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Predicting Transfer of Generic Information Literacy Competencies by Non-Traditional Students to Their Study and Work Contexts: A Longitudinal Perspective

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Abstract: Rapid developments in contemporary societies not only ask for lifelong learning but increasingly also for training in generic competencies suitable for multiple contexts and life stages. An indicator of training success is the transfer or application of new learning, a longitudinal process influenced by various theory- and evidence-based factors. The present study combined a multi-contextual and longitudinal approach by investigating non-traditional distance education students' intention to transfer newly acquired generic information literacy competencies to their study and work contexts before, directly after, and three months after training. Three surveys, using a combination of Ajzen's theory of planned behavior and Holton et al.'s Learning Transfer System Inventory model, measured the influence of performance outcomes expectations, organizational openness to change, and performance self-efficacy on intention to transfer and transfer behaviour. The participants were 82 adult educational professionals enrolled in an online information literacy course at the Open University. Partial least squares-based structural equation modelling (PLS-SEM) confirmed the value of employing a multi-contextual and longitudinal approach within this specific setting. Furthermore, notably, self-efficacy appeared to predict pre-training intention in both study and work contexts and transfer behaviour in the work context. Educational implications, limitations, and directions for future research are discussed.

Keywords: lifelong learning; non-traditional students; higher education; generic competencies; transfer of learning; multi-contextual transfer; theory of planned behavior; learning transfer system inventory

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1. Introduction

1.1. Lifelong Learning and Non-Traditional Learners

Many contemporary societies are confronted with rapid developments in various aspects of life. To be able to make informed decisions regarding challenges and opportunities in the different life stages increasingly requires a process of lifelong learning. This is defined as 'all learning activities undertaken throughout life, with the aim of improving knowledge, skills and competence, within a personal, civic, social and/or employment-related perspective' [1]. Its importance is acknowledged and supported by major international institutions like UNESCO [2], OECD [3], ILO [4], and EC [5] for the advancement of equal opportunities and social inclusion, active citizenship, employability, productivity, and the green transition each with their own specific set of required competencies [6].

In this process, driven by developments in distance and online education, learning is no longer mainly reserved for the traditional young post-high school student. Instead, education increasingly takes place in the adult stages of life. These so-called non-traditional

students, the participants in the current study, form a heterogeneous group of, amongst others, adult students, part-time students, and full-time employees [7,8]. They want to or have to retrain for their current or prospective jobs or just want to complete a degree, while in the meantime having to cope with other responsibilities in life. They have different demographics, a variety of socio-economic and educational backgrounds, diverse life and work experiences, specific individual needs and preferences, and different levels of motivation and engagement [9–12]. According to the established andragogic model of Knowles, adult learners distinguish themselves from traditional learners by their desire to know why they learn, by their self-directedness, by contributing their life and work experiences, by linking learning to their need to cope effectively with real-life situations, and by their intrinsic motivation to learn the things that will help them in their life situations [13] (p. 47).

1.2. Generic Competencies for Multiple Contexts

While lifelong learning may have a narrow focus, aiming at the acquisition of specialized technical skills or domain-specific content knowledge, there is a growing demand for so-called generic competencies that are meant for, or potentially suitable for, multiple contexts in life like education, work, and everyday life [14]. These competencies are also referred to as 21st-century skills, life or lifelong skills, learning-to-learn skills, non-academic and non-cognitive skills, non-technical skills, soft skills, transferable skills, character skills, high-order skills, or meta-skills. Without undervaluing content acquisition as an acknowledged part of education, this alone is no longer enough to make students succeed in their academic and professional lives [15–17]. Depending on their definition and field of application, generic competencies may include critical thinking, communication, self- or interpersonal management, problem-solving, reasoning, creativity, collaboration or teamwork, entrepreneurship, leadership, and information literacy.

The latter includes the skills, knowledge and attitudes to effectively and efficiently find, evaluate, process and present the information that is required to make informed decisions in our increasingly information-intensive societies. Although often considered merely an essential study competency within formal education [18] or library settings [19], it is also crucial in knowledge-based work environments to strengthen competitiveness and improve the employability and adaptability of the workforce [5]. In daily lives, it is, amongst other things, considered a prerequisite for democracy as it enables citizens to make informed choices despite today's information overload and developments like fake news, deepfake, chatbots and conversational agents like ChatGPT. Participants in this study took a course in information literacy while studying Educational Sciences at the Open University in the Netherlands.

Typically, training of generic competencies will focus on their use within a specific training setting, field or profession. Managerial training in problem-solving or teamwork generally will be aimed at their transfer to specific work contexts while a course in information literacy in higher education will be targeted at writing papers or theses. To make use of their full potential within the context of lifelong learning it is important to emphasize the multi-contextual usability of these generic competencies in the curricular design. This would not only foster the development of a transfer mindset among the learners but could also encourage their pre-training motivation to attend, their engagement during the training, and their intention to apply new learning after the course to multiple contexts. This might be particularly relevant for adult learners who are eager to know why they should engage in learning and in what ways this might help them in various real-life situations.

1.3. Transfer of Learning: A Longitudinal Process

Many institutions like schools, universities and public libraries but also organizations and commercial businesses offer training, in this study used interchangeably with courses or interventions, in these generic competencies. The main fundamental goal of education, and therefore of educational designers, is to achieve long-term transfer of learning, in a

work context also referred to as transfer of training. This is defined as the application of what has been learned to new situations [20]. It is not only considered the very essence of education in general but also the foundation of generic competencies like learning, thinking, and problem-solving [21] (p. xiii). Paradoxically, ample research since the early twentieth century in fields like education, human resource management, and psychology has indicated that transfer, although omnipresent in daily life, is limited in formal education or training [22–24]. Or, in the words of Haskell [21] (p. xiii): 'Despite the importance of transfer of learning, research findings over the past nine decades clearly show that as individuals, and as educational institutions, we have failed to achieve transfer of learning at any significant level'. Additionally, in the context of this paper, previous and anecdotal evidence shows that 'soft skills training is significantly less likely to transfer from training to job than hard-skills training' [25]. This transfer problem is also attributed to so-called far transfer where the training and application contexts are significantly different [26,27]. This not only affects the quality of education and training but also leads to a waste of resources that are made available by governments, organizations, and companies [28,29]. This makes research on how to facilitate the transfer of learning all the more relevant.

The research literature on transfer, with its cognitive, motor, and socio-emotional dimensions, reflects a lively debate about the character of successful transfer, its what, how, when, where, and how to measure it [30]. Sometimes transfer concerns the mainly routine replication of what has been taught. According to Thorndike's theory of identical elements, this is a situation where the training and application contexts and behaviour are almost identical and certain behaviour can only be executed in one specific way. Transfer can then be measured by simple testing or observing the use and effectiveness of specific behaviour at a specific moment, mostly directly after an intervention.

Current rapid developments in all aspects of life, however, increasingly require the acquisition and application of more generic competencies that can be applied in multiple contexts and performances that may be different to the training environment. A corresponding and broader interpretation of transfer is given by for example Bransford and Schwartz [31] who introduced the generic concept of 'preparation for future learning', i.e., learning how to solve problems in changing contexts, and by Hager and Hodkinson [32] who defined transfer as 'learning across boundaries'. This shift in interpretation of transfer is relevant to the current study where participants were engaged in a course in information literacy. The transfer or application of these multi-faceted generic higher-order cognitive competencies [33,34] generally requires so-called high-road or mindful transfer [27], includes mainly open skills of which the application largely depends on a given situation and the creativity of the learner, and can be characterized as far transfer [25] as these competencies can be applied in a variety of ways and contexts during the longitudinal process of lifelong learning.

One way of evaluating the transfer of learning is to investigate aspects that may have influenced the transfer process. These can relate to, amongst other things, the characteristics of the individual learner, to the training content and design, and favourable or limiting circumstances in the application environment. Generally, transfer research is focused on their influence during training itself. However, we consider the transfer of learning to be a longitudinal process that is influenced by a variety of variables not only during but also before and after training. Two previous studies from a pre-training perspective [20,35] have confirmed this view. In the current study, we have tested this longitudinal perspective by analysing the transfer process at three moments in time: directly before, directly after, and three months after training, thus complementing limited existing longitudinal transfer research [20,35–39].

Another way of evaluating the transfer process is by measuring transfer outcomes. This is typically done during one-shot post-training tests by supervisors and the results are considered to be indicators of the effectiveness and therefore of the quality of training. This might be appropriate when it involves the near transfer of relatively closed skills. It is, however, not adequate when it involves the far transfer of open skills by mainly

autonomously operating professionals as is the case in this study. When often advised multi-rater or content-based transfer measurements are not possible or appropriate Hutchins and colleagues [40] suggest the use of the learners' self-reports of their intention to transfer as alternative outcome scores. They argue that, while Ajzen's theory of planned behavior (TPB) may give us a better understanding of the antecedents of behavioural intentions, Holton et al.'s Learning Transfer System Inventory (LTSI) model offers insight into the antecedents of transfer behaviour itself. They propose additional research where both TPB and the LTSI are combined to better understand the psychological processes and variables involved in all phases of the transfer process. In this study, we have answered this call and complemented previous research on transfer intentions [20,35,39,41–45] by combining Ajzen's well-established socio-psychological theory of planned behavior and Holton et al.'s extensively tested Learning Transfer System Inventory to investigate in what way performance outcomes expectations, organizational openness to change, and transfer self-efficacy relate to the non-traditional learners' intention to transfer their newly acquired generic information literacy competencies to multiple contexts: to their study environment at the Open University and their educational work environments.

1.4. Theory of Planned Behavior Combined with the Learning Transfer System Inventory

Ajzen's theory of planned behavior, based on Fishbein's expectancy-value theory and extending Fishbein and Ajzen's earlier theory of reasoned action, assumes that human behavioural intentions are driven by:

- *Attitude toward the behavior* deriving from a person's emotional estimate (behavioral beliefs) of the expected outcomes of specific behaviour, personal experiences, information sources, and inferences [46]
- *Subjective norms* or perceived social pressure to perform a specific behaviour as a result of personal assumptions (normative beliefs) about expectations of important others like family, friends, peers, or supervisors, and the motivation to comply
- *Perceived behavior control* as the result of a person's estimation (control beliefs) of aspects that may facilitate or hinder a specific behaviour, based on past experiences and prospects. Ajzen added this construct to the model of his earlier theory of reasoned action when he recognized that behaviour is not always completely under a person's volitional control. Perceived behavioral control is conceptually similar to self-efficacy.

Ajzen defines intentions as "indications of how hard people are willing to try, how much of an effort they are planning to exert to perform the behavior. As a general rule, the stronger the intention to engage in a behavior, the more likely should be its performance" [47] (p. 181). Meta-analyses show that the TPB, originating in the fields of social and behavioural psychology, has been used in a wide variety of contexts and applied to a large number of behaviours [48–50]. Some studies regard intention as a dimension of motivation [51,52] or use it interchangeably with motivation [53–55]. Although we acknowledge that both concepts are closely related, we consider both to be successive steps in a motivational process [40,46,56,57]. Intrinsic and extrinsic motives are the reasons why people become committed, inclined or willing to apply a specific behaviour. Intention is considered to be the culmination of a motivational process, expressing a stronger propensity to perform a certain behaviour than motivation [40]. In a recent description of his conceptual framework, Ajzen states that a 'favorable attitude and a supportive subjective norm provide the motivation to engage in the behavior but a concrete intention to do so is formed only when perceived control over the behavior is sufficiently strong' [58].

The TPB suggests that the formation of behavioural intention is a rational, conscious, deliberative or planned process. Although this exclusive focus on reasoned action has been criticized, for example concerning health behaviour [59,60], the application or transfer of higher-order cognitive information literacy competencies, in general, will require a person's conscious attention. This refers to actions like formulating a relevant information question, selecting and using credible and adequate information sources, critically evaluating the information gathered, and referring to the information sources in a correct manner.

In this study, we have operationalized Ajzen's three variables using three corresponding constructs from the LTSI. Over many decades research on transfer has identified a variety of determinants that could potentially facilitate or inhibit the transfer of learning in a given situation. What was missing, however, was an empirically tested taxonomy or model that incorporated these variables into one integrated and interrelated transfer system. For this reason, Holton and colleagues [61] developed the Learning Transfer System Inventory model, based on and extending the previous work of Roullier and Goldstein [62]. They constructed a questionnaire to investigate all variables that may affect the transfer of learning from training to the work environment. In its current version, it includes eleven variables related to the training content and design and five more general constructs. For the current study, we have selected three general LTSI constructs that we considered to correspond best with the three constructs from the TPB:

1. performance outcomes expectations representing attitude toward the behavior
2. organizational openness to change representing subjective norms
3. performance self-efficacy representing perceived behavioral control.

1.4.1. Performance Outcomes Expectations representing Attitude toward the Behavior

According to the expectancy-value formulation of the TPB, favourable or unfavourable attitude toward a specific behaviour, in this case, the application of newly acquired information literacy competencies, are based on a person's subjective expectations about the likely consequences of implementing that behaviour and will determine a person's intention to apply, or not apply, this information behaviour.

The corresponding construct from the LTSI, performance outcomes expectations, is defined as a person's prospects that changes in job performance, in this case by applying the newly acquired information literacy competencies, will lead to valued outcomes.

In this study, one of the related items in the questionnaire was 'When I use the newly gained competencies to improve my performance I expect it will be valued positively in my study/work environment'.

1.4.2. Organizational Openness to Change representing Subjective Norms

In the TPB subjective or social norms, based on a person's normative beliefs, are considered to be proximal determinants of behavioural intention. Ajzen [58] distinguishes between injunctive normative beliefs about the expected positive or negative responses of important others to a given behaviour, and descriptive normative beliefs as to whether referent others also perform the intended behaviour. These beliefs result in a person's perceived, and therefore subjective social pressure to perform or not perform a specific behaviour, in this study the transfer of newly acquired information literacy competencies. Here, 'important others' in the study context are the participants' fellow students and lecturers and in their work context their colleagues and supervisors.

Organizational openness to change is particularly relevant for the prominence given to lifelong learning. It reflects an open attitude of individuals, teams, or organizations towards the use of newly gained insights and acquired competencies that are 'out of the ordinary' but that might benefit individual and organizational performance. Research shows that there is a direct relationship between organizational openness to change and the transfer of learning [63,64]. In this study, we have asked participants if they expect (pre-intervention) or have experienced (post-intervention) an open atmosphere that enables their behavioural changes, encouragement to use newly acquired competencies to improve performance, and an open attitude towards change if this will improve the performance of the group or team.

1.4.3. Performance Self-Efficacy representing Perceived Behavioral Control

The third proximal variable in the TPB is also based on a person's accessible behavioural beliefs. Here, these beliefs express the expectations about factors that may facilitate or impede the intended behaviour, based on her or his previous experiences and the anticipation of future conditions. These control factors may refer to internal con-

trol aspects like personal skills, abilities or deficiencies, or external control aspects like given opportunities and available resources like time and money needed to perform the intended behaviour. According to Ajzen, perceived behavioral control is assumed to have a moderating effect on the influence of the other two proximal constructs attitude and subjective norm on behavioural intention [58]. This means that a person's feeling of being able to perform an intended behaviour may overrule the influence of attitude and norms on intentions. When it appears to be difficult to estimate actual behavioural control, a person's perceived, and hopefully realistic, behavioural control can be used as a proximal determinant of behaviour itself.

In the TPB, perceived behavioral control consists of two concepts: controllability and self-efficacy. The first relates to the belief that one's behaviour is volitional or by one's own autonomous choice. Self-efficacy stems from Bandura's social cognitive theory and is considered to be an important precondition for behavioural change. It is a person's confidence that s/he can accomplish a specific goal or master and perform a specific behaviour. In the LTSI, self-efficacy is defined as "an individual's general belief that he is able to change his performance when he wants to". The predictive value of self-efficacy in direct or indirect relation to transfer behaviour is well-supported by previous research in a variety of fields [65–67]. Also, Machin [68] found that pre-training self-efficacy significantly predicted post-training self-efficacy, which in turn predicted transfer implementation intentions.

In this study, we have investigated both the controllability and self-efficacy aspects of perceived behavioral control. We have asked participants how confident they were that they will be (pre-training) or have been (post-training) able to use newly gained transfer competencies, overcome obstacles that may hinder the use of new learning, complete the tasks and reach the goals of the course, and improve their performance through this course.

In conclusion, the present study aimed to contribute to the research debate on transfer and offer suggestions for the design of transfer-enhancing education in various ways. The first aim was to investigate if a multi-contextual perspective, at the moment largely missing in transfer research, would be of additional value when designing training in generic competencies. The second aim was to complement limited research on the longitudinal character of the transfer process by measuring the relationships between three TPB/LTSI variables and the learner's transfer intentions at three moments in time: at the start, at the end, and three months after training. The third aim was to investigate the predictive validity of a combination of Ajzen's TPB and Holton et al.'s LTSI (Figure 1).

Based on these three aims, the study tested the following set of hypotheses:

Hypothesis 1 (H1). *As an indication of the longitudinal character of the transfer process, we expected that performance outcomes expectations (attitudetoward the behavior), organizational openness to change (subjective norms), and performance self-efficacy (perceived behavioral control) would predict each other before, directly after, and three months after training.*

Hypothesis 2 (H2). *We anticipated positive relationships between performance outcomes expectations (attitudes toward the behavior), organizational openness to change (subjective norms), and performance self-efficacy (perceived behavioral control) with intention to transfer.*

Hypothesis 3 (H3). *We assumed positive relationships between post-training transfer intentions and transfer behaviour.*

Hypothesis 4 (H4). *We expected a difference in the relationships between performance outcomes expectations (attitude toward the behavior), organizational openness to change (subjective norms), performance self-efficacy (perceived behavioral control) and intention to transfer for the study and work contexts (H4).*

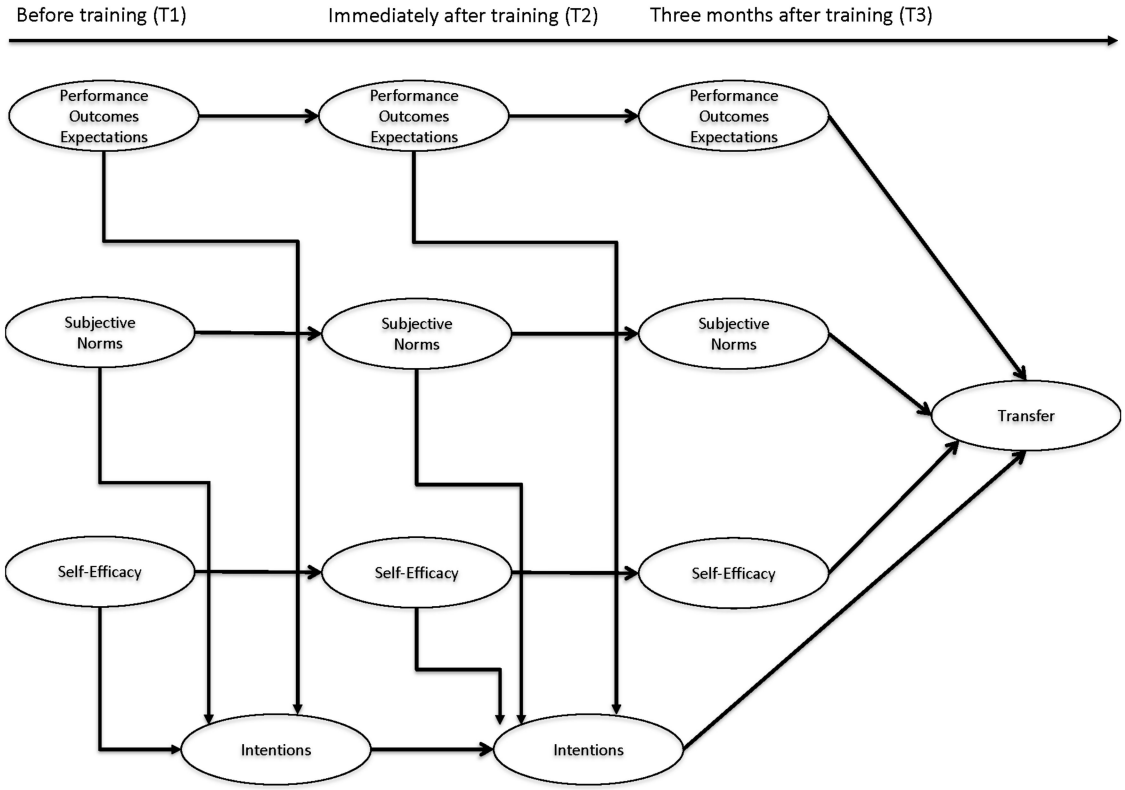

Figure 1. Hypothesized path model used for the study and work contexts.

2. Methods

2.1. Participants

Participants in this study were non-traditional adult students who enrolled in training in information literacy during their first year of the premaster Learning Sciences at the Open University of the Netherlands. A majority of the students studied part-time and worked in addition to their university studies as a teacher in primary, secondary, and higher education. The study used three measurement moments in time: before training, immediately after training, and three months after training. Due to drop-out and non-response, 82 (68 women, 14 men) of the initial 366 respondents participated at all three measurement times. We have used a convenience sampling approach and performed a non-response analysis. This did not result in any significant differences in the demographic profiles of participants in measurement times 1, 2, and 3, signalling that drop-out did not tend to be an issue.

Table 1 presents demographic information of all study participants in terms of their gender, work experience, and work type characteristics.

2.2. Training Course and Procedure

To prepare them for their study, all students were required to complete a mandatory web-based course Information Literacy for Social Scientists (4.3 ECTS) [69]. The instructional design of this course was based on the Four-Component Instructional Design (4C/ID) model [70] with performance feedback and integrated five authentic tasks that varied in level of support [20,71]. An example of the tasks was "For this assignment, you will search for scientific resources in the Library system of the Open University. It is important to work systematically, selecting the proper search strategy in advance and if necessary, adjusting it based on your experiences. Generate effective search terms based on the given guidelines. And consider the use of grey literature and the use of the snowball search technique. It is important to document this process to maintain your systematic approach".

The procedure for this study followed a longitudinal survey design with three measurement times. Before starting the web-based course and immediately after the course,

students were asked to fill out a questionnaire that was integrated into the electronic course. A third questionnaire was sent by email three months after completion of the course. All students were assured that their responses were used confidentially for research purposes only and that their personal data and responses would be treated confidentially and with utmost care.

Table 1. Demographic characteristics of the study participants.

Variable	Frequency	Percentage
Gender		
Female	68	
Male	14	
Work experience		
Less than 2 years	6	7.3
2–5 years	12	14.6
6–10 years	17	20.7
More than 10 years	42	51.2
Work type		
Permanent position	67	81.7
Temporary position	5	6.1
Temporary employment agency	2	2.4
Voluntary work	1	1.2
Other work type	7	8.5

2.3. Measures

The measures were collected with three multi-item questionnaires, of which the pre- and post-intervention surveys were online and integrated into the course, while the third survey was emailed three months after the course. A Likert-type 7-point response format was used for all scales, ranging from 1 = "do not agree at all" to 7 = "totally agree". Following Ajzen's theory of planned behavior, the independent variables in this study were attitude, social norms, and self-efficacy (equal to perceived behavioral control) as well as intention to transfer [48]. The dependent variable was transfer of training. Table 2 shows three reliability indicators of each scale: Cronbach's Alpha, composite scale reliability, and average variance extracted.

Table 2. Reliability indicators of each factor in study and work contexts.

Factor	Study Context			Work Context		
	Cronbach's Alpha	Composite Scale Reliability	Average Variance Extracted	Cronbach's Alpha	Composite Scale Reliability	Average Variance Extracted
Performance outcomes expectations						
Time 1	0.74	0.76	0.52	-	-	-
Time 2	0.81	0.82	0.60	0.72	0.72	0.57
Time 3	0.73	0.75	0.51	0.91	0.91	0.83
Subjective norms						
Time 1	0.75	0.75	0.51	0.86	0.86	0.66
Time 2	0.80	0.80	0.58	0.86	0.86	0.68
Time 3	0.88	0.88	0.70	0.83	0.83	0.62
Self-efficacy						
Time 1	0.81	0.81	0.52	0.90	0.90	0.76
Time 2	0.89	0.89	0.67	0.87	0.87	0.69
Time 3	0.76	0.75	0.50	0.80	0.80	0.57
Transfer intentions						
Time 1	0.91	0.91	0.77	0.92	0.92	0.79
Time 2	0.98	0.98	0.94	0.96	0.96	0.88
Transfer						
Time 3	0.95	0.95	0.86	0.92	0.92	0.80

2.4. Analysis

Data analysis included two steps: data screening and path modelling. First, data screening suggested that data were non-normally distributed and missing at random; missing data were thus handled with the expectation-maximization imputation implemented in SPSS 28. Second, path modelling was performed using partial least squares-based structural equation modelling (PLS-SEM). PLS-SEM is robust against departures from normality in small samples [72] and was used in this study to test the hypothesized relationships among variables based on the path weighting scheme algorithm implemented in SmartPLS 3.3 [73]. As recommended in Hair et al. [72], we estimated the psychometric properties based on three reliability coefficients and used the cut-off criteria of the average variance extracted (AV) > 0.50, composite scale reliability (CS) > 0.60, and Cronbach's a > 0.70.

3. Results

Figures 2 and 3 show the path coefficients of the two PLS-SEM models for the study and work contexts, respectively.

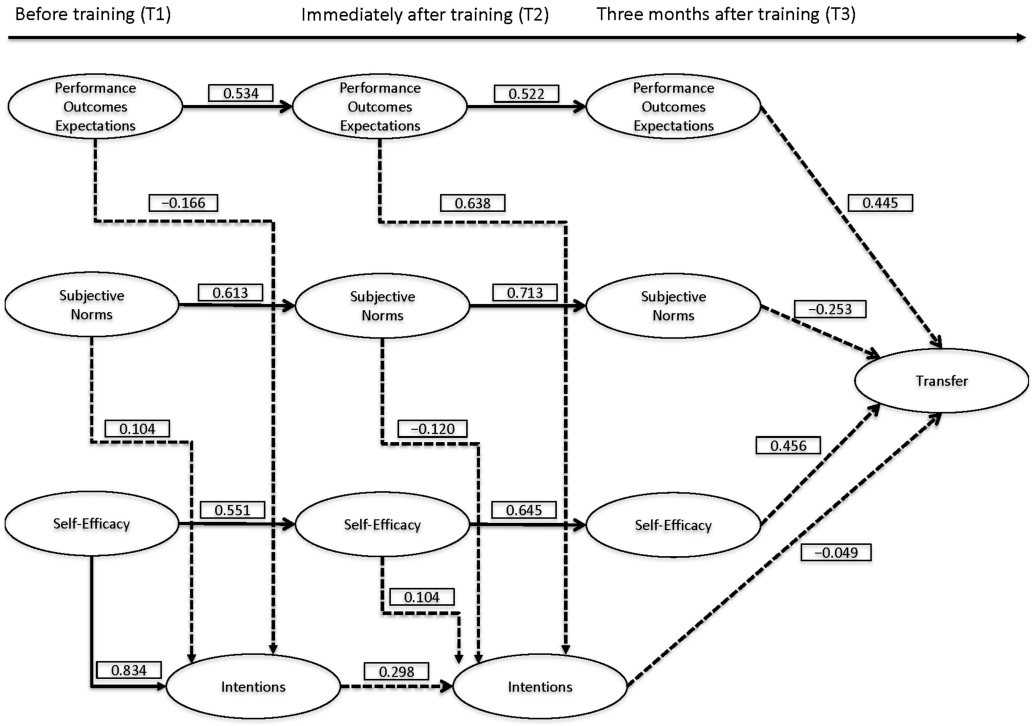

Figure 2. Path model with parameter estimates for the study context. Note: Solid lines indicate significant relations ($p < 0.05$), and dashed lines indicate non-significant relations ($p > 0.05$).

In line with Hypothesis 1, the findings illustrate the expected longitudinal character of the factor predictions. Performance outcomes expectations (attitude toward the behavior), organizational openness to change (subjective norms), and performance self-efficacy (perceived behavioral control) at Time 1 predicted the respective measures at Time 2, which in turn predicted the respective measures at Time 3. This pattern was identical for the study and work contexts.

In line with Hypothesis 2, the findings illustrate that performance outcomes expectations (attitude toward the behavior), organizational openness to change (subjective norms), and performance self-efficacy (perceived behavioral control) were associated with intention to transfer, albeit not always at a statistically significant level ($p < 0.05$). The strongest predictor of transfer intentions was transfer self-efficacy. This pattern of findings was similar for the study and work contexts and for the measures at Time 1 and Time 2.

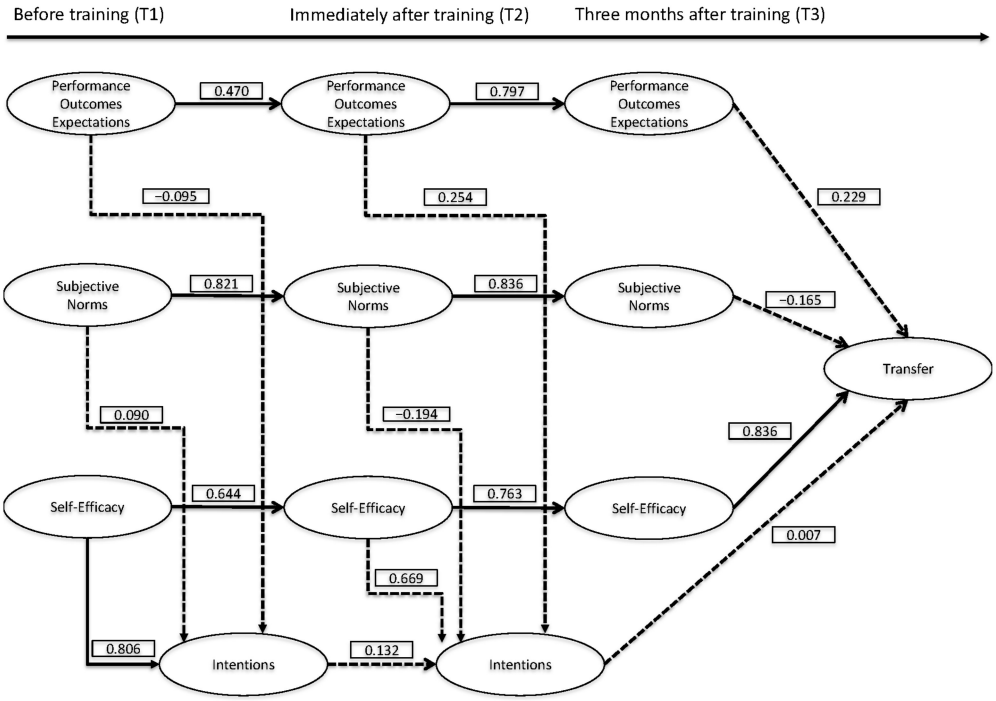

Figure 3. Path model with parameter estimates for the work context. Note: Solid lines indicate significant relations ($p < 0.05$), and dashed lines indicate non-significant relations ($p > 0.05$).

In line with Hypothesis 3, the results indicated positive relationships between post-training transfer intentions and transfer behaviour in the work context; however, the path coefficient was marginal. In the study context, transfer intentions after training were weakly and non-significantly associated with transfer three months after training.

Finally, in line with Hypothesis 4, the findings reveal several differences between the study and work contexts in the size of the parameter estimates between performance outcomes expectations (attitude toward the behavior), organizational openness to change (subjective norms), and performance self-efficacy (perceived behavioral control) and intention to transfer for the study and work contexts. These differences highlight the need to examine several contexts for the transfer of generic skills and underscore the importance of adopting a multi-contextual perspective in the transfer of training literature.

4. Discussion

The accelerated developments in contemporary information-based societies not only increasingly require lifelong learning but also the acquisition of generic competencies, like information literacy, which can be applied in multiple contexts like study, work, and everyday life. Training in these competencies typically focuses on a single work of educational context and therefore leaves their potential multi-contextual value largely unused. Furthermore, the application or transfer of new learning, considered to be the main goal of training, appears not to be self-evident, especially in formal educational settings. Evaluation of the transfer process generally takes place during post-training tests and by assessing which aspects have influenced the transfer of learning after training. This limited focus misses out on aspects that may have affected this process in a more longitudinal trajectory, so also directly before and some time after training. The present study combined a multi-contextual and longitudinal perspective by investigating non-traditional students' intention to transfer newly acquired generic information literacy competencies to multiple contexts before, directly after, and three months after training.

The first aim was to investigate the relevance of adopting a multi-contextual starting point when designing training-for-transfer in generic competencies, more specifically in information literacy. In this way complement transfer research that has mainly been

focussed on single-context transfer, typically from training to work or an educational environment. We have used the theory of planned behavior (TPB), in combination with three constructs from the Learning Transfer System Inventory (LTSI) to investigate their influence on the non-traditional students' intention to transfer newly acquired information literacy competencies to both their study and work environments.

Partial least squares-based structural equation modelling (PLS-SEM) showed clear differences between the parameter estimates for the study and work contexts before, directly after, and three months after training (H4). The results confirm and complement the outcomes of two previous pre-training sub-studies [20,35], indicating the added value of adopting this multi-contextual perspective.

These results can be used by educational designers to develop transfer-enhancing curriculums for generic information literacy competencies for non-traditional adult students. First and foremost, designers should be made aware of the broader relevance of these competencies, in this case, information literacy, for the process of lifelong learning. By emphasising the potentially wider applicability of the training in their training descriptions and curriculums, going beyond the limited traditional focus on one single work or education context, they might strengthen the learners' motivation to attend, finish, and transfer training. This is all the more relevant to adult learners who are characterized by their desire to know in what way training might be helpful in their various life contexts. Additionally, providing them with a set of competencies to engage in multiple contexts in a demanding information-intensive society may shift their focus from learning for a grade within the training context to a more general 'transfer mindset' [74] or 'spirit of transfer' [21]. During training, lecturers could assess and discuss different application contexts that might be relevant to the participants, learn about their specific information literacy characteristics and practices, and offer opportunities, for example in case studies, to apply and test these competencies in the different contexts. Furthermore, training content might combine the concepts and techniques suggested by Perkins and Salomon [75]. Educators could start with so-called low-road transfer, using examples in which training and application contexts are comparable and apply the technique of 'hugging' by emphasizing the similarities between these contexts and the appropriate skills. In the next step, they could focus on transfer to significantly different contexts, so-called high-road transfer, and use the technique of 'bridging', i.e., mindfully tailoring the information literacy concepts and practice to these new contexts and discussing aspects that may foster or impede transfer.

The second aim of this study was to complement limited research on the dimensionality of the transfer process by measuring the relationships between three TPB/LTSI variables and the learner's transfer intentions at three moments in time: at the start (T1), at the end (T2), and three months after (T3) training. Generally, transfer outcomes from one-shot post-training retention tests are used as indicators of training success. Also, the evaluation of the transfer process itself typically takes place after training, focussing on aspects that may have influenced transfer during or at the end of the training. In this way, neglecting variables that may be of influence already before or some time after training. In response to a call for longitudinal research on transfer [29,36,38,68], the current study is one of few that has used three measurement moments to identify at what stage in the transfer process each factor is most influential and how this may change over time. It followed up on two previous sub-studies [20,35] that have indicated the relevance of including the pre-training stage when evaluating the transfer process.

Results of PLS-SEM analyses showed clear and significant trajectories between T1, T2, and T3 of each of the three LTSI variables performance outcomes expectations (POE), organizational openness to change (OtC), and performance self-efficacy (SE). Additionally, the parameter estimates increased during the transfer process. Furthermore, only in the pre-training phase transfer self-efficacy significantly predicted transfer intentions in both study and work contexts while it predicted training transfer only in the work context three months after training. These differences in outcomes are indicative of the longitudinal and changeable character of the transfer process (H1). This might lead educational designers

to take the pre-training (T1) and, if possible, the retention phase (T3) into consideration when designing and evaluating training-for-transfer. Already in the pre-training phase, they might increase the learner's intention to transfer by the way they frame the training in curriculum descriptions and course materials. This may include an emphasis on the mandatory character of the training as an indication of its relevance. They can also highlight the multi-contextual value and applicability of information literacy competencies as discussed before and shift the students' focus from merely the training context to a more longitudinal transfer and lifelong learning perspective. This might help students to become more aware of aspects that may be of influence during the various stages of the transfer process and to take appropriate measures to enhance the transfer of learning.

The third aim was to investigate the predictive validity of a combination of Ajzen's TPB and Holton et al.'s LTSI, more specifically the influence of three theory-based variables on the non-traditional students' intention to transfer newly acquired generic information literacy competencies. In doing so, responding to calls for additional research on transfer intentions [55,76], on multi-contextual transfer [77], and on the antecedents of not only behavioural intentions (TPB), but also of their consecutive translation into actual transfer behaviour (LTSI) [40]. In this study, the LTSI, performance outcomes expectations(POE) is associated with TPB's attitude toward the behavior, (AtB) organizational openness to change (OtC) with subjective norms (SN), and perceived behavioral control (PBC) with performance self-efficacy (SE).

Despite strong data sets results show that in both study and work contexts, there were limited significant relationships between POE/OtC/SE and intention to transfer at all three measurement moments (H2), and between transfer intentions and transfer behaviour (H3). Only self-efficacy predicted transfer intentions before training in both study and work contexts, and transfer behaviour in the work context three months after training. One possible explanation of these results may be the selection of the LTSI constructs allocated to the TPB antecedents as used in this study. Furthermore, the longitudinal character of the study may have been of influence on the results. A previous pre-training substudy within the same research setting with 303 respondents showed clear and significant relationships between LTSI constructs and transfer intentions [20]. The non-significant results in the current study may have been caused by the limited sample size resulting from dropout and non-response three months after training, which is an acknowledged threat to longitudinal studies [78]. Also, a systematic review by McEachan et al. [79] indicated that the TPB was less predictive of behaviour when studies used a longitudinal rather than a 'shortitudinal' design.

When looking at the individual constructs, one can imagine that students may have considered openness to change to be inherent to their study environment and therefore did not perceive it as significant for their transfer intentions. This may also have been the case in their work context where they operated as autonomous professionals in an educational environment. It seems obvious that the application of generic competencies like information literacy to improve performance is likely to be welcomed rather than criticized. Furthermore, while we expected that transfer intentions would influence transfer behaviour, only self-efficacy in the work context predicted transfer. As previous studies showed, mixed results of the predictive validity of self-efficacy for behavioural intention and transfer behaviour, additional interviews with respondents might have been of additional value in explaining these results.

5. Limitations and Directions for Future Research

This study indicated the value of adopting a multi-contextual and dimensional perspective when teaching generic information literacy competencies for transfer. Future research might address some of its limitations for generalization of the results.

First, this study took place in a specific setting: mandatory online training in generic information literacy competencies at the Open University for non-traditional students who studied besides their educational work. These aspects all have their specific characteristics

that might influence the transfer process. For example, previous research indicates that voluntary or mandatory training programmes may have a different impact on predictors of behavioural intentions used in the theory of planned behavior [80], or on antecedents of transfer of training like motivation [81]. Also, the online character of the training will require training didactics different from the ones used for face-to-face training. And non-traditional learners will require teaching strategies and training content that is more based on an andragogical than on a pedagogical approach as applicable to pre-adult learners. Additionally, information literacy is primarily a higher-order cognitive generic competency and transfer dynamics may be different when training involves, for example, more social or managerial generic competencies like communication or teamwork. Future research therefore might consider including voluntary training participation, different kinds of generic competencies or information literacy contexts, face-to-face or blended learning environments, and regular instead of non-traditional students.

Furthermore, this study used a relatively small sample size due to a drop in survey respondents between T1 (366) and T3 (82). Non-response and dropout are acknowledged complications in longitudinal studies that might threaten their validity, especially when using online surveys as in this study [78]. In our analysis, we have used PLS-SEM which is considered robust against departures from normality in small samples [72]. Our non-response analysis did not show any significant differences in the participants' profiles at the three measurement times. However, for follow-up studies with large numbers of dropouts and non-responses, we would advise paying attention to possible attribution bias and investigating potential causes and remedies as suggested in the extensive literature on longitudinal surveys.

Also, this study used self-report measurements as the only data source. This might lead to common method bias [82], i.e., variance in the measures caused by the methods used and not by the represented constructs. We have tried to reduce social desirability bias by offering a private online survey environment and by stating that all data would be anonymized. Although we concur with arguments against the use of single-source measurements, several characteristics, especially of the students' work environment, complicated the use of additional data sources suitable for both contexts. Respondents were distance non-traditional students working as autonomous educational professionals throughout the Netherlands. This makes evaluation of transfer behaviour through tests and direct observations by peers or supervisors, as common in study contexts, near to impossible. All the more so because the application of the newly acquired information literacy competencies involves high road transfer of open high-order thinking skills of which implementation depends on the circumstances and creativity of the user. Despite these limitations, we would welcome future research that investigates additional data sources suitable for simultaneous use in multiple contexts.

Finally, to investigate the antecedents not only of behavioural intentions but also of subsequent transfer behaviour, three TPB scales have been operationalized with three LTSI constructs. As this resulted in a limited number of significant predictors, future research might consider the use of different transfer models, theories, or LTSI constructs as suggested by Hutchins et al. [40]: expected positive and negative personal outcomes for AtB, feedback, support and effort-performance expectations for SN, and readiness to learn for PBC.

6. Conclusions

This study introduced a novel multi-contextual perspective for the transfer of generic competencies that are potentially suitable for use in multiple life contexts in the process of lifelong learning. In this way, extending the typical single-context focus on transfer from training to a work or educational environment. A second aim was to complement the limited research on the dimensional character of the transfer of learning by using three measurement times instead of the typical one-shot post-training test to evaluate the transfer process. Also, this study combined Ajzen's well-established theory of planned behavior and Holton et al.'s extensively tested Learning Transfer System Inventory to investigate the

antecedents of both behavioural intentions and transfer behaviour. Results indicated the value of adopting a multi-contextual and longitudinal perspective when investigating the transfer of learning. And, as this study endorses research on the development of transfer intentions into actual transfer behaviour, future research might investigate the potential value of alternative theories, models, and variables.

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