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Chapter 7

Field independence in higher education and the case of distance learning

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Abstract

It has been postulated that student autonomy in distance education could be operationalized in terms of the cognitive style of field independence. While distance learning students often obtain high scores on field independence, this is also true of campus-based students. Field independence is not positively related to students' course evaluations, their preference for independent learning, their course completion in distance education, nor their level of autonomy. Consequently, field independence is not useful for understanding experiences or attainment in distance education. © 1998 Elsevier Science Ltd. All rights reserved.

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1. Field independence learning

Field independence as a concept was introduced more than 40 years ago. While its precise significance for education remains a matter of debate, it has been claimed to have a special relevance in the field of distance education (Gibson, 1990; Thompson, 1984a). The purpose of this chapter is to analyze field independence and assess the empirical evidence that it predicts participation, attitudes, and outcomes in distance education.

The concept of field independence originated in the rod and frame test (RFT) which was initially devised by Witkin and Asch (1948) as a test of spatial orientation. In this procedure, the participant is presented with a movable luminous rod that is

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surrounded by a square luminous frame in an otherwise totally dark room. Both the rod and the frame are presented in an orientation that is rotated to the left or to the right of the true vertical. On some trials, the chair on which the participant is seated is also tilted either to the same side or to the opposite side as the frame. The participant's task is to adjust the rod until it lies at the true (i.e., gravitational) vertical regardless of the orientation of the frame, and the final deviation of the rod from the vertical is taken as a measure of performance. The typical finding, the rod and frame effect (RFE), is that the participant places the rod tilted in the direction of the frame, indicating that orientation is influenced by the prevailing visual field.

Witkin et al. (1954, Chapter 6) found that performance on the RFT was correlated with performance on a number of other tasks that required the separation of a stimulus from the field in which it was presented but did not involve spatial orientation. An example of such a procedure is the embedded figures test (EFT), which requires the participant to locate a simple figure incorporated within a larger complex figure. These findings suggested that the latter tests and the RFT were measuring a single trait that reflected a person's degree of independence from the structure of the prevailing visual field (p. 119).

Subsequent research indicated that performance on the RFT was related to other cognitive dimensions that involved spatial restructuring, and it was concluded that tests such as the RFT and the EFT were primary measures of 'field independence' as a cognitive style (Witkin and Goodenough, 1981). This style was characterized by Witkin et al. (1977) as

the extent to which the person perceives part of a field as discrete from the surrounding field as a whole, rather than embedded in the field; or the extent to which the organization of the prevailing field determines perception of its components; or, to put it in everyday terminology, the extent to which the person perceives analytically (pp. 6–7).

Witkin et al. (1977) argued that field independent individuals tended spontaneously to create organizational structures during learning, whereas field dependent individuals had to rely upon information that was provided by the experimenter (in the laboratory) or the teacher (in the classroom). They reviewed evidence which suggested that field independence was related to a person's choice of academic discipline and eventual career, such that field independent students were associated with the sciences, mathematics, and engineering, whereas field dependent students were associated with the arts, social sciences, and the humanities. Witkin and his colleagues also claimed that field independence was related to academic progress in certain specialized courses but not in mainstream programs of study within higher education.

2. Research issues

Unfortunately, the empirical underpinning of field independence as a fundamental cognitive style is not very satisfactory. The magnitude of the correlation between

performance on the RFT and performance on the EFT is only moderate (Arbuthnot, 1972). Moreover, Witkin et al. (1954, pp. 85–88, 164–165) found that the correlation was statistically significant in a group of 46 men but not in a group of 45 women. This undermines the idea of a single dimension of field independence which is common to both men and women and which can be measured either by the EFT or by the RFT. Tinajero and Páramo (1997) found that performance on the EFT was related to academic attainment in secondary education whereas performance on the RFT was not; they inferred that field independence was bidimensional.

However, the testing situation of the RFT is bizarre, and performance is influenced by noncognitive factors such as anxiety (Witkin et al., 1954, p. 191). Quite plausibly, some participants might experience unease when being tested in nearly total darkness. Such unease might even be well founded, in that Sherman (1978, pp. 25–26) implied that there were anecdotal reports of sexual harassment in the administration of the RFT. There is also evidence that the RFE is a product of two different mechanisms (Goodenough et al., 1987); recent experiments have shown that it depends on sensory factors that have little to do with high-level cognition (Cian et al., 1995; Cian and Raphel, 1995). Although many researchers regard field independence as a major determinant of cognitive and social functioning, it is now normally measured using different forms of the EFT and only rarely using the RFT (Jonassen and Grabowski, 1993, pp. 87–98).

However, there are also serious problems with the EFT. One is that field independence is hypothesized to be a stable personality trait (Witkin et al., 1967). However, Witkin (1950) presented data that showed a clear practice effect across the individual test items. In fact, Witkin et al. (1954, p. 86) reported significant practice effects in a retest carried out 3 years after the original administration of the EFT. Goldstein and Chance (1965) confirmed that practice improved performance on the EFT, and they pointed out that this was inconsistent with the idea that it was measuring a relatively constant psychological trait or style. They also suggested that the EFT was sensitive to motivational factors and hence was not simply a measure of an individual's perceptual ability.

A basic difficulty with the RFT and the EFT is that they are supposed to serve as measures of cognitive style yet both are measures of cognitive performance. As Caplan and Kinsbourne (1982) pointed out, the individuals who are classified as 'field independent' are those who give more accurate settings on the RFT or more correct responses on the EFT. In other words, both of these tests measure the person's capacity for particular kinds of analytical functioning rather than a purely stylistic preference; at best, they might said to be measuring the capabilities that are prerequisites for adopting different cognitive styles (see Wachtel, 1968, 1972a, b).

It is this consideration which turns the nominally neutral attribute of field independence into a desirable mode of thinking (Kogan, 1971). In fact, performance on both the RFT and the EFT is correlated with measures of general ability and thus effects of field independence are inherently confounded with those of intelligence per se (Goldstein and Blackman, 1978, pp. 185–186, 210; Zigler, 1963). Vernon (1969, p. 61) pointed out that purely at a conceptual level field independence was remarkably

close to conventional definitions of general intelligence. The correlation with verbal intelligence tends to be higher for the EFT than for the RFT (Loo, 1979), which would explain why field independence as measured by the EFT can predict school attainment (e.g., Kush, 1996; Tinajero and Páramo, 1997).

3. Distance and autonomy in distance education

Moore (1973) defined distance teaching

as the family of instructional methods in which the teaching behaviors are executed apart from the learning behaviors, ... so that communication between the teacher and the learner must be facilitated by print, electronics, mechanical or other devices (p. 664).

This physical separation usually also entails a temporal separation; that is, the communication between the teacher and the student is asynchronous (Threlkeld and Brzoska, 1994). Moreover, the 'distance' is often not merely geographical, but social and personal (Keegan, 1990). In order to capture these different aspects of the learner's predicament, Moore (1983) coined the expression 'transactional distance,' which he described as a function of the structure of the educational program and the quality of the dialog between the teacher and the learner.

Moore (1972, 1973) argued that there was a positive relation between distance education and student autonomy. On the one hand, learning at a distance should nurture student autonomy by requiring learners to function in a self-directed way; on the other hand, autonomous learners should find distance education more congenial than traditional learning situations. He suggested that distance learning institutions should try to design courses that would attract autonomous learners and subsequently discussed the implications of this suggestion for both course design and faculty development (Moore, 1986). However, he also argued that the promotion of autonomy was becoming accepted as a goal in the education of children and adolescents, and that distance education would therefore be the most appropriate means of delivering courses for the new generation of autonomous adult learners.

In fact, in research on distance education, learner autonomy has been characterized in two different ways (Schuemer, 1993). The first is as a prerequisite for successful academic attainment in the face of transactional distance. The second is as a goal or ideal that distance educators should strive to achieve. Nevertheless, both accounts seem to give rise to certain interesting empirical predictions, e.g., that students who are taking courses by distance learning should be more likely to exhibit autonomy than students who are taking conventional, campus-based courses; that students who are taking courses by distance learning should prefer independent study to didactic teaching methods; and that those students in distance education who exhibit autonomy should be more likely to complete their courses and less likely to withdraw than those students who do not.

4. Field independence and distance learning

In testing such predictions, Moore (1976) operationalized the notion of student autonomy in terms of field independence. As he later explained:

This was selected because it appeared to represent in one system the personality characteristics which might be expected to predict successful independent learning; it discriminates the person who is likely to define his needs independent of others, maintains his own directions, and prefers self evaluation over evaluation by external standards (Moore, 1977, p. 22).

He assessed students taking a distance learning program at a university in the United States and students following a campus-based program based upon independent study at a Canadian university. Both groups were tested on the EFT and they also reported on their attitudes toward independent study.

Moore found that the distance learning students did obtain relatively high scores on field independence in comparison with normative groups and he inferred that “by a self-selection process only those who can tolerate non-social learning conditions survive in a program where dialogue is so low” (as quoted in Coggins, 1988, p. 27). Unfortunately, college students are selected (directly or indirectly) on the basis of verbal intelligence, which (as noted above) is confounded with field independence. It follows that any random sample of college students is likely to yield high scores on tests of field independence (Goldstein and Blackman, 1978, p. 210). Thus, Moore’s results with distance learning students might well be wholly artificial.

At the same time, Moore found that the students working by independent study did not obtain higher scores on the EFT than normative groups and this finding in itself would appear to contradict the notion that field independence is a measure of student autonomy. In addition, there was no significant relationship within either group between the students’ scores on field independence and how positively they regarded independent study. In a subsequent investigation, Smith (1980) found no relationship between scores on field independence and whether students following conventional courses preferred independent study over lecture-based teaching methods. This was true whether field independence was measured using the RFT or the EFT. In short, there is little if any evidence that field independence mediates the preference of students for self-directed or autonomous forms of learning.

Thompson (1984b; Thompson and Knox, 1987a, b) carried out a similar study involving students who were taking courses by distance learning at a Canadian university. They were asked to carry out the EFT at the beginning of their course and categorized as field independent or field dependent on the basis of a median split of their EFT scores. Within each category, one half of the students received routine support in their course, whereas the remainder additionally received systematic tutoring by telephone following the return of each assignment. The students in the entire sample obtained relatively high scores on field independence in comparison with normative groups and Thompson inferred that field dependent people would simply not choose to study by distance learning. However, this trend was significant

only among the female students, not among the male students, and it is subject to the problem of sampling bias in college students in general, mentioned earlier.

Thompson compared completion rates between the field independent and the field dependent students. Contrary to his expectations, he found that 60% of the field dependent students completed their courses (in that they attended the final examinations) whereas only 54% of the field independent students did so. Thompson suggested that field dependent students who took distance learning programs were unrepresentative of field dependent people in general, insofar as they were apparently less sensitive to the lack of immediate structure and support that was inherent in distance education. However, this is an entirely circular argument, because the only criterion that Thompson could use in order to identify this 'unrepresentative' group of field dependent people was their success in distance learning courses.

At the end of their courses, the students were asked to complete an evaluative questionnaire. There were few significant differences between the field independent students and the field dependent students, but the latter tended to provide more positive evaluation scores overall. There was also a significant interaction with the effect of telephone tutoring, such that the field independent students gave lower evaluation scores in the absence of telephone tutoring, but the field dependent students were not influenced by this manipulation when evaluating their courses. These findings were contrary to Thompson's own expectations that field dependent students would find distance learning courses less congenial and that they would be more responsive to support in the form of telephone tutoring.

5. Field independence and student autonomy

Much of the extant research has been premised on the assumption that field independence is an appropriate index of student autonomy, but this has not been subjected to a direct test in the context of distance education. One early attempt to operationalize learner autonomy was Guglielmino's (1978) self-directed learning readiness scale, which was employed in a number of studies of adult learning. Tzuk (1985) administered both this instrument and the EFT to 160 students in four different institutions of further and higher education. The correlation coefficient between self-directness and field independence was +0.24. Although this was statistically significant, it implies that field independence accounts for only a small proportion (less than 6%) of individual variation in self-directedness.

Most research into autonomy has been influenced by Weiner's (1979) attributional theory of student motivation and has used instruments such as Rotter's (1966) internal-external locus of control scale. Students with an internal locus of control see themselves as having responsibility for success or failure in academic situations. This is linked with greater academic achievement, although the relationship is stronger in adolescents than in adults (Findley and Cooper, 1983). Some argue that attributions help to determine students' achievement (e.g., Covington and Omelich, 1984), but others argue that the causal direction is the reverse (e.g., Marsh, 1984). It is, nevertheless, clear that college students generally tend to exhibit an internal locus of control

and that this is positively related to the level of performance that they expect to attain (Chen and Tollefson, 1989).

Locus of control and field independence are similar conceptually; hence, it would be reasonable to expect them to be associated empirically. In fact, Lau et al. (1981) noted that several studies had failed to find a significant relationship between Rotter's (1966) locus of control scale and various measures of field independence. They themselves used another instrument to assess locus of control and the hidden figures test to assess field independence in students at three universities in the United States and four universities in the Philippines. The correlation between internal locus of control and field independence was + 0.01 in the US students and – 0.06 in the Filipino students. In both groups, there was a curvilinear relationship such that extremely high or low scores on field independence were linked to an external locus of control.

6. Conclusions

It is therefore reasonable to conclude that field independence is not an adequate measure of autonomy in learning and that it is not helpful in appreciating the experience of distance learning students or in predicting their academic attainment. In light of the available research evidence, it is unfortunate that writers continue to commend the cognitive style of field independence as a useful tool in research into distance education (e.g., Ehrman, 1990; Gibson, 1990). In fact, Wilson (1993) characterized the majority of students taking courses by distance learning in Africa as field dependent; such gross stereotyping hardly assists the important task of trying to adapt distance learning programs to new cultural contexts.

Moore (1973) acknowledged that distance teaching programs were very heterogeneous in terms of the extent that they promoted learner autonomy; other writers have commented that institutional constraints, combined with the need to award externally recognized qualifications, can make it difficult to adopt a genuinely student-centered approach to course design and delivery in distance education (Farnes, 1975; Thorpe and Grugeon, 1987). Equally, traditional, campus-based institutions have always provided some opportunities for students to engage in independent study (Rumble, 1989). In addition, since Moore (1973) originally proposed that distance learning required learners to function in a self-directed or autonomous manner, it has become increasingly recognized that the students' perceived control of the learning process is as a desirable – if not essential – ingredient of effective learning in all forms of secondary and tertiary education (see, e.g., Bandura, 1997, Chapter 6; Perry, 1991; Taylor and Burgess, 1995).

Thus, fostering independent, autonomous, or self-directed learning is not a goal that is in any sense peculiar to distance education. Instead, as Garrison and Baynton (1987) commented, the development and maintenance of control over the learning process depends upon the achievement of a dynamic equilibrium among three components of that process: *independence*, or the freedom to choose one's learning objectives, learning activities, and methods of evaluation; *power*, or the capacity to participate in and assume responsibility for the learning process; and, finally, *support*,

or the resources that a learner can access in order to execute the learning process. Based on the available evidence it seems reasonable to conclude that the construct of field independence has very little to contribute to achieving the corresponding goals of autonomy, empowerment, and access to resources in education.

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