



Evaluation and revision of the Study Preference Questionnaire: Creating a user-friendly tool for nontraditional learners and learning environments

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ABSTRACT

Numerous learning style instruments have been developed over the years. However, the majority of these instruments have not been psychometrically validated or designed with non-student populations in mind. The aim of this research was to revise an existing measure – Ford's (1985) Study Preference Questionnaire to assess holist vs. serialist processing. This shorter measure was designed to be more user-friendly, applicable to various learning contexts (e.g., as an online tool) and different learner groups. In order to test the new scale properties, the revised measure is tested several times in surveys before being embedded into an e-module. The results obtained for the shortened questionnaire were analyzed using principal axis factoring and confirmatory factor analysis. In terms of transferability and validity, we also considered how the final revised measure performed using data from two samples (English and German), thus establishing the validity of the measure across two samples and languages. In the final step, we examined the degree to which holist, serialist or versatile learners differed in terms of their age characteristics and performance on a learning task.

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1. Introduction to learning styles and utility of existing instruments

In the present work context, employees are expected to continually improve and develop their knowledge in order to stay up to date with technological developments and new workplace processes. There is a need for more research that considers personalized approaches in academic and work-based learning activities. Cognitive and so-called learning styles may provide an important starting point for the development of instruments to support learners more effectively. Capturing learning styles can provide important information to examine learner differences and performance across various learning set-ups, which can help to successfully personalize the learning experience and improve tutoring of learners, an issue that is particularly relevant to e-learning settings.

As is the case with many individual differences, numerous different individual cognitive styles have been proposed, many of which assess individual preferences for more or less structure and guidance (Clarke, 1993). Messick (1976) defined cognitive styles as attitudes, preferences and habitual strategies that are stable determinants of how individuals perceive, remember, think, solve problems and relate to other learners. Ford and Chen (2000 pg. 283) propose that “cognitive styles operate across a range of cognitive activities, including learning. The term learning styles is used here to denote cognitive styles observed specifically in a learning context”. Like many personality definitions, learning styles

are defined as stable and consistent while researchers acknowledge that they are also influenced by the learning environment and experience (Desmedt & Valcke, 2004).

It is important to consider a variety of limitations when discussing learning styles more generally. A number of themes can be identified that are problematic to tackle for researchers and practitioners alike. First, there are a large number of proposed learning styles. Coffield, Moseley, Hall, and Ecclestone (2004), for example, identified 71 different models of learning styles. Many of these learning styles are defined in very different ways. In line with the large number of learning styles, there are a variety of cognitive and learning style inventories in existence. The majority of these instruments continue to be used in the educational setting rather than in the work setting to date. For those interested in an in-depth discussion of these styles and instruments, we suggest Coffield et al. (2004) as a resource.

The development of new measures in the modern learning environment is hampered by a number of limitations associated with the terminology and measures themselves which have been criticized for their poor measurement properties, resulting in calls to remedy this situation (Peterson, Rayner, & Armstrong, 2009). It is important to assess the extent to which these measures can be revised to be applicable to non-student populations, including employees that feature more heterogeneous age groups than most college populations. Second, these instruments were predominantly designed for student populations and their learning activities (e.g., reading books, taking exams, teachers, professors). In addition, educators and training professional need to carefully consider the utility of continuing to use lengthy or complex questionnaires with a more diverse group of learners with different skill levels and educational background.

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1.1. Holist and serialist learning style

Our work tries to respond to the call for more research by Peterson et al. (2009) and wishes to remedy this situation in relation to one such measure, the Study Preference Questionnaire (SPQ) by Ford (1985). The goal of our research was to create a revised measure with psychometrically sound properties to assess serialist and holist preferences, creating a new revised measure that is both user-friendly and applicable to non-student populations.

This instrument was designed to assess serialist, versatile, and holist processing preferences. Pask (1976a) suggested that individuals utilize different strategies when approaching a learning task by focusing on comprehension or operational aspects associated with learning. Serialists can be labeled “operation learners” with a more pronounced bottom-up approach (Ford, 1985). These individuals tend to focus on the immediate or local aspects. They have a narrower focus, oftentimes emphasizing the details and the way to success rather than trying to achieve a larger overview. Serialists learn in a linear and sequential fashion which goes hand in hand with an emphasis on logical arguments, simple hypotheses, and memorizing facts for reproduction (Ford, 2000).

Holists are “comprehension learners” with a clear top-down approach to tasks (Ford, 1985). They have a more global strategy and wider focus on several aspects. This means they like to focus on numerous topics simultaneously, emphasizing the use of numerous sources in order to elaborate on information and seek patterns among facts. These aspects lead to more generalized descriptions and higher level comprehension, but potentially at the expense of individual detail.

The scale was meant “to assess preferences for one or other sequence of learning approaches (global description-building predominantly before local procedure-building, or vice versa) amongst learners ‘versatile’ in the sense of being able to combine both approaches, as well as comprehension and operation learners” (Ford, 1985, pg. 71). These individuals are successfully able to combine both strategies. Ford (1985) and Pask (1976b) further subdivide holists and serialists into subgroups, however, for the purpose of the current article, we focus on holist vs. serialist preferences of processing.¹

1.2. Justification for scale selection

We selected this measure for two reasons. First, there is little work available that demonstrates the psychometric properties of the scale by Ford using factor analysis. He provided no reliability information in the original article in which he published his scale (see Clarke, 1993). Ford (1985) ended up using just five out of his 18 double-statement items in his original analysis, noting that just one of 18 items was a good predictor of serialist vs. holist tendencies. Ford and Chen (2000) also used a shortened scale of the SPQ; these authors make no mention of how the scale had been utilized or what the psychometric properties of the shortened scale were. And as a third example, Clarke (1993) similarly reduced the original scale from 18 to 13 items and reported a coefficient alpha (.670) for the shortened scale. Several authors who applied the SPQ by Ford (1985) explicitly pointed out the need for studies regarding its reliability (Clewley, Chen, & Liu, 2010) as does Ford (2000) himself. No factor analyses had been conducted by either Ford (1985) or Clarke (1993). Similar issues arise with the studies of Ford, Wilson, Foster, Ellis, and Spink (2002) and Ellis, Ford, and Wood (1993). There is therefore a distinct lack of psychometric validation of his scale despite its popularity. These circumstances clearly make a

psychometric re-examination of this scale a priority for its continued use in education or work settings.

The original item presentation presents the second problem. The original scale features 18 items. Each item includes two statements which are considered polar opposites of each other. Participants are asked to indicate their level of agreement with one or the other statement. This complexity increases working memory demands (Daneman & Carpenter, 1980), possibly contributing to early fatigue.

2. Methods and results (evaluation studies I – III)

The evaluation and revision of the scale took place in three stages, involving three studies.

2.1. First evaluation and revision: Reformatting of scale and item review

2.1.1. Aims of this revision

Our first goal was to examine item content, their match with the original definition of serialist or holist learning preference, and the original scale properties. This review led to a number of changes to the original instrument. In the original measure, one item would include two – often lengthy – statements to be compared. By combining two statements, Ford forces participants to make a decision either or, without accounting for the influence of forced choice and cognitive demands to process so much information.² For utilization of the SPQ in an online learning environment high cognitive load is counterproductive since it inhibits learning (Niederhauser, Reynolds, Salmen, & Skolmoski, 2000). By changing the semantic differential response format cognitive load is decreased (Friborg, Martinussen, & Rosenvinge, 2006). This subsequently improves user friendliness. In the first step of the evaluation, the original 18 item scale (Ford, 1985) was changed into a 36-item scale, assessing each statement on its own merit. A similar approach has been utilized in the past in the revision of another scale that originally featured two statements per item (e.g., Greene, Azevedo, & Torney-Purta, 2008).

Second, we changed the answering format. The original response scale was a five-point Likert scale ranging from (1) ‘I agree with the statement on the left’ to (5) ‘I agree with the statement on the right’. The idea was that individuals would be closer to either one end or the other. With the new item presentation, it was moreover necessary to change the response scale to a five-point Likert scale ranging from (1) ‘I strongly disagree’ to (5) ‘I strongly agree’. Participants with a holist style were expected to endorse holist items more strongly than the serialist items and vice versa. It allowed us to test the utility of each statement. This change gave us the option to develop two subscales to assess each dimension.

In the third step, we needed to reconsider the extent to which the items clearly measured holist vs. serialist preferences as no information was provided about this in the original scale descriptions (Ford, 1985). In the absence of any instructions informing users of the need to reverse code items, it is not surprising to find that researchers have reported confusing results when using this instrument.

Our second goal was to examine various possibilities to shorten and improve the psychometric properties while still retaining enough items to capture the main characteristics of individuals with holist and

¹ Versatility reflects a learning preference that is not specifically serialist or holist. Being able to reliably capture holist and serialist preferences therefore helps to detect versatile learners who rank equally high or low on both scales, which means their learning preferences vary and may not be as consistent as observed in individuals with a more pronounced holist or serialist preference.

² An example of the original item including two statements reads as follows (Clarke, 1993, pg. 58): (a) “I like to approach a new subject in a broad way – often looking at widely spaced aspects of the subject and seeing how they may all fit together, before going back to ‘fill in’ any strictly logical steps that I have skipped.” And (b) “I like the logical links between different aspects of a new subject to be very close, so that when I’m learning about a second aspect I can see very clearly how it relates to the first aspect that I have already learned about, and so on”. The response scale ranged from: 1 = I agree with the statement on the left; 2 = I agree (with reservations) with the statement on the left; 3 = No preference for either statement; 4 = I agree (with reservations) with the statement on the right; and 5 = I agree with the statement on the right.

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