base de cette pratique. Parmi les facteurs analysés figurent le *préjugé de confirmation* (faire des choix qui confirment nos préjugés) et la *qualification de l'utilisateur* (accès limité à des utilisateurs qualifiés, par exemple des psychologues), en outre l'insuffisance de ressources et de compétences pour évaluer la recherche, associée à la demande des éducateurs d'appliquer des techniques axées sur des données probantes. Les auteures concluent que si l'évaluation des styles d'apprentissage *peut* être utile dans l'optique d'une réflexion sur les forces et les faiblesses, elle devrait jouer un rôle limité dans les choix éducatifs.

Introduction

Education is an investment in a person's future self (Gough 2010), and the learning process is most effective if the learner is able to undertake it with a sense of achievement. While younger learners (below the age of 25) have been found to prefer supervision and guidance (Ausburn 2002), adult learners have been shown to prefer to engage in learning that offers opportunity for self-direction and "freedom", or a sense of control over aspects of learning (ibid.). Sarah Cornelius et al. (2011) posit that there is a need to ensure that adult learning environments allow "for flexible approaches that can accommodate individual learner characteristics, preferences, motivations and goals" (ibid., p. 381). In other words, adults are attracted to learning opportunities (e.g. course offers) which seem promising in terms of allowing them to match their choices to their own perceived predispositions, and thus to stay in charge of their own "investment".

Research into how students learn is vast and fragmented. One of the likely reasons for this is the sheer multitude of different models of students' learning styles and approaches to learning[1] which meanwhile exist – their number has grown to more than 70 (Coffield et al. 2004). Recently, research reignited in the area of

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[1] While the terms are often used interchangeably, there is in fact a difference between learning styles and approaches to learning. Briefly, a learning *style* is our preference for how we like to experience learning,

learning approaches traditionally described as *deep, surface* and *strategic* (Entwistle and Ramsden 1983).[2] Studies are particularly interested in understanding how learning approaches influence concepts such as positive learner experience (Mirghani et al. 2004), exam performance (Feeley and Biggerstaff 2015), curriculum design (English et al. 2004) and learner transition into higher education (Moran et al. 2006, p. 14). It appears, however, that the research findings on how students learn – based on their approaches and/or styles – have limited clarity and therefore limited utility. While the concepts outlined above are relevant to all learners, further work has also highlighted that adults learn differently from younger learners (see Ausburn 2002). Classical theorists such as Stephen Brookfield (1986), Malcolm Knowles (1975, 1980) and Jack Mezirow (1991) suggest that we need to think about and address adult learners in a different way to how we consider their younger counterparts. One area of attention that has been suggested by these researchers is that of *choice*, specifically, *wanting* to learn – rather than *needing* to learn, which is a situation more commonly associated with adult learners. Choice may also allow for adult learners to take a wider range of factors into consideration when making decisions about programme or course selection; and personal approaches to learning or inherent learning style may be one of those factors.

In their aim to enable both programme or course providers and learners themselves to optimise learning outcomes, researchers measure learning styles using indicators developed for this purpose. Adult learners who, for example, fill in a questionnaire to find out what their own learning style is might end up with a learning style termed "visual", suggesting their particular strength is remembering things they have seen better than, say, things they have heard ("verbal"). Yet, it is unclear how much weight the resulting learning style "label" should have in an adult learner's decision to pursue a programme of study or a course. We deem it possible that an adult learner might deselect a potentially fulfilling or lucrative option based on their understanding of their own learning style and how it will be supported in different learning environments. This narrative review critically examines some of the research which explores the usefulness of considering students' learning styles in adult education. We present a discussion – which remains hypothetical – on why the use of learning styles measures continues to be popular despite the absence of rigorous research findings to support this practice. Our aim is to provide insight into learning style measures in order to support adult learners and adult educators in considering their value and usefulness in guiding educational choices.

Footnote 1 continued

while a learning *approach* is how we think about the function of our learning. We further consider this difference at the beginning of the section entitled "Conceptual challenges".

[2] In a nutshell, *deep learning* refers to active cognitive engagement with a topic and involves drawing on and feeding into the learner's long-term memory. By contrast, *surface learning* involves memorising facts without necessarily understanding them, drawing on and feeding into our short-term memory. Finally, *strategic learning* is learning to suit a specific purpose, e.g., learning content only related to an exam.

Narrative review of literature

Conceptual challenges

In a recent letter to the Editor of the *Education for Health* journal, Navin Rajaratnam and Suzanne D'Cruz (2016) commented on the idea that *learning approaches* and *learning styles* have different purposes, despite the fact that researchers tend to use the terms interchangeably. This tendency was noted earlier by Noel Entwistle (1991, 2001), who pointed out that "confusion has crept in with additional terms being used to describe overlapping concepts". John Biggs (1993) offers an example of this through his observation that the term "approaches to learning" has two meanings. It can either be used to describe a context-specific learning behaviour (influenced by the environment) or to describe a person's predisposition which denotes a constant state or habitual response (in terms of psychological tendencies). Further terminology exists which could be compared and contrasted in a similar manner, for example, *personality style, information processing style* and *instructional preference* (Curry 1983) versus *learning style, learning preference* and *learning strategy* (Sadler-Smith 1996). Similarly, Simon Cassidy (2004) highlights the fact that "learning style" and "cognitive style" are also used interchangeably in the literature. The significance of this is explained by Cassidy (ibid.), who suggests that there are fundamental differences between these two concepts; specifically, *cognitive style* should be viewed as a core component of a learning style rather than in parallel. Given the ambiguity around these terms in the literature, research which is based on poorly defined concepts and terms needs to be questioned as to its specificity, practical utility and validity. It appears too often that research into learning styles is not in fact based on common assumptions, let alone on a well-defined theoretical vantage point.

Defining learning styles

Leaving learning approaches to one side, we confine ourselves to learning styles here, because these are commonly used in educational practice. A wide range of disciplines have become engaged in the practice of learning styles classification. Educators from disparate fields, including psychology, pedagogy, vocational training, industry, management and health care have developed and researched learning styles categorisations using their own frames of reference and nomenclature, whilst not necessarily consulting the literature existing in parallel disciplines (Cassidy 2004). The limited collaboration between researchers from differing backgrounds has led to a body of knowledge which can be described as incongruent (Smith and Dalton 2005). *Learning style* was a term introduced by Gordon Pask to categorise learners in an either/or fashion, as being "holist" or "serialist",[3] and

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[3] "The *holist* has many goals and working topics under his aim topic; the *serialist* has one goal and working topic, which may *be* the aim topic. Evidence suggests that the holist is assimilating information from many topics in order to learn the 'aim' topic, while the serialist moves on to another topic only when he is completely certain about the one he is currently studying" (Pask 1976, p. 130; italics in the original).

> [h]aving adopted one kind of strategy the [learner] does not relinquish it (even though he cannot successfully execute it) unless strong advice is provided or he learns about a different domain where he can start afresh (Pask 1976, p. 130).

It is true to suggest that over time, the classifications of learning styles have been extended from those offered by Pask. According to Peter Cuthbert,

> the term "Learning Style", as it is used by Kolb (1984) and Honey and Mumford (1986), describes an individual's preference for understanding his/her experiences and transforming them into knowledge (Cuthbert 2005, p. 236).

However, there are other ways of thinking about the concept of learning styles that are not based on the definition or the four-stage model of experiential learning suggested by Kolb.[4] These include (but are not limited to) the Onion Model (Curry 1983, 1987), Fundamental Dimensions (Riding and Cheema 1991), Cognitive-Centred, Learning-Centred and Personality-Centred approaches (Rayner and Riding 1997), the Gregorc Model (Gregorc 1982), the Learning Styles Model (Dunn et al. 1975, 1996; Dunn and Dunn 1978), the Learning Model (Felder and Silverman 1988) or Five Learning Systems (Given 2002). In an attempt to streamline this body of knowledge, there have been several reviews which have attempted to clarify the diverse classifications of learning styles, resulting in an array of "type theories" being developed (DeBello 1990; Riding and Cheema 1991; Misko 1994; Rayner and Riding 1997, 2002; Cassidy 2004; Coffield et al. 2004; Smith and Dalton 2005).[5] These "type theories" have provided a means of explanation and dialogue relating to individual learning in certain circumstances. Richard Riding and Stephen Rayner (2002) for example, consider cognitive style (a learner's preferred way of processing information) in addition to learning preferences in an attempt to integrate existing knowledge on learning styles.

Despite the emergence of type theories, however, the lack of consensus on language and meaning in the area of learning styles remains and can be seen in the diversity of "type theories" themselves. Despite the disparity in core terminology and definitions, educators continue to make use of learning styles measures (i.e. categorisations), and adult learners use the outcome of their learning style measurement (i.e. the evaluation of an assessment by way of a questionnaire they fill in) to make decisions about their education. Philip Newton (2015) refers to the belief in the effectiveness of determining distinct learning styles as the "learning styles myth" which might lead some adult learners to make decisions with regard to their choice of courses or programmes based on questionable evidence. Paul Kirschner (2017) adds that type classifications are based on the assumption that

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[4] David Kolb's four-stage model of experiential learning, conceptualised as a cycle, encompasses (1) concrete experiences (CE); (2) reflective observation (RO); (3) abstract conceptualization (AC); and (4) active experimentation (AE). (Kolb 1984).

[5] Originating in the fields of philosophy and mathematics (Russell 1903), a *type theory* strives to avoid paradoxes. In the learning styles context, a type theory contends that there are a number of distinct types of learners and instructional methods that suit each type.

people can be categorised neatly into groups and points out that this assumption is not supported by objective research.

Measuring learning styles

Many people do not fit one particular style, the information used to assign people to styles is often inadequate, and there are so many different styles that it becomes cumbersome to link particular learners to particular styles (Kirschner 2013).

There is, however, a genuine interest in educators' motivations to assess students' learning styles – possibly because associations are commonly made in the literature between learner motivation and learning styles, see, for example, Myron Dembo and Helena Seli (2013). Richard Felder and Joni Spurlin (2005, p. 104) comment specifically on the use of the *Index of Learning Styles* (Soloman and Felder 1999),[6] and they warn educators of common misuses and make misassumptions explicit. Specifically, these researchers suggest that "learning styles dimensions … are continua, not either/or categories" (ibid., p. 104). Also, learning styles profiles suggest behavioural tendencies rather than being infallible predictors of behaviour. Learning style preferences are not reliable indicators of learning strengths and weaknesses and can be affected by a learner's educational experience. Soloman and Felder adamantly clarify that "the point of identifying learning styles is not to label individual learners and modify instruction to fit their label" (Soloman and Felder 1999, pp. 104–105). These recommendations offer a useful barometer for educators to check that they are using information on students' learning styles appropriately and with consideration.

Furthermore, theorists differ in their view of whether learning styles are in fact static throughout a person's life or changeable given different contexts (Reid 2005; Smith and Dalton 2005). Jan Vermunt and Yvonne Vermetten (2004), with their research on the *Inventory of Learning Styles* (ILS), depart from the concept of a fixed categorisation of learners by focusing on what they term "learning patterns". These include undirected learning and reproduction-directed learning (both of these are discouraged by problem-based teaching) as well as meaning-directed learning; application-directed learning; cooperative learning and independent learning. Their research demonstrates that a learner's learning pattern is in fact not a stable attribute and can indeed change over time. They acknowledge factors which have an influence on learning patters such as the learning context, personality and prior education amongst others. They are also clear on the dimensions which are measured by the ILS (ibid.).

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[6] "The *Index of Learning Styles* is an online survey instrument used to assess preferences on four dimensions (active/reflective, sensing/intuitive, visual/verbal, and sequential/global) of a learning style model formulated by Richard M. Felder and Linda K. Silverman. The instrument was developed and validated by Richard M. Felder and Barbara A. Soloman. Users answer 44 a–b questions and submit the survey, and their four preferences are reported back to them immediately to be copied or printed out. The results are not stored: when the report window is closed, the results are irretrievably lost (NCSU 2017). The "four preferences" refer to inclinations towards a learning style which is (1) either active or passive; (2) sensing or intuitive; (3) visual or verbal; and (4) sequential or global. The questionnaire is available at https://www.webtools.ncsu.edu/learningstyles/ [accessed 5 November 2017].

For most other learning styles measures it is not entirely clear what exactly is being measured – thus research based on these measures may be delving into territory that is distinctly different from the intended research target (Coffield et al. 2004). Therefore it is reasonable to surmise that basing one's educational decisions on information gathered on learning styles does not seem advisable.

Discussion

Despite concerns raised in a recent paper by Kirschner (2017, p. 166), which contained an "evidence-informed plea to teachers, administrators and researchers to stop propagating the learning styles myth", learning styles measures continue to be used. While there are a number of hypothetical reasons suggested in research, the main driver behind the continued use of learning styles measures remains unclear. Ideas relating to ease of access and administration, complications in evaluating research, and lack of overall validity of measures have all been presented to explain the use of learning styles measures.

First of all, it is important to highlight that most learning style measurement tests are sold without a user qualification standard,[7] an omission which can arguably lead to misuse or misinterpretation. The power of labelling has also been widely reported on (Gove 1980), demonstrating how the consequences of labels can have either positive or limiting effects on individuals. Aside from this, a number of educators who use learning styles measures often have not engaged any of the research literature associated with these assessments. The primary reason for this is likely to be the sheer volume of publications available now (Cassidy 2004) which serve to add to the philosophical debate rather than offering strict guidance. This leads to a state where educators may instead choose to read the information which is easily (even freely) accessible and summarised in a user-friendly manner. Such information may not be peer-reviewed research but rather marketing information which is deliberately made easily accessible and encourages the use of (a particular provider's) learning styles measures.

It is reasonable to suggest that not all measures are equally well validated. Therefore, depending on the measure which has been selected, there may be very little scientific literature available. Aidan Moran et al. (2006, p. 12) support this concern, as they suggest that "many of these scales are deficient either because they are atheoretical in nature or because they lack empirical validity".

In cases where access to research information is not a problem, critical appraisal skills may well be. Educators may not be in a position to determine the level of rigour in the findings presented for any given study. They may be inclined to read findings without having the ability to realise that only a very small section of the learning styles hypothesis has been addressed as a result of design flaws. Based on

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[7] With the increasing need for adults to engage in lifelong learning, especially in terms of vocational upskilling, the market for psychological tests and assessments to help them decide on what to enrol in is thriving. Potential purchasers include individuals (learners and educators) and institutions. The purpose of a provider's *user qualification standard* is to avoid misuse by restricting the sale and distribution subject to certain conditions (e.g. only selling to qualified psychologists).

the presentation of positive findings, which may have the effect of confirming their earlier beliefs, educators might continue to use the learning styles measures. Harold Pashler et al. (2008) points out that many studies address only one half of the "meshing hypothesis" (meshing or linking a learner's preferences with a particular teaching style),[8] and positive findings tend to be reported in relation to learners identifying their own learning style. However, according to Pashler et al. (ibid., p. 117), there is little evidence of any real practical utility of having identified learners' styles. While talking about and thinking about learning is of course a positive process, it does not in fact provide a dependable foundation for the use of a learning styles classification as a basis for decision making on potential programmes and courses. An educator might not, however, see past the initial positive effect of discussion on a learner's strengths and weaknesses in the long term.

A further reason for the continued (more or less cautious) use of learning styles measures is *confirmation bias* on the part of the educator (Newton 2015), which describes the process by which a person interprets information in a manner that confirms their world view. Confirmation bias could therefore lead educators to approach publications on learning styles with an expectation that they are a useful tool.

The reality we are operating in is one where not all educators have equal amounts of training in evaluating psychometric properties of measures. Consequently, some educators might be attracted by the high *face validity* of any given questionnaire and also interpret the widespread use of this questionnaire as validation for its rigour. They may not have the skill to be able to identify questionable internal validity arising from limited coherence of basic theoretical constructs guiding the development of a particular learning styles questionnaire (Kayes 2005).

Consideration should also be given to the status and expertise that standardised testing appears to ascribe to practitioners. Educators may relish the notion that they are able to provide individual insights and solutions to learners, especially those who are experiencing difficulties (Pashler et al. 2008). This is supported by the recent emergence of the field of "Educational therapy", which to a large degree relies on the insights gained from the idea of learning styles. Educational therapists are a professional group which might therefore have an interest in maintaining and nurturing the idea of learning styles categorisation (Ficksman and Adelizzi 2010; Ungerleider 2011).

Finally, it can be argued in some cases that educators may see learning styles measures as an attractive approach to implementing what they perceive to be evidence-based practice in teaching. The multitude of existing measures do largely claim to provide evidence of characteristics and tendencies related to learning, and as a bonus, they come with step-by-step instruction. However, practising an effective evidence-based teaching style is not as easy as simply implementing a set of instructions (Dunlosky et al. 2013). It has been widely acknowledged that bridging the theory–practice divide is more complicated and requires in-depth reflection. Productive reflection should include access to research information,

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[8] The *meshing hypothesis* refers to the idea that "the theoretical basis for the formulation of cross-over interactions is typically based on a preferential model" (Kirschner 2015).

consideration of the teaching context, collaboration with colleagues and negotiation with higher structures in curriculum design and assessment methods (ibid.). Alas, it is time-consuming and requires a high level of engagement – which the implementation of a learning styles questionnaire does not.

Summary

In summary, the number and scope of research findings on the utility of learning styles categorisation are vast, multi-disciplinary and potentially confusing to the untrained reader. Systematic reviews over many years have shown that there is no evidence for the usefulness of learning styles questionnaires for the purpose of making decisions with regard to education. Despite this insight, the use of learning styles categorisation remains high for various reasons, including the sense that a learning style measure could be (erroneously) perceived as being evidence on which decisions can be based. It is time to explore and present other concepts associated with learning that can help the learner make more informed choices to support self-direction and educators to take a more holistic view of their learners.

Conclusion

The use of learning styles assessments *can be* useful for the purpose of reflection on strengths and weaknesses, but it *is not* a fixed indicator of a person's educational capabilities and should play a limited role in educational choices. It is essential that educators using these assessments are vigilant against creating an expectation that an individual learning style is predictive in informing educational decisions. Furthermore, educators should guard against creating expectations on the part of the learner that their individual style needs to be catered for in the design and presentation of teaching material in order for them to learn effectively. Learners need to be empowered to realise that their learning style is not a limiting factor in the ability to adapt to a variety of learning situations.

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