PREDICTING NON-TRADITIONAL LEARNERS' INTENTIONS TO TRANSFER GENERIC INFORMATION LITERACY COMPETENCIES FOR THE BENEFIT OF LIFELONG LEARNING: A MULTI-CONTEXTUAL AND LONGITUDINAL APPROACH

Laurent Testers

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Abstract

This dissertation investigates the significance of adopting a multi-contextual and longitudinal approach when designing transfer-enhancing education in generic information literacy competencies. To this end, it examines the influence of theory- and evidence-based contextual variables, taken from Ajzen's theory of planned behavior (1991) and the Learning Transfer System Inventory model (Holten et al., 2000), on the intention of non-traditional students enrolled in a-synchronous online education, to transfer generic information literacy competencies to two different contexts: their study and work. Studies 1 and 2 focus on organizational variables, Study 3 on learner characteristics, and Study 4 on variables from both domains. Investigating this within a single study adds a novel multi-contextual approach to the conceptual development of transfer studies that is currently absent from the literature. To investigate the longitudinal and dynamic nature of the transfer process, multi-item self-report questionnaires were used to gather data related to the two contexts at three moments in time: before, directly after and three months after training. Studies 1, 2 and 3 focused on the understudied pre-training phase, while Study 4 examined the dynamic character of the transfer process by including all three measurement times. In all studies, exploratory and confirmatory factor analyses were used to uncover the structure underlying the relatively large set of variables. Furthermore, structural equation modelling was used to test the hypotheses regarding the interrelationships among the multiple interacting variables in the studies. Results indicated that these variables had a distinctive influence on the students' transfer intentions, depending not only on the different stages of the transfer process but also on the transfer environment. This confirms the relevance of a multi-contextual and longitudinal perspective in designing education for the transfer of generic competencies. Implications for theoretical development and educational practice, as well as directions for future research, are discussed.

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1. Introduction

This dissertation examines the significance of a multi-contextual and longitudinal approach, currently largely absent from information literacy and transfer research, in designing transfer-enhancing education in generic information literacy competencies for the benefit of lifelong learning. This introduction describes the coherence, societal and scientific relevance, and intrinsic multi-contextual properties of the main concepts in this order: lifelong learning, non-traditional online learners, generic competencies and more specifically information literacy, and its education and multi-contextual transfer.

1.1. Lifelong Learning

In many of today's societies, we see the emergence of new developments at an ever-accelerating pace in all aspects of life. This means that knowledge and skills that have been acquired in the past quickly become obsolete. To be able to make well-informed decisions concerning life's constantly changing opportunities and challenges one has to stay up-to-date with the latest developments in study, work, and personal life. For this reason, learning was put on the international agenda already in the 1970s by organizations such as UNESCO, the European Council and the OECD that introduced different but overlapping concepts such as lifelong education, recurrent education, education permanente, and lifelong learning (Hager, 2021; Reischmann, 2014). After a decline in attention as a result of this conceptual ambiguity there was a revival of interest in the 1990s, partly as a result of globalization, the rise of neoliberalism and the importance of continuously creating and applying top-notch knowledge and skills to promote economic and technological competitiveness. During this period, there were two different interpretations of continuous learning: lifelong education and lifelong learning. The proponents of lifelong education advocated a structured, formalized and intentional way of continuous learning at educational institutions, guided by quality criteria and guarantees. Lifelong learning, also labelled lifewide learning (Reischmann, 2014) includes, besides intentional learning during formal and non-formal education, informal learning (Joosten-ten Brinke, 2008) and personal development *from the cradle to the grave*, characteristic of so-called learning societies and often taking place unconsciously, unintentionally, independently and self-directed during everyday life. Various definitions of lifelong learning exist, depending on their contexts. The European Commission describes it 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" (Eurostat). Today, its importance is emphasized by major global institutions, for example in the Sustainable Development Goals of the United Nations, the establishment of UNESCO's Institute for Lifelong Learning, and policy and strategy papers by global and regional organizations like OECD (2021), ILO (2023), World Bank (2019), the European Commission (2019), and ASEAN (Mateo, 2020). Their efforts are focused on the advancement of equal opportunities and social inclusion, active citizenship, employability, productivity, and the green transition, each with its own specific sets of required competencies.

1.2. Non-Traditional Learners

This revived attention for lifelong learning, driven by developments in online and distance education resulted, among other things, in an increase in so-called *non-traditional learners* in formal and non-formal continuous and periodic training, in this study used interchangeably with course or intervention, at colleges and universities (Francois, 2014; Jennings, 2021). Although a variety of characteristics have been attributed to this group of learners, one can generally describe them as adult students who have deviated from the traditional educational path and want to complete a degree after a significant interruption caused by various private circumstances. Or they return part-time to college or university because they want to, or have to, (re-)train for current or prospective jobs while working and having other responsibilities in life. They have different socio-economic and often unconventional educational backgrounds, different demographic characteristics, diverse life and work experiences, specific individual needs and preferences, and different motivational orientations (Francois, 2014) and engagement (Carreira & Lopes, 2021; Gegenfurtner et al., 2018; Jiang, 2020; Schuetze & Slowey, 2002; Zamecnik et al., 2022). The participants in the studies included in this dissertation, also referred to as students, learners, or trainees, were non-traditional students in their first year of the premaster Learning Sciences at the Open University of the Netherlands. They studied part-time and additionally worked as a teacher in primary, secondary, and higher education.

The characteristics of these adult learners require teaching methods that differ from those used in pedagogy that focuses on children and adolescents for whom education is the primary activity. To date, there is not one unified definition, theory, or model that explains how and why adults learn and how to best facilitate this highly independent and self-directed process (Merriam, 2017). One of the most renowned designers of adult education is Malcolm Knowles. In the 1970s he developed a model called andragogy by incorporating his own

educational experiences into a pre-existing concept coined in 1833 by the German educator Alexander Kapp. Andragogy, a set of principles Knowles (1980) considered applicable to most adult learning situations, has been defined as "… the art and science of helping adults to learn, and the study of adult education, theory, processes, and technology to that end" (Titmus et al., 1979). It is based on assumptions about the differences between children and adults as learners (Clapper, 2010). Knowles, focussing more on the learning process than learning content, assumed six unique characteristics and requirements that distinguish adults from pre-adult learners and that form the basis for specific procedures used in adult education (Knowles et al., 2015, pp. 47–49):

- the need to know why they have to learn something;
- self-directedness, a deep psychological need to be looked upon as capable of self-direction and responsible for their own lives and learning process without others imposing their will;
- a desire to contribute accumulated life and work experiences as valued resources for learning;
- readiness to learn based on the learner's needs when having to cope effectively with real-life situations;
- a pragmatic orientation towards learning, only wanting to learn what is needed and can be applied to help them deal with real-life situations; and
- intrinsic motivation to learn and develop rather than externally imposed motivators to participate in learning.

Although andragogy is widely used for adult education, critics have argued that Knowles' initial model, besides lacking validity and consistent learning effectiveness, assumed that all adults have the same unique and distinctive characteristics and educational experiences, regardless of their specific backgrounds, demographics, and circumstances (Clapper, 2010; Clardy, 2006). Knowles acknowledged these initial shortcomings and endorsed the diversity in adult learners as described above. In response, he positioned pedagogy and andragogy within a continuous lifelong learning process where previously distinctive characteristics for children and adults, like self-directedness and intrinsic motivation, could apply to both groups, depending on the circumstances and the qualities of the learners. More recently, in addition to this focus on the characteristics of the individual adult learner, there is an emerging recognition of the role of *context* in the adult learning process, where context is

conceived as ”a broad concept referring to where the learner is situated concretely (as in the workplace) or socio-culturally (…). This linking of the individual’s learning process to his or her context makes for a richer, more holistic understanding of learning in adulthood” (Merriam, 2008, p. 95).

1.3. Online Adult Education

Earlier we mentioned that the rapid social and technological developments require continuous learning. At the same time, these also provide new opportunities to do so. One development that has promoted and facilitated the lifelong learning process among adult learners is the rapid rise of digital education delivered in synchronized, asynchronous, blended, flipped and massive open online course (MOOC) formats (Van Doorn & Van Doorn, 2014), accessible at or close to homes or workplaces. The adult non-traditional learners in this dissertation studied at the Open University in the Netherlands, which offers asynchronous online education characterized by individual focus and independence of time, place and group. This means that the training programme did not involve direct physical or electronic contact with fellow students, while contact with instructors about training assignments and results was primarily via e-mail.

Compared to face-to-face education, this online way of teaching offers students the much-appreciated flexibility in time and place when taking the education in combination with other work- or family-related activities (Chang et al., 2015; Gegenfurtner et al., 2018; Ebner & Gegenfurtner, 2019). It may also enhance their motivation to participate in continuing education (Gegenfurtner et al., 2019). A prerequisite is that students have access to these online resources and an open attitude to use them, as well as sufficient skills, self-confidence, support and encouragement (Merriam & Bierema, 2013).

The rise of online education has led to the development of a variety of online learning theories such as community of inquiry, connectivism, and online connective learning, each explaining and supporting the online learning process with their specific approach. Concerning adult online learning, andragogy is also considered by many to be a theory of distance education because of its high percentage of adult learners (Simonson & Zvacek, 2024), offering various suggestions for the design of distance educational systems for adults. In general, this should take into account, among other things, learner-related characteristics like background, technology and information literacy proficiency and self-efficacy, performance expectations, preference for an asynchronous or blended approach, and external factors like programme structure, requirements and flexibility, time constraints, work and

family responsibilities, social influences, and a supportive and respecting learning climate (Knowles, 1980; Lu et al., 2022; Merriam & Bierema, 2013). We recognize these aspects as contextual variables that also influence the next stage in the learning process, namely the transfer of learning, a relatively understudied topic in adult learning literature (Merriam & Leahy, 2005).

1.4. Transferable Generic Competencies

The renewed focus on lifelong learning increased not only the number of non-traditional learners but also the demand for and attention to so-called *generic skills*. Notably, the shift since the late 1980s from industrial- to more service-, knowledge- and information-based economies and the associated rapid technological, scientific and also social changes required the acquisition of new professional and personal abilities (Peverati, 2014). While still an indispensable aspect of education and work, content or domain-specific knowledge alone no longer guaranteed personal, academic and professional success but required a broader set of skills (Carvalho & Rabechini, 2015; Deming, 2017; Rios et al., 2020; World Economic Forum, 2016), complementary and synergistic to contextualized skills (Billing, 2007; Salomon & Perkins, 1989). Across professional fields, employers and governments confirmed the importance of these skills for employability, workplace productivity and international competitiveness in a globalizing world and prompted higher education institutions to pay more attention to education in generic abilities (Billing, 2007; Clarke, 2018; Cornford, 2005; Suleman, 2018).

A variety of names are assigned to these generic abilities, including generic skills, soft skills, 21st-century skills, lifelong skills and transferable skills, while their interpretation depends on the contexts in which they are used. They may consist of intrapersonal skills such as self-regulation of emotions, self-awareness and ethics, or refer to interpersonal skills such as teamwork, conflict management, and verbal and nonverbal communication. They may also be of a higher-order cognitive nature like critical thinking, learning how to learn, meta-cognition and information literacy, the competency in which the participants in this dissertation were trained. This diversity makes it difficult to conceptualize, organize and assess them unambiguously (Rios et al., 2020). In a general sense, however, the term generic means that they are generalizable and thus suitable for application in diverse situations, making them particularly relevant for lifelong learning. This transferability, an intrinsic property of generic skills (Popov, 2019), involves a process of generalization and adaptation to new and varying settings. Practice, however, shows that training in generic skills tends to

focus on application within one specific context, field or profession. Management training in teamwork or conflict management, for example, will focus on their application in specific work contexts, while information literacy training in higher education is particularly focused on study purposes. To harness their broader potential in the context of lifelong learning, therefore, requires a shift from this mono-contextual to a broader multi-contextual perspective at all stages of the learning process, including the transfer phase. Pointing out this wider utility may not only lead to a change in mentality among students from *learning for a grade* to a more general *transfer spirit* (Haskell, 2001). It can also increase the learners' motivation to participate in training, and their intention to apply new learning in 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.

1.5. Information Literacy

A transferable generic skill that is particularly relevant to contemporary information-intensive societies is information literacy, a concept coined by Zurkowski in 1974. This is the competency to find, critically analyse and contextualize, process, and present required information in any form in an effective, efficient and ethical way (Johnston & Webber, 2003). These components are incorporated under different wordings in a variety of models, including the Information Problem Solving model by Brand-Gruwel et al. (2005). This, combined with the 4C/ID model (Van Merriënboer & Kirschner, 2018) for learning complex cognitive skills, was used for designing the information literacy course that the participants in this research took while studying Educational Sciences at the Open University in the Netherlands. This dissertation uses the broader term generic information literacy competencies instead of skills to emphasize that it entails, besides practical skills, domain-specific knowledge and an open, inquisitive and critical disposition. According to the American Library Association (1989) information literate individuals:

> … have learned how to learn. They know how to learn because they know how knowledge is organized, how to find information, and how to use information in such a way that others can learn from them. They are people prepared for lifelong learning because they can always find the information needed for any task or decision at hand.

The United Nations Educational, Scientific and Cultural Organization (UNESCO) considers information literacy a basic human right and the foundation for independent self-directed

lifelong learning, both of which are considered *beacons* of information-intensive societies. It applies to all disciplines, learning environments and levels of education, while at the same time recognizing differences in learning styles and contexts. Its Information for All Programme considers it a prerequisite for democracy as it enables citizens to find and access information about their health, environment, education and work, and use it to make informed decisions about their lives. This in an era characterized by an overload of information and facts being replaced by fake news, deepfake, chatbots and conversational agents such as ChatGPT, raising questions about reliability, authenticity and validity (ACRL, 2000). For this reason, the institute and others advise introducing information literacy in national tertiary, non-formal and lifelong education (Abid, 2005; Webber & Johnston, 2014). Not least to strengthen competitiveness, and improve the employability and adaptability of the workforce in knowledge-intensive work environments (Commission of the European Communities, 2000).

In higher education, unfortunately, this conception of information literacy as a generic, multi-contextual competency has usually been interpreted as a one-size-fits-all educational practice where one set of standardized context-independent skills is considered applicable to all other environments. Or been neglected when focusing on only a single context, typically formal education or, to a lesser extent, work. It is not without reason that information literacy skills are often associated with study skills learned and used merely within formal academic and library settings (Hoyer, 2011; Lloyd, 2005; Tuononen et al., 2022). This dissertation broadens this de facto limited mono-contextual perspective by assuming its broader multi-contextual applicability in lifelong learning, as articulated by major international organizations. Previous initiatives that paid attention to the role of context in the information literacy debate focused mainly on its definition, conceptualization and corresponding educational practice. They extended its narrow interpretation as the acquisition of textual learning skills and attributes to a more holistic socio-cultural and even corporeal (Lloyd, 2010) process that is influenced by the diverse ways in which information manifests itself in different contexts (Bundy, 2004). Among others, Lloyd (2005) recommended educational designers pay more attention to the specificities of these contexts to improve information literacy education and contribute to truly generic and transferable learning practices. Later initiatives like the Information Literacy and Lifelong Learning model by Irving et al. (2015) and Sayyad Abdy's Information Experience Design (Bruce et al., 2017), emphasized the multi-contextual value of information literacy for lifelong learning. This dissertation applies this multi-contextual perspective to the transfer phase in the educational process and

investigates the influence of contextual factors on students' intention to transfer newly acquired information literacy competencies to two different contexts.

1.6. Transfer of Learning Theories

As mentioned earlier, to make well-informed decisions in a rapidly changing and increasingly complex world it is important to keep abreast of relevant social, economic, and technological developments in society. In the globalizing and highly competitive business environment, this sparked in the 1980s the development of countless professional training programs worth billions of dollars. At the same time, these significant investments provided the impetus for extensive research on questions about their effectiveness and to what extent training was actually applied at, or transferred to, the workplace and contributed to improved personal and business performance.

This relatively recent interest in the transfer of learning, with its cognitive, social-emotional and motor dimensions, is built on a long tradition of research from a variety of backgrounds, including human resource management, psychology, and education. This has led to an ongoing lively debate on the nature of successful transfer, its what, how, when, where and how long, and its underlying mechanisms (Lobato, 2006). In this dissertation, a more classical interpretation of transfer is used namely the application of what has been learned in new situations (Testers et al., 2019). It is generally regarded as the raison d'ètre of education and an indication of its effectiveness and therefore its quality. And, as noted earlier, it is intrinsic to lifelong learning and generic competencies such as learning, thinking, problem-solving (Haskell, 2001, p. xiii), learning-to-learn (Bond, 2022), and information literacy. Although transfer of training and transfer of learning are often used interchangeably, in this dissertation the latter concept is preferred as it broadens transfer beyond a limited work-related formal and informal training setting.

While it is generally considered an essential aspect of education and training, paradoxically, ample research for over a century indicates that transfer of learning (hereafter transfer), although ubiquitous in daily life, is limited in formal educational or organizational settings (Baldwin et al., 2017; Ford et al., 2018, p. 220; Katsioloudes, 2015; Perkins & Salomon, 2012). Or, in the words of Haskell (2001, 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". This also applies to the transfer of specifically generic competencies (Leberman & McDonald, 2006), with research showing a mixed picture of its success, among

other things, because of ambiguity in its operationalization (Laker & Powell, 2011) and measurement (Massenberg et al., 2017). Also, previous and anecdotal evidence shows that "soft skills training is significantly less likely to transfer from training to the job than hard-skills training" (Laker & Powell, 2011, p. 120). Furthermore, this transfer problem occurs when it involves, what Perkins and Salomon refer to as *far transfer*, where the training and application contexts are significantly different, as is the case in this dissertation (Jaeggi et al., 2014; Perkins & Salomon, 1992). These transfer problems not only affect the quality of education but also lead to a loss of valuable resources made available by governments, organizations, companies and educational institutions (Blume et al., 2010; Ford et al., 2018; Grossman & Salas, 2011). Not surprisingly, the results of a comprehensive survey indicated that a majority of 1.500 senior managers at 50 organizations that were interviewed were dissatisfied with the learning and development outcomes of their companies (Beer et al., 2016). The recognition of these transfer problems resulted in extensive research from different viewpoints and the development of a variety of cognitive, behavioural and contextual theories, taxonomies, and complementing or competing models, illustrating the complexity of the transfer process and the desire to understand its dynamics.

At the beginning of the 20th century, for example, Woodworth and Thorndike (1901) developed their theory of identical elements, challenging the assumptions earlier made in the Formal Discipline theory of transfer. They assumed that transfer is more likely to happen when the learning and transfer situations share observable and measurable identical physical or common stimulus elements. This is also referred to as *near* transfer (Perkins & Salomon, 1992) and generally involves so-called *closed skills* that have a single correct way of application. Later this position was confirmed by Detterman who argued that the transfer of generic or non-specific concepts, principles and strategies, also labelled *far* transfer, would rarely occur (1993, p. 5). Successful *near* transfer of context-specific skills and knowledge to identical situations, for example within a training setting, has since been extensively researched and confirmed (Doyle, 2004; Leberman et al., 2006).

However, it is particularly this *far* transfer that is required within the changing contexts of lifelong learning and the increasing importance attributed to generic competencies. In the case of information literacy, this involves the so-called *high-road* (Perkins & Salomon, 1992) or mindful transfer of generic, complex multi-faceted higher-order cognitive competencies (Brand-Gruwel et al., 2005; Reece, 2005), also labelled *open skills*, whose application largely depends on the creativity of the learner in unpredictable and changing situations (Laker & Powell, 2011). Comprehensive research since Woodward and

Thorndike has gathered accumulated evidence that competencies can be generalized and transferred from training to new and different settings, provided appropriate conditions and teaching practices are met, and depending on the way transfer is conceptualized and accordingly assessed. Various progressive transfer theories responded to criticism of traditional, primarily cognitive interpretations of transfer, that consider it merely a replicative exercise and transportation of knowledge and skills from one setting to another, irrespective of the influence of context (Hager & Hodkinson, 2009). Of these innovative perspectives, such as actor-oriented transfer (Lobato & Hohensee, 2021), expansive framing (Engle, 2006), and boundary crossing (Engeström et al., 1995), particularly *preparation for future learning* (Bransford & Schwartz, 1999) offers an interesting approach for transfer to new and constantly changing information-intensive contexts during lifelong learning. It focuses on "people's abilities to learn new information and relate their learning to previous experiences" (p. 69) rather than only on the replication of course content. In this respect, transfer is considered more as an attitude, habit of mind, or transfer spirit (Haskell, 2001).

Consistent with the various conceptualizations of transfer are the views on how to evaluate the transfer process. A common way is to assess the productive use of the training content as a transfer outcome (De Corte, 2003; Gegenfurtner, 2011), typically during one-shot post-training summative knowledge and behavioural tests by peers and supervisors. This might be appropriate when it involves the *near* transfer of context-specific knowledge and functional skills to comparable contexts. It becomes problematic when it involves *far* transfer of more generic competencies or soft skills to deviant contexts, especially when it comes to complex high-order cognitive competencies like information literacy, whose application depends on the given situation and the creativity and adaptivity of the learner. This is all the more true if it involves predominantly independently operating professionals, as is the case in this dissertation.

1.7. Transfer of Learning Predictors

An alternative approach is to shift the focus from measuring transfer outcomes to the transfer process itself by examining context-specific antecedents of transfer. Baldwin and Ford (1988) were among the first to identify contextual socio-cultural variables influencing transfer success. Their systematic review of existing transfer research published from the 1950s to the 1980s resulted in a linear model entailing three domains: trainee characteristics, training design, and work environment. The latter is more commonly referred to as transfer climate, situational constraints, and application or organizational environment, terms used

interchangeably in this dissertation. In the years to follow extensive empirical research has complemented the original limited set of transfer-related contextual variables.

As mentioned earlier, the main goal of this dissertation is to examine the relevance of using a multi-contextual and longitudinal perspective in designing transfer-enhancing generic information literacy education for lifelong learning. To this end, the main general research question in all four studies was: to what extent do contextual variables influence the transfer of learning process to two different transfer environments, hypothesizing that final parameter estimates would differ between both contexts. In each of the studies, this was shaped in its own manner and is further explained in section 4, Overview of Studies. The variables were taken from the Learning Transfer System Inventory (LTSI) by Holton and colleagues (Bates et al., 2012; Holton et al., 2000), a well-established and internationally validated instrument for measuring the influence of sixteen constructs on the transfer process.

In this dissertation transfer of learning is considered a dynamic process that unfolds over time, starting before, and continuing during and after an intervention. In doing so, responding to calls to supplement limited transfer research and modelling using a longitudinal design (Blume et al., 2017; Bruce et al., 2017; Deckers et al., 2022; Gegenfurtner et al., 2009, 2013; Hinrichs, 2014; Massenberg et al., 2017; Quesada-Palarès et al., 2022; Schoeb et al., 2021; Testers et al., 2019, 2020, 2024). To this end, Studies 1, 2 and 3 applied a cross-sectional approach and investigated the transfer process at a rarely examined pre-training stage, while Study 4 used three measurement times: before, directly after and three months after training.

In the LTSI model motivation to transfer is considered a proximal predictor of individual transfer performance. In this dissertation, we consider the intention to transfer a stronger antecedent of transfer behaviour. Although both concepts are closely related and intention is sometimes regarded as a dimension of motivation (Gegenfurtner et al., 2010, 2013) or used interchangeably with motivation (Connor & Armitage, 1998; Foxon, 1994; Mishra & Sahoo, 2022), we consider both successive steps in a continuous motivational process (Al-Eisa et al., 2009; Hutchins et al., 2013; Li et al., 2020; Quesada-Pallarès & Gegenfurtner, 2015). While intrinsic and extrinsic motives represent the reasons for people to perform a specific behaviour, intention is the pinnacle of the motivational process, expressing a stronger propensity to perform a specific behaviour than motivation (Hutchins et al., 2013). Various theories consider intention a reliable predictor of behaviour including Ajzen's well-established socio-psychological Theory of Planned Behavior (TPB), applied in a broad spectrum of contexts and behaviours (Ajzen & Schmidt, 2020; Sheeran et al., 2016;

Steinmetz et al., 2016). Ajzen considers behavioural change the result of behavioural intention and defines intentions as "indications of how hard people are willing to try, how much of an effort they are planning to exert, in order to perform the behavior. As a general rule, the stronger the intention to engage in a behavior, the more likely should be its performance" (1991, p. 181). It assumes that attitude toward a behaviour, social norms, and perceived behavioural control predict behavioural intentions and thus behaviour and has, among other things, successfully been used to predict the transfer of learning (Cheng et al., 2015; Gegenfurtner & Testers, 2022; Jacot et al., 2018; Quesada-Palarès, 2012). As the name implies, the TPB assumes that the formation of behavioural intention is a largely conscious, rational and planned process. Although this basic principle has been criticized for this restrictive premise, for example in the health sector (Sheeran et al., 2013; Sniehotta et al., 2014), it applies to high-order cognitive information literacy behaviour that largely requires a person's conscious attention, for example in formulating an accurate information question, selecting the most appropriate information sources, and critically evaluating the results.

Based on their literature review Cheng and colleagues (2015) concluded that a link between trainees' intention and transfer behaviour was largely missing from transfer research and models. Also, Hutchins and colleagues (2013) noticed that only little prior research existed on the relationship between intention to transfer and multiple transfer-related factors. To better understand the psychological processes and variables involved at all stages of the transfer process this dissertation responds to their call for additional research that combines the TPB, which provides insights into the antecedents of behavioural intentions, with the LTSI model that offers an understanding of the antecedents of transfer behaviour itself (p. 259).

In summary, this introduction elaborated on the importance of a multi-contextual and longitudinal approach in designing transfer-enhancing education in generic information literacy competencies for the benefit of lifelong learning. Thus connecting to current developments in society and exploring aspects of the transfer of learning which to this day are largely absent from transfer and information literacy research. This resulted in the aims described in the following section.

2. Aims

The overall goal of this dissertation is to foster transfer-enhancing education in generic competencies that utilizes their intrinsic multi-contextual and transferable nature for the benefit of lifelong learning. To this end, educational designers need to know whether, and to what extent, context-specific variables from the intended transfer environments influence the transfer of learning process. And thus, whether it is important to adopt a multi-contextual and longitudinal perspective in designing education in generic competencies.

Starting from the theoretical background described in the introduction, the first aim is to examine the significance of using a multi-contextual approach when designing transfer-enhancing education in generic information literacy competencies. In this way, extending the typical single-context focus of information literacy and transfer research and practice, usually from training to education or work, and making best use of the multi-contextual potential of these competencies. The hypothesis is that this will be the case. In support, a second aim is to investigate the predictive value of a selection of theory- and evidence-based variables, taken from Ajzen's theory of planned behavior (TPB) and the Learning Transfer System Inventory (LTSI) by Holton and colleagues, for the students' intention to transfer learning to their Study and Work contexts, hypothesizing different scores between the two contexts. This uses a novel research design in which both contexts are examined within a single study. A third aim is to complement limited research on the dynamic nature of the transfer process by using a longitudinal approach, measuring the influence of variables from the TPB and LTSI on the transfer process at three moments in time: before, directly after, and three months after training. It is hypothesized that these variables influence the transfer process at the three measurement times.

As for the individual studies, Studies 1, 2 and 3 aimed to test this longitudinal nature of the transfer process by examining the transfer process from an understudied pre-training position, complementing research from primarily a post-training perspective. Study 4 included all three measurement moments. The aim of Study 1 was to investigate the predictive value of six variables from the organizational environment for the learners' pre-training intention to transfer learning to their Study and Work environments. Peer support, supervisor support, peer sanctions, supervisor sanctions, opportunity to use, organizational openness to change, and feedback were posited to predict motivation to transfer. Motivation to transfer, in turn, was posited to be the predictor of intention. Study 2 aimed to analyse the influence of these organizational variables directly on the learners' pre-training intention to transfer to both contexts. The aim of Study 3 was to examine the effect of five learner

characteristics on the trainees' pre-training transfer intentions to their Study and Work: learner readiness, motivation to learn, expected positive outcomes, expected negative outcomes, and personal capacity. Finally, Study 4 operationalized three constructs of the TPB with three LTSI variables from two different domains: performance self-efficacy and performance outcomes expectations both associated with learner characteristics, and organizational openness to change from the transfer environment. The study aimed to measure their influence on the students' transfer intentions to both contexts at three moments in time: before, directly after, and three months after training. And then, the relationship between post-training transfer intentions and transfer behaviour.

In summary, by exploring this multi-contextual and longitudinal perspective and novel research design, this dissertation aims to contribute to the conceptual development of transfer studies, provide educational designers with suggestions for transfer-enhancing education, and thus support the education in, and application of generic information literacy competencies for the benefit of lifelong learning.

3. Materials and Methods

This methodological paragraph describes the participants, the training programme, and the designs and statistical estimates that best fit the aims of this dissertation.

3.1. Participants

Participants in this dissertation were non-traditional adult students who enrolled in mandatory training in information literacy during their first year of the premaster Learning Sciences at the Open University of the Netherlands. Most students studied part-time besides their work as trainers or teachers in primary, secondary, and higher education. They participated in this research at three points in time: through mandatory questionnaires before and directly after the course, and a voluntary questionnaire three months after the course. Studies 1, 2 and 3 included data from the mandatory pre-training questionnaire. Study 4 included respondents who participated at all three measurement times, resulting in high drop-out and non-response rates. A convenience sampling approach and non-response analysis did not indicate 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. Differences in variable scores between female and male participants appeared to be statistically non-significant ($p > 0.05$). Table 1 presents the demographic characteristics of the participants per study, including gender, age, years of work experience, and work type.

Table 1

Demographic Characteristics of the Participants by Study

Characteristic	Study 1 (n = 234)	Study 2 (n = 303)	Study 3 (n = 363)	Study 4 (n = 82)
Gender				
Female	81%	78%	78%	83%
Male	19%	22%	22%	17%
Age				
≤ 25 years	40%	17%	19%	-
26–35 years	25%	34%	33%	-
36–45 years	18%	28%	27%	-
46–55 years	14%	17%	17%	-
56–65 years	2%	4%	4%	-
Work experience				
< 2 years	-	17%	17%	7%
2–5 years	-	19%	21%	15%
6–10 years	-	28%	27%	21%
> 10 years	-	36%	35%	51%
Work type				
Permanent position	-	76%	76%	82%
Temporary position	-	13%	13%	6%
Temporary employment agency	-	4%	5%	2%
Voluntary work	-	3%	3%	1%
Other work type	-	4%	3%	9%

3.2. Training Programme and Procedure

To prepare for their study, participants were required to complete a web-based course Information Literacy for Social Scientists (4.3 ECTS, equal to 120 hours of study) (Wopereis et al., 2016). The instructional design of the course was based on the Information Problem Solving model by Brand-Gruwel et al. (2005) and the Four-Component Instructional Design (4C/ID) model (Van Merriënboer & Kirschner, 2018). During the course, students worked on five authentic tasks, each with varying levels of support (Brand-Gruwel et al., 2009). They reported on their task solution steps using a process worksheet. The lecturer then provided students with feedback on their performance. An example of these tasks is:

> For this assignment, you will search for scientific resources in the library system of the Open University. It is important to work systematically, select the proper search strategy in advance and if necessary, adjust 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.

To best fit the longitudinal aim of this dissertation, the survey design included three measurement times: before, directly after, and three months after the course. Before starting the web-based course and being provided with comprehensive information about the course content students completed a first multi-item questionnaire, followed by a second one directly after training, both mandatory and integrated in the online course curriculum. A third voluntary questionnaire was sent by email three months after completion of the course. Beforehand, participants received instructions on how to complete the instrument. They were also assured that their responses would only be used for research purposes and that these, along with their personal data, would be kept confidential and treated with the utmost care.

3.3. Measures

To best suit the multi-contextual aim of this dissertation, a novel questionnaire design was used in which each question was related to two contexts: the students' Study and Work environments. The three multi-item Dutch questionnaires were based on students' self-reports and used a Likert-type 7-point response format for all scales, ranging from 1 = "do not agree at all" to 7 = "totally agree". For reasons of comparability, the same number of variables and items were used for both the Study and Work contexts. Data collection started in January

2014 and was concluded in December 2017, in part because of the redesign of the Information Literacy course. For item samples, please check the separate studies in the Appendix.

3.4. Data Analysis

Data analysis included three steps: data screening, factor analysis, and path modelling. The separate studies used different designs and statistical estimates, presented in Table 2.

Table 2

Number of Participants, Design, and Statistical Estimation by Study

Study	Participants	Design	Statistical Estimation
1	234	Cross-Sectional	• Data screening; • Exploratory Factor Analysis; • Structural Equation Modelling
2	303	Cross-Sectional	• Data screening; • Exploratory Factor Analysis; • Confirmatory Factor Analysis; • Structural Equation Modelling
3	366	Cross-Sectional	• Data screening; • Exploratory Factor Analysis; • Confirmatory Factor Analysis; • Structural Equation Modelling
4	82	Longitudinal	• Data screening; • Confirmatory Factor Analysis; • PLS-based Path Modelling - Structural Equation Modelling (PLS-SEM)

Initial data screening (cf. Kline, 2015) at item level indicated univariate and multivariate normality, linearity, and heteroscedasticity in all four studies. Missing values were randomly missing and treated with Expectation-Maximization (EM) imputation (Allison, 2003). The studies showed no multivariate outlying cases.

Study 1 used exploratory factor analysis (EFA) and Studies 2, 3 and 4 confirmatory factor analysis (CFA) to explore the underlying structure of the large number of items and their association with the variables used in the studies. These analyses were performed separately for the study and work contexts. In Study 1 principle axis factoring (PAF) was used as factor extraction method while Studies 2, 3 and 4 used maximum likelihood (ML). All four studies applied Direct Oblimin for rotation. In all studies, several items were removed until an unambiguous structure emerged (cf. Güvendir & Özkan, 2022; Kline, 2015). When items that were associated with one specific construct displayed substantial secondary loadings, both the items and construct were discarded from the final model.

In Studies 1, 2 and 3 Structural Equation Modelling (EQS version 6.3) was used to test the models for the study and work contexts, investigating the amount of variance between both contexts. Study 1 used a simple path model while Studies 2, 3 and 4 examined a so-called *hybrid MRA model*, which incorporates a measurement model (cf. CFA factor analysis) as well as direct causal effects (cf. MRA model) (Kline, 2015). In these studies five goodness-of-fit indices were used to estimate the extent to which the hypothesized model structures fitted the entered data: X^2 statistics to estimate absolute fit, Comparative Fit Index (CFI), Incremental Fit Index (IFI), Standardized Root-Mean Square Residual (SRMR), and the Root-Mean Square Error of Approximation (RMSEA) together with its 90% confidence interval. The studies followed the recommendations of Hu & Bentler (1999) for cut-off criteria with CFI > 0.95, IFI > 0.95, SRMR < 0.08, and RMSEA < 0.06 to indicate acceptable model fit. Because of the relatively small sample size, path modelling in Study 4 was performed using partial least squares-based structural equation modelling (PLS-SEM). PLS-SEM is robust against departures from normality in small samples (Hair et al., 2022) and was used to test the hypothesized relationships among variables based on the path weighting scheme algorithm implemented in SmartPLS 3 (Ringle et al., 2015). As recommended by Hair et al. (2022) the psychometric properties were estimated based on three reliability coefficients and used the cut-off criteria of the average variance extracted (AVE) > 0.50, composite scale reliability (CFC) > 0.60, and Cronbach's $\alpha > 0.70$.

4. Overview of Studies

The studies presented in this overview contributed to the overall goal of this dissertation, which is to promote transfer-enhancing education in generic competencies that takes advantage of their intrinsic multi-contextual and transferable qualities for lifelong learning. More specifically, they examined the influence of theory- and evidence-based contextual variables on the transfer of learning process in two transfer contexts at three moments in time: before, directly after, and three months after training. This section offers the main findings of the studies included in this dissertation and listed in the Appendices.

Study 1: Testers, L., Gegenfurtner, A., & Brand-Gruwel, S. (2015, August 25-29). ***The influence of organizational environment in a Study and Work context on pre-training motivation and intention to transfer*** **[Conference presentation]. EARLI 2015 Conference, Limassol, Cyprus.**
https://www.researchgate.net/publication/298786726_Intention_to_transfer_Environmental_factors_influencing_transfer_intentions_in_study_and_work

This first study addressed the question to what extend context affects the transfer of learning process, thus testing the significance of adopting a multi-contextual approach when designing transfer-enhancing education of generic competencies for lifelong learning. To this end, it examined the predictive value of organizational variables taken from the Learning Transfer System Inventory (LTSI) model (Holton et al., 2000) for the learners' motivation to transfer new learning to two different transfer contexts: their Study and Work. The organizational variables were peer support, supervisor support, peer sanctions, supervisor sanctions, opportunity to use, organizational openness to change, and feedback. It was then investigated to what extent motivation to transfer predicted intention to transfer, in this dissertation considered a closer predictor of transfer behaviour. It was hypothesized that the final parameter estimates would differ between both contexts.

Participants were 234 non-traditional students in their first year of the premaster Learning Sciences at the Open University of the Netherlands, who were about to attend a mandatory information literacy course. Besides their study, they worked in primary and secondary education and training. During the web-based course (4.3 ECTS, equal to 120 hours of study) students learned how to formulate an accurate research question, define search words and concepts, find and use the appropriate information resources, critically evaluate

and process the information, and present it properly and ethically. Information literacy is considered a transferable generic competency as the acquired knowledge, skills and attitudes can be applied not only in an educational or academic setting but also in other contexts like work and private life.

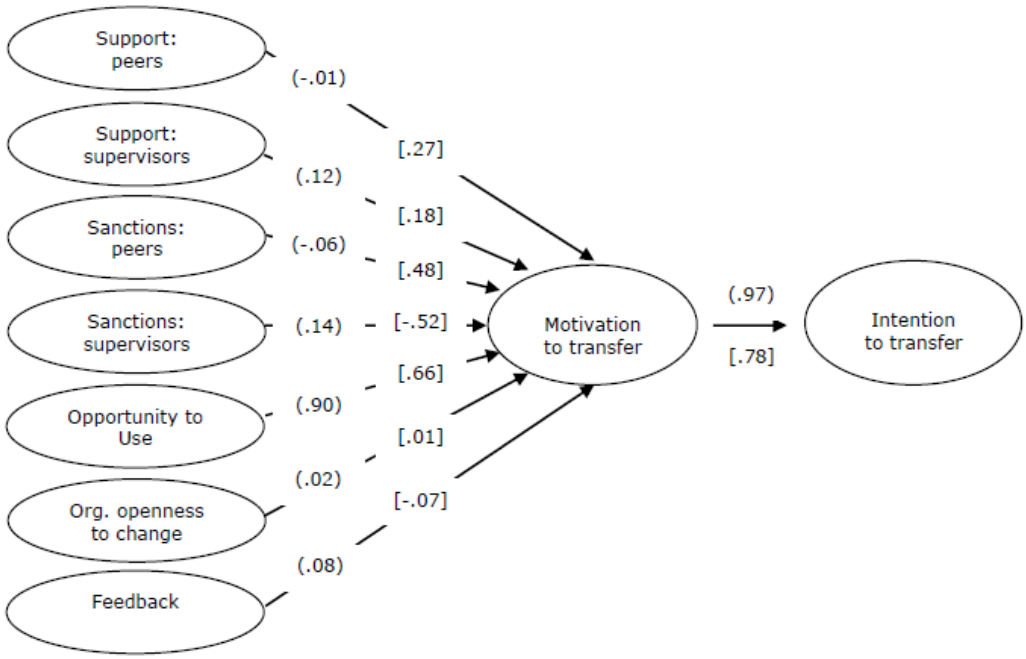
In this study, the transfer of learning is considered a longitudinal process, starting before and continuing during and after training. While the transfer of learning is typically assessed during post-training skills or knowledge tests, this study focused on the underexposed pre-training stage, with the hypothesis that already at this stage contextual variables affect the learners' transfer motivation and intentions. Before starting the course, provided with comprehensive course information, students completed a Dutch online multi-item self-report questionnaire, consisting of the above-mentioned organizational variables, 62 questions and 124 Work and Study-related items. A 7-point Likert scale was used ranging from 1 (strongly disagree) to 7 (strongly agree). Table 1 in Study 1 in the Appendices displays the various scales, the number of items, an example of an item from the questionnaire, and the reliability coefficient (Cronbach's Alpha).

After initial data screening, bivariate correlation analysis was used to investigate the relationships between the seven independent organizational variables and the dependent variable motivation to transfer for both the students' Study and Work contexts. Structural equation modelling (SEM) was used to construct a measurement model in which underlying latent variables were related to actual (observed) results from the questionnaires.

Results suggested acceptable model fit for both contexts, with Yuan-Bentler scaled X^2 Study = 463.77 (df = 316) and X^2 Work = 597.59 (df = 316), CFI Study = 0.93 and CFI Work = 0.89, SRMR Study = 0.09 and SRMR Work = 0.11, and finally RMSEA Study = 0.07 and RMSEA Work = 0.09. As hypothesized, motivation to transfer positively predicted intention to transfer for both contexts. For the Study environment, the anticipated opportunity to use was by far the strongest predictor of pre-training motivation to transfer, while peer support, peer sanctions, and organizational openness to change showed a negligible effect. For the Work environment, the expected opportunity to use proved to be the strongest antecedent of motivation to transfer, besides peer sanctions. Estimated supervisor sanctions, feedback, and organizational openness to change had the lowest predictive strength. These results are in-depth discussed in Study 1. in the Appendices. Figure 1 presents the final parameter estimates of the hypothesized path model for the Study and Work contexts.

Figure 1

Final Parameter Estimates of the Hypothesized Path Model for the (Study) and [Work] contexts



In short, the present study aimed at complementing existing research on the transfer of learning in various ways. Results confirmed the hypothesized differences between the final model estimates and goodness of fit statistics for the Study and Work contexts. This indicates that a multi-contextual approach might be in place when designing transfer-enhancing education in transferable generic information literacy competencies for the benefit of lifelong learning. Concerning the influence of organizational variables on the transfer process, the study suggested that for both the Study and Work contexts, anticipated opportunity to use was the strongest predictor of motivation to transfer, while motivation to transfer itself was a strong predictor of intention to transfer. Furthermore, results indicated that these contextual factors affected the transfer process already in the pre-training phase, demonstrating the longitudinal nature of this process.

Study 2: Testers, L., Gegenfurtner, A., van Geel, R., & Brand-Gruwel, S. (2019). From monocontextual to multicontextual transfer: Organizational determinants of the intention to transfer generic information literacy competences to multiple contexts. ***Frontline Learning Research, 7*****(1), 23–42.** https://doi.org/10.14786/flr.v7i1.359

This second study further explores the question of to what extent context affects the transfer of learning process, and education in generic competencies for lifelong learning benefits from a multi-contextual and longitudinal design perspective. For this purpose, it estimated the pre-training influence of organizational variables on the students' intention to transfer prospective new learning from an information literacy course to their Study and Work contexts, this time without using a mediating variable. The independent constructs were peer support, supervisor support, opportunity to use, openness to change, and feedback.

As in Study 1, participants were adult students who were about to take a mandatory study-directed web-based course Information Literacy for Social Scientists while studying in their first year of the premaster Learning Sciences at the Open University of the Netherlands. The course was designed according to the Information Problem Solving model by Brand-Gruwel et al. (2005) and the Four-Component Instructional Design (4C/ID) model (Van Merrienboer & Kirschner, 2018). In this course, students worked on five authentic tasks with varying levels of support and received performance feedback on their task solution steps. An example task is:

> Imagine you are a teacher in primary education and you want to know more about how to stimulate and support collaborative learning amongst your students. Study four information sources using the checklist 'Critical Reading' and write a short essay (600 words) in which you answer your research questions and critically reflect on them.

Before the actual start of the course, provided with ample information about the course content, 303 students completed a self-report multi-item questionnaire that was embedded in the electronic learning environment and integrated into the course as Task 0. The survey used a 7-point Likert scale, ranging from 1 (do not agree at all) to 7 (totally agree). As in all studies, they were assured in advance that their responses and personal information would be kept confidential and used only for research purposes. Table 2 in Study 2 presents an overview of the number of items, reliability coefficients, and sample items per scale.

Exploratory factor analyses were used to examine the underlying structure of the set of items for both the Study and Work contexts. This suggested a five-factor structure. The items of the construct opportunity to use displayed substantial secondary loadings in both contexts, leading to the removal of these items from the final model. The initial path model was tested with Structural Equation Modelling (EQS version 6.3), using a so-called *hybrid MRA model* approach separately for the Study and Work contexts. This incorporates a measurement model (cf. CFA factor analysis) and direct causal effects (cf. MRA model) (Kline, 2015).

Results demonstrated an acceptable fit to the data, that was slightly better for the Study context compared to the Work context, with X^2 Study = 99.43 (df = 80) and X^2 Work = 206.39 (df = 80), CFI Study = 0.99 and CFI Work = 0.96, IFI Study = 0.99 and IFI Work = 0.96, SRMR Study = 0.04 and SRMR Work = 0.04, and finally RMSEA Study = 0.03 (90 % CI = 0.00, 0.05) and RMSEA Work = 0.07 (90 % CI = 0.06, 0.08). In the transfer context Study, intention to transfer was positively predicted by supervisor support (β = 0.31, p < 0.01), openness to change (β = 0.10, p < 0.05) and feedback (β = 0.37, p < 0.01); the relationship between intention to transfer and peer support (β = 0.04) was statistically non-significant. In the transfer context Work, intention to transfer was predicted by supervisor support (β = 0.31, p < 0.01) and feedback (β = 0.19, p < 0.01); the relationship of intention to transfer with peer support (β = −0.05) and openness to change (β = −0.04) was statistically non-significant. The quality and utility of the model are supported by the amount of variance explained in both contexts: 79.42 % (Study context) and 83.27 % (Work context) of the data. Figures 2 and 3 present the model parameter estimates of the structural relations among factors for the transfer contexts Study and Work, respectively.

Figure 2

Measurement and Structural Model Parameter Estimates of Transfer Context: Study

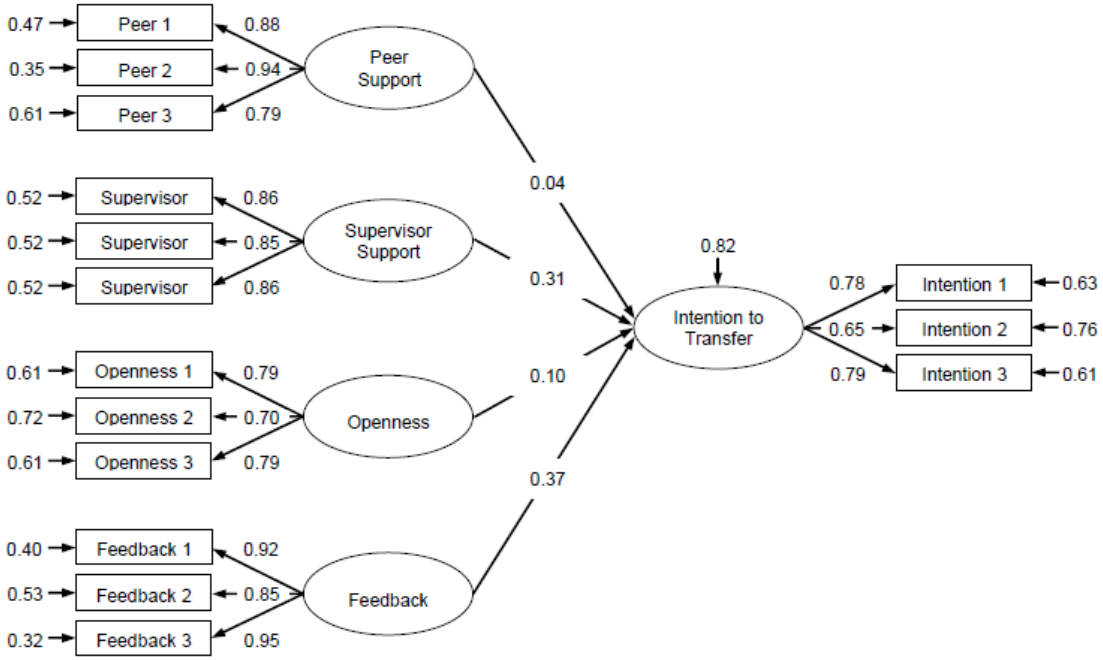
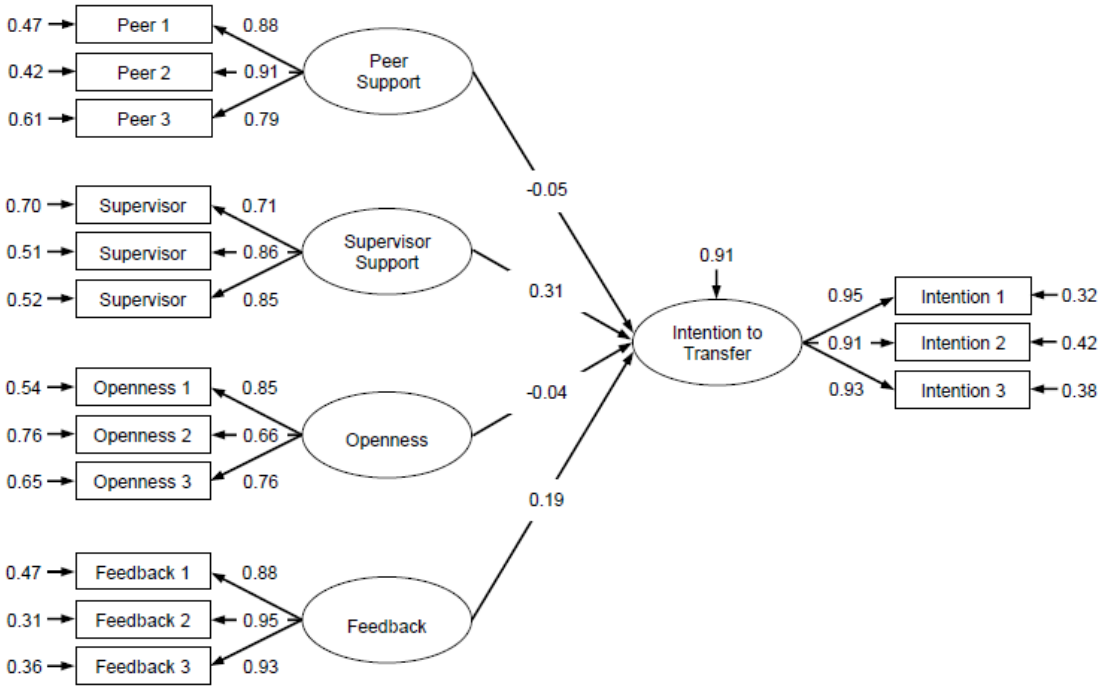


Figure 3

Measurement and Structural Model Parameter Estimates of Transfer Context: Study



To summarize, differences in the model parameter estimates for the Study and Work contexts tended to indicate the relevance of a multi-contextual perspective when designing transfer-enhancing education in generic transferable information literacy competencies useful in multiple lifelong learning contexts. Regarding the influence of specific organizational variables on the transfer process, supervisor support appeared to be a strong antecedent of transfer intentions in both contexts. Feedback was considered the most important predictor of the students' intention to transfer in the Study context. The construct opportunity to use showed substantial secondary loadings in both contexts and was dropped from the final model. Finally, the findings confirmed that contextual variables can influence learners' intention to transfer their upcoming training before it has actually taken place, indicating the longitudinal nature of the transfer process.

Study 3: Testers, L., Gegenfurtner, A., & Brand-Gruwel, S. (2020). Taking affective learning in digital education one step further: Trainees' affective characteristics predicting multicontextual pre-training transfer intention. ***Frontiers in Psychology, 11,*** **2189.** https://doi.org/10.3389/fpsyg.2020.02189

In online learning environments, as is the case in all four studies in this dissertation, it is considered important to foster a positive and motivating affective learning climate (Mazer et al., 2007). Previous research indicates that this will result in positive attitudes toward the training content, and in lecturers and students who are feeling ready, able and motivated to participate in, and successfully complete training. This third study aimed to take this focus on learning one step further into the learning process, namely to the multi-contextual transfer or application of learning. It addressed the question to what extent five affective learner characteristics from the Learning Transfer System Inventory model predicted trainees' pre-training intention to transfer new learning to their Study and Work contexts. It was hypothesized that this would differ between both contexts already in the pre-training stage, thus confirming the multi-contextual and longitudinal nature of the transfer process.

The 366 respondents, as in all studies in this dissertation, participated in asynchronous learning at the Open University in the Netherlands, an educational institute that offers personalized and activating online education. They attended a course in information literacy, and had no direct physical or electronic contact with fellow students, while contact with lecturers about training assignments and results mainly took place via email.

Data was collected using a multi-item web-based online self-report survey that participants completed before taking the course. It used a novel design in which each question was related to the participants' Study and Work environment (Testers et al., 2015, 2019). The survey used a 7-point Likert scale, ranging from 1 (do not agree at all) to 7 (totally agree). The dependent variable was the intention to transfer while the five independent variables were learner readiness, motivation to learn, positive personal outcomes, negative personal outcomes, and personal capacity. For reasons of comparability, in all four studies, the same number of variables and items were used for both the Study and Work context.

After initial data screening, exploratory factor analysis was used to uncover the underlying structure of all items of the constructs separately for the Study and Work contexts. To achieve an unambiguous structure several items were removed from the original item set. The total variance explained in both contexts confirmed the utility of the model: 76.01% for the Study context, and 76.52% for the Work context. With Structural Equation Modelling (EQS version 6.3) the initial models for the Study and Work contexts were tested, using a *hybrid MRA model* approach that incorporated confirmatory factor analysis, and an MRA-based model for measuring direct causal effects. Five goodness-of-fit indices with corresponding cut-off criteria were used to measure to what extent the hypothesized model fitted the research data: X^2 to measure absolute fit, Comparative Fit Index (CFI, >0.95), Incremental Fit Index (IFI, >0.95), Standardized Root-Mean Square Residual (SRMR, <0.08), and the Root-Mean Square Error of Approximation (RMSEA, <0.06).

Results indicated an acceptable and comparable model fit for both the Study and Work contexts. In the Study context, the X^2 was 207.69 (df = 120), CFI = 0.97, IFI = 0.97, SRMR = 0.05, and RMSEA = 0.05 (90% CI = 0.04, 0.06). In the Work context, the X^2 was 252.34 (df = 120), CFI = 0.96, IFI = 0.96, SRMR = 0.05, and RMSEA = 0.06 (90% CI = 0.05, 0.07). In the transfer context Study, intention to transfer was positively predicted by learner readiness (β = 0.10, $p < 0.01$), motivation to learn (β = 0.48, $p < 0.01$), personal outcomes positive (β = 0.13, $p < 0.01$), and personal outcomes negative (β = 0.13, $p < 0.01$); the relationship between intention to transfer and personal capacity ($\beta = -0.15$) was statistically non-significant. In the transfer context Work, intention to transfer was predicted by learner readiness (β = 0.30, $p <$ 0.01), motivation to learn (β = 0.34, $p < 0.01$), and personal outcomes positive (β = 0.30, $p <$ 0.01); the relationship of intention to transfer with personal outcomes negative ($\beta = -0.11$) and personal capacity (β = 0.02) were statistically non-significant. A comparison between both transfer contexts showed clear differences in model parameter estimates between the independent and dependent variables. These were the highest for negative personal outcomes

(Study context: β = 0.13, Work context: β = −0.11, Δ = 0.24) and learner readiness (Study context: β = 0.10, Work context: β = 0.30, Δ = 0.20), followed by personal capacity (Study context: β = −0.15, Work context: β = 0.02, Δ = 0.17), positive personal outcomes (Study context: β = 0.13, Work context: β = 0.30, Δ = 0.17), and motivation to learn (Study context: β = 0.48, Work context: β = 0.34, Δ = 0.14). These results tended to indicate the significance of taking multiple transfer contexts and learners' characteristics into account when designing online education in generic competencies that enhances the students' transfer intentions. Figures 4 and 5 present the parameter estimates of the hypothesized path models for the transfer contexts Study and Work, respectively.

Figure 4

Measurement and Structural Model Parameter Estimates of Transfer Context: Study

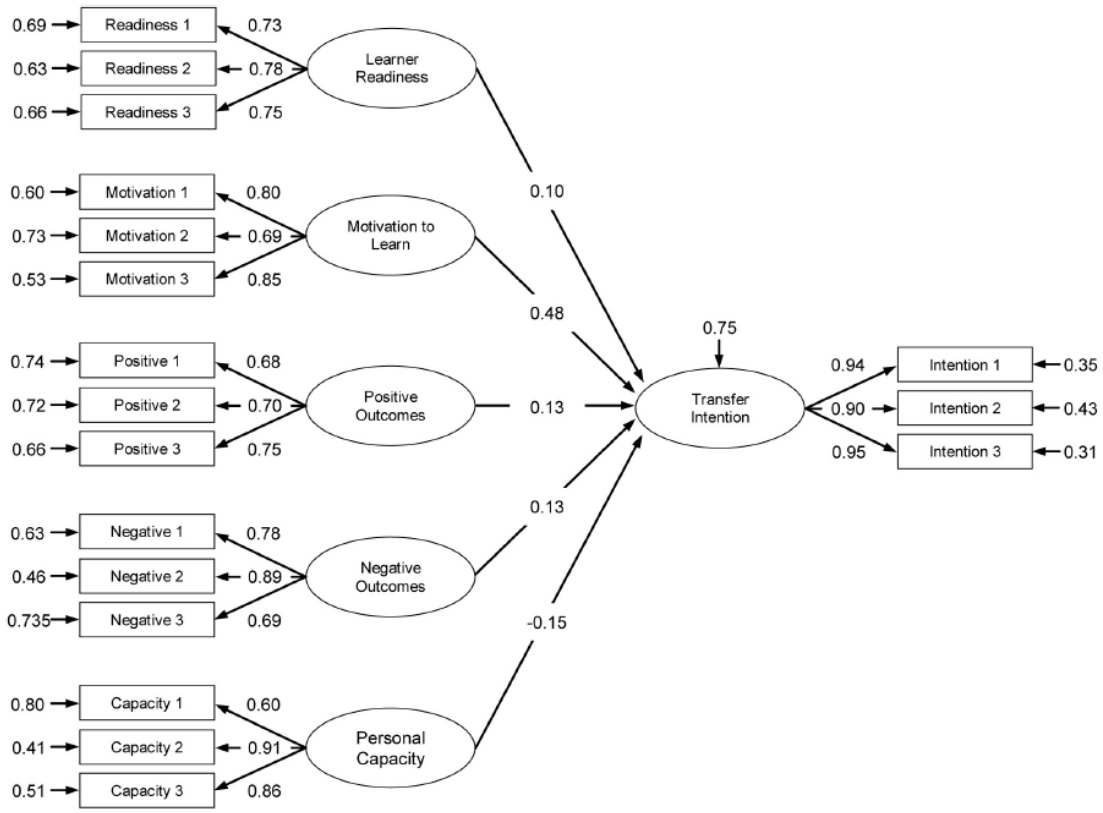
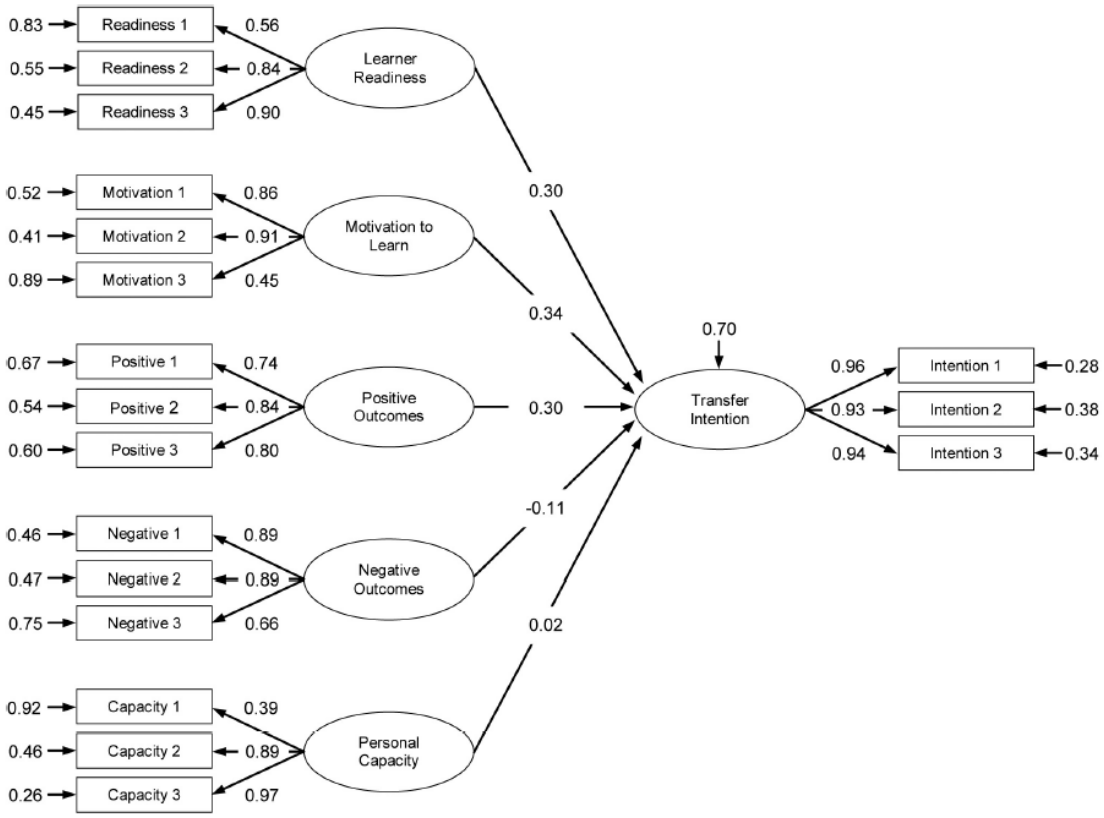


Figure 5

Measurement and Structural Model Parameter Estimates of Transfer Context: Work



In summary, this study aimed to take research on the impact of affective variables on online learning one step further into the learning process, focussing on the transfer of learning. In doing so, it applied the multi-contextual approach central to this dissertation and assessed the influence of five affective variables on the participants' intention to transfer future learning to their Study and Work contexts. Differences in the final model parameter estimates and goodness-of-fit statistics for both contexts tended to indicate the significance of adopting a multi-contextual perspective when designing transfer-enhancing education of generic information literacy competencies. Of the affective variables taken from the domain of learner characteristics, learner readiness, motivation to learn, and expected positive personal outcomes predicted intention to transfer for both contexts. Finally, results indicated that affective learner characteristics can influence the transfer of learning already in the pre-training phase.

Study 4: Testers, L., Alijagic, A., Brand-Gruwel, S., & Gegenfurtner, A. (2024). Predicting Transfer of Generic Information Literacy Competencies by Non-Traditional Students to Their Study and Work Contexts: A Longitudinal Perspective. *Education Sciences, 14*(2), 117. https://doi.org/10.3390/educsci14020117

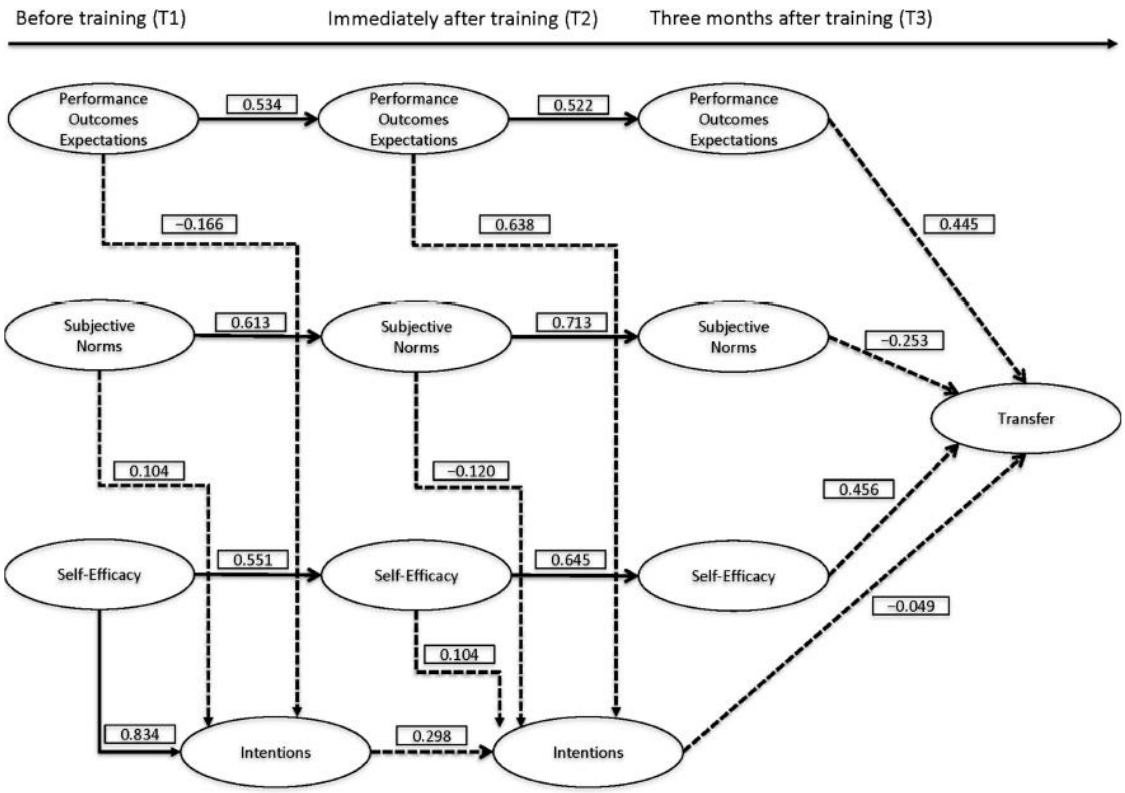
In this fourth study, the aim was to contribute to the transfer of learning debate in various ways. First, it focussed on the question if a multi-contextual perspective would be relevant when designing transfer-enhancing education in generic information literacy competencies for lifelong learning. To this end, it measured the influence of contextual variables on the students' intention to transfer new learning to their Study and Work contexts, hypothesizing differences in parameter estimates for both models. Second, it addressed the question about the assumed dynamic longitudinal nature of the transfer process by examining the influence of contextual variables on non-traditional students' intention to transfer generic information literacy competencies at three moments in time: before, directly after, and three months after training. Finally, to better understand the psychological processes and variables involved in all phases of the transfer process, it explored the question of the value of combining constructs from the TPB, which focuses on antecedents of behavioural intentions, with variables from the LTSI model that offers insight into the antecedents of transfer behaviour itself. More specifically, performance outcomes expectations represented attitude toward the behavior, organizational openness to change represented subjective norms, and performance self-efficacy represented perceived behavioral control.

As in the previous three studies, participants were non-traditional adult students who participated in a mandatory online Information Literacy course during their first year of the premaster Learning Sciences at the Open University of the Netherlands. Unlike the previous studies, which used only pre-course data, this study included 82 students who participated in the mandatory pre- and post-course surveys, and in the voluntary survey three months after the course. The multi-item questionnaires used a 7-point Likert scale, ranging from 1 = "do not agree at all" to 7 = "totally agree". Initial data screening suggested that data were non-normally distributed and missing at random. For path modelling partial least squares-based structural equation modelling (PLS-SEM), a powerful tool against departures from normality in small samples, was used (Hair et al., 2022). Psychometric properties were estimated with 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 α > 0.70.

Results indicated differences between parameter estimates for the Study and Work contexts. This underscores the value of adopting a multi-contextual perspective when designing transfer-enhancing education of generic information literacy competencies for lifelong learning. Figures 6 and 7 show the path coefficients of the two PLS-SEM models for the Study and Work contexts, respectively.

Figure 6

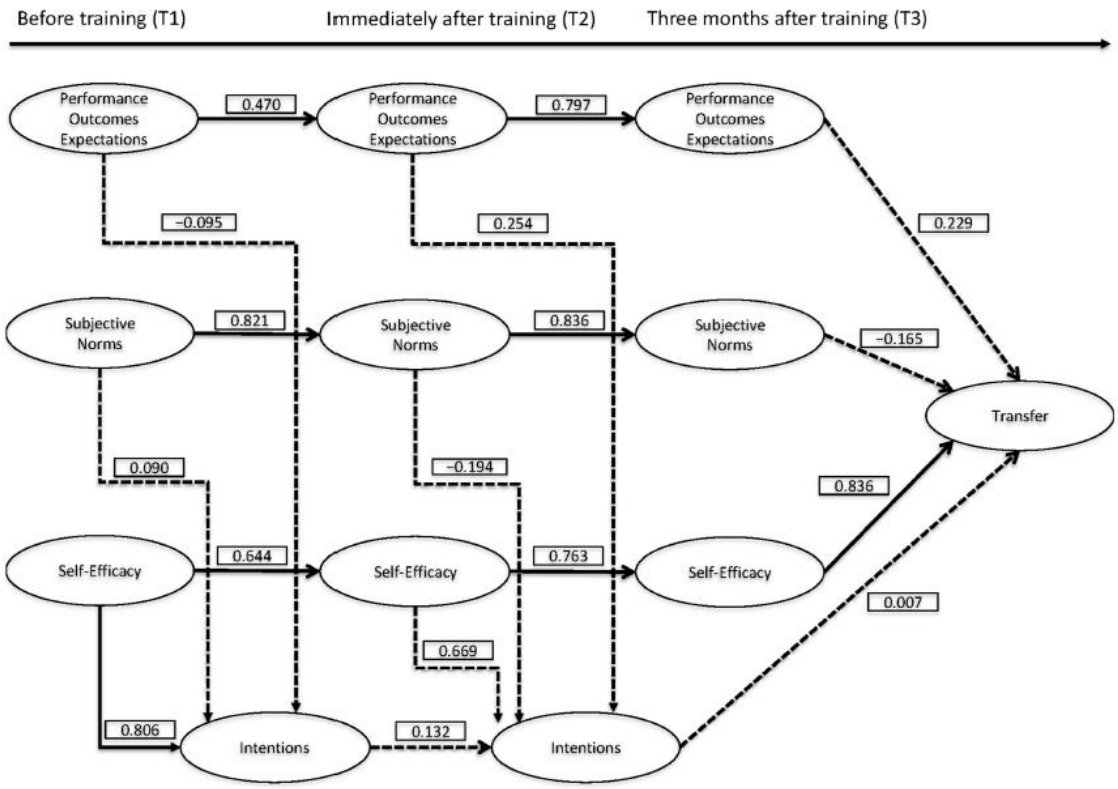
Path Model with Parameter Estimates for the Study Context



Note. Solid lines indicate significant relations ($p < 0.05$), and dashed lines indicate non-significant relations ($p > 0.05$).

Figure 7

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 ($p > 0.05$).

Also, findings confirmed the hypothesized longitudinal character of the transfer process: 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. Findings also illustrated 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, although not always at a statistically significant level ($p < 0.05$). Transfer self-efficacy appeared to be the strongest predictor of transfer intentions. These findings were similar for the Study and Work contexts and for the measures at Time 1 and Time 2. Finally, findings suggested a positive albeit marginal relationship between post-training transfer intentions and transfer

behaviour in the Work context while in the Study context, transfer intentions immediately after training were weakly and non-significantly associated with transfer three months after training.

In conclusion, this study aimed at complementing research on the transfer of generic competencies for lifelong learning in different ways: by exploring the significance of adopting a multi-contextual and longitudinal perspective when designing transfer-enhancing education, and by combining the LTSI and TPB to gain a better understanding of variables involved in all phases of the transfer process. Results confirmed the value of this multi-contextual and longitudinal approach. Combining the LTSI and TPB in the way it was done in this study resulted in a limited number of significant relationships between the variables. Only transfer self-efficacy predicted transfer intentions for both the Study and Work contexts at Time 1, while it was the only predictor of transfer behaviour at Time 3.

The next chapter will elaborate in detail on the main findings of all four studies, and the implications for theoretical development and the design of transfer-enhancing education in generic information literacy competencies.

5. General Discussion

Lifelong learning is of all times. You learn from experiences in daily life, from what you are taught in school and what is necessary to pursue a profession. Never before, however, have new developments in all aspects of current societies succeeded each other so rapidly and did existing knowledge and skills become obsolete as quickly as they do today. This is why governments and companies emphasize the importance of lifelong learning, not only of context-specific knowledge and skills but also of so-called generic competencies that are considered essential to function well in many aspects of life. Their intrinsic multi-contextual and transferable nature promotes their use outside the training setting, making them eminently useful for and throughout the lifelong learning process. An indispensable cognitive generic competency in today's knowledge-intensive societies is information literacy, which is taught in various formal and non-formal settings like universities and libraries. Essential to education and training is the actual transfer or application of new learning. More than a century of research from various disciplines has learned that this transfer is not self-evident, that it is a complex process that is influenced by a variety of contextual variables related to, among other things, learner characteristics, training content and delivery, and transfer climate. Until today, there is not one single overarching theory or educational approach but many initiatives that, each from their specific viewpoint and emphasis, contribute to a better understanding of the transfer process. This dissertation aims to complement existing research on the transfer of learning by investigating its multi-contextual and longitudinal dimensions. In this way, responding to calls for additional research and current societal developments, contribute to the theoretical and practical development of transfer-enhancing education in generic information literacy competencies for the benefit of lifelong learning. This chapter discusses the main findings related to the central topics of this dissertation, and their implications for theory development and educational practice, respectively.

5.1. Main Findings

The first aim was to investigate the significance of a multi-contextual approach in designing transfer-enhancing education in generic competencies, more specifically in information literacy. In doing so, complementing information literacy and transfer research that focuses primarily on transfer to one context, typically from training to the related educational environment or to work. Thus, leaving the potentially multi-contextual nature of generic competencies untapped. To this end, this dissertation adds a new aspect to transfer theories by

including two transfer contexts within one sample, exploring the influence of contextual variables on non-traditional students' intention to transfer generic information literacy competencies to both their Study and Work environments. For this purpose, a novel survey design was used, in which each question related to both contexts. Model parameter estimates in all four studies showed clear differences between the beta coefficients for both contexts, in the first three studies in the pre-course phase, and in the fourth study before, directly after, and three months after the course. In this indicated that it is important to pay attention to the specificities of the intended transfer contexts when designing multi-contextual transfer-enhancing education in generic competencies.

The second aim of this dissertation was to respond to a call from the research field to complement limited research on the dimensionality of the transfer process (Ford et al., 2018; Gegenfurtner et al., 2009; Grossman & Salas, 2011; Machin & Fogarty, 2003; Massenberg et al., 2017). While previous research generally focused on the influence of training-related variables on post-training transfer measurements, in this dissertation transfer of learning is considered a longitudinal and dynamic process, influenced in varying degrees by various contextual variables not only during, but also before and some time after training. The results confirmed both characteristics of the transfer process. All studies showed that already before the actual training, variables related to learner characteristics and transfer environment influenced the learners' intention to transfer new learning to their Study and Work contexts. Additionally, Study 4 was one of the few that used three measurement moments to identify at which stage in the transfer process each factor was most influential and how this may change over time. Results showed that measures before training (Time 1) predicted measures directly after training (Time 2), which in turn predicted measures three months after training (Time 3), for both contexts and in varying degrees. This indicated the dynamic nature of the transfer process.

In support of the first aim, the third aim was to investigate the influence of a selection of theory- and evidence-based variables on the learners' intention to transfer new learning to their Study and Work environments. These variables were taken from Holton et al.'s (2000) extensively and internationally validated Learning Transfer System Inventory model (LTSI), and ordered under three domains first introduced by Baldwin and Ford (1988): learner characteristics, training content and delivery, and the transfer environment. The first two studies focussed on contextual variables from the transfer environment, Study 3 included variables related to learner characteristics, while Study 4 used variables from both domains. To gain a deeper understanding of the psychological processes and variables involved in all

phases of the transfer process (Hutchins et al., 2013), Study 4 combined variables from the Theory of Planned Behavior (TPB) (Ajzen, 1991) that focuses on antecedents of behavioural intentions, with variables from the LTSI model that investigates predictors of transfer behaviour itself. Results indicated that these variables did influence the transfer process before, directly after, and three months after the course. Their predictive value differed per domain, measurement time, and transfer context. While the first three studies generally yielded statistically significant relationships between the dependent and independent variables, this was limited in Study 4. All in all, however, the studies confirmed results from earlier research and recommendations on how to enhance the transfer of learning. In conclusion, while evaluation of the transfer process generally focuses on variables related to training content and delivery, results indicated that it would be beneficial to adopt a broader view of the transfer process and include variables from other domains that may contribute to transfer success or failure.

Implications of these main findings for theoretical development and educational practice are discussed in turn.

5.2. Implications for Theory Development

This dissertation contributes to theory development in various ways. First, it introduces a novel multi-contextual approach that is currently missing from the transfer of learning debate. Multi-contextuality is an essential attribute of some key features in contemporary societies, which are also central to this dissertation: lifelong learning, non-traditional learners, generic competencies, and information literacy. This is explained in detail in the Introduction. However, a multi-contextual approach is currently lacking in transfer and information literacy theory, which generally focuses on mono-contextual transfer from formal and non-formal education and training, predominantly to the learners' study or work environments. To test the relevance of this new approach this dissertation uses a novel approach by comparing in one study the influence of contextual variables on the transfer process in two transfer contexts simultaneously: the students' Study and Work. Results confirm that applying this multi-contextual research approach is in place when it involves education in generic competencies like information literacy that are significant for multiple contexts during lifelong learning.

Second, transfer research typically consists of cross-sectional studies that focus on post-training transfer and measurement. This dissertation considers the transfer of learning as a longitudinal process that is influenced by contextual variables before, at the end, and some

time after training. To investigate the relevance of this longitudinal approach, Studies 1, 2 and 3 assessed the transfer process from a little applied pre-training perspective while Study 4 includes measurements at all three moments in time. All studies confirm that at all stages contextual variables influence the learners' intention to transfer learning to both their Study and Work contexts to varying degrees. This calls for further research on the role of longitudinality in the development of transfer theories.

Third, as explained in the Introduction, the research setting and design did not allow for measuring the actual transfer of information literacy competencies to these two contexts. Instead, this research investigates the extent to which contextual variables, taken from the LTSI, influence the transfer process. However, instead of using LTSI's individual and organizational performance as the measurable transfer outcomes, this dissertation investigates the influence of contextual variables on the learners' transfer intentions, in the TPB and this dissertation considered the closest predictor of transfer behaviour. Parameter estimates of the models in Studies 1, 2 and 3 confirm the value of this approach for transfer research and the validity of contextual variables from different domains used in the LTSI model. The separate studies included in the Appendices offer suggestions as to why variables from different domains are found to be significant, or not, at different stages of the transfer process. Study 4 contributes to the theoretical discourse around LTSI and TPB by responding to a call by Hutchins et al. (2013) to combine both model and theory for a better understanding of the dynamics at all stages of the transfer process. It exploratively tested this combination by operationalizing three TPB constructs with three LTSI variables. Results indicate that more research is needed to examine the value of different variables and of cross-sectional instead of longitudinal analysis for this approach.

Finally, this dissertation contributes to theory building around information literacy by exploring the significance of dimensionality and contextuality for the transfer phase of the learning process. Results indicate that both perspectives can enrich and broaden the theoretical debate on information literacy education, which is often characterized by a mono-contextual and one-size-fits-all approach. Also, information literacy competencies are considered intrinsic to learning. Not surprising therefore that it is associated with educational concepts like independent self-directed and self-regulated lifelong learning (Andretta, 2007; Brand-Gruwel & Stadtler, 2011; Bundy, 2004; Ladell-Thomas, 2012), synchronous and asynchronous online learning, informed learning (Bruce, 2008), information literate lifecourses (Webber & Johnston, 2013), and preparation for future learning. The latter, explored by, among others, Bransford and Schwartz, contributes an interesting perspective on

the transfer of learning to dynamic, knowledge-rich environments. It focuses less on *learning what* but more on *learning with*, less on replication of acquired knowledge and skills but more on exploring "people's abilities to learn new information and relate their learning to previous experiences" (Bransford & Schwartz, 1999, p. 69). To this end, providing students with a balanced mix of both general principles and domain-specific examples or identical elements (Bransford et al., 2000, p. 77). This might be particularly appealing to non-traditional learners who are eager to use previously acquired knowledge and experiences, and to organizations operating in fast-changing environments that need people who know how to learn using tools such as information literacy.

5.3. Implications for Educational Design

Results from the studies included in this dissertation confirm the significance of using a multi-contextual and longitudinal perspective when designing transfer-enhancing education in generic information literacy competencies for lifelong learning. Guided and at the same time constrained by the specific research conditions, this section offers suggestions for the design of transfer-enhancing education.

As mentioned earlier, transfer and information literacy research and educational design are predominantly based on a mono-contextual approach. To make non-traditional students aware of the multi-contextual potential of generic competencies, and teach them how to use this for their lifelong learning, educational designers have various teaching methods at their disposal. Assuming that they themselves are aware of the importance of transfer in the learning process (Yelon et al., 2014) they can, for example, provide a variety of transfer contexts or situations for practice (Van Merriënboer, 1997). Or ask students about application situations relevant to them, including their specific information literacy characteristics, needs, practices, and anticipated or experienced transfer facilitators and obstacles. Students should also be made aware that information literacy competencies include both generic and domain-specific features, and that mindful abstraction and de-contextualization are needed to make them available to different lifelong learning contexts (Brand-Gruwel et al., 2005). Suggestions by Perkins and Salomon (1988, 1989) can be helpful here. They propose starting a course by practising so-called *low-road* transfer, using examples in which training and application contexts are comparable, and applying the technique of *hugging* by emphasizing the similarities between these contexts and the most appropriate skills. Lecturers can then focus on transfer to significantly different contexts and use the technique of *bridging*, i.e. mindfully tailoring the information literacy concepts and practices to these new contexts, using for

example real-life cases contributed by the students, and discussing aspects that may foster or impede transfer. In this way, they involve students in the design of flexible personalized learning trajectories (Brand-Gruwel et al., 2014, 2024; Könings et al., 2011) and strengthen their confidence that the generic competencies learned during the course, albeit in an adapted form, are transferable to other contexts. This may be specifically appealing to adult learners who are characterized, among other things, by their desire to know why they have to learn, in what way training will be helpful in their various life contexts, and how they can contribute their accumulated experiences as valued resources for learning. It may enhance their motivation to engage in training, their intention to apply new learning in different contexts and even shift the typical focus from *learning for a grade* to a more general transfer mindset (Yancey et al., 2018) i.e. awareness of the transfer potential of other training programmes.

Results of all studies also indicate the longitudinal nature of the transfer process. Transfer of learning is not only what happens during an end-of-training assessment but is a complex process, influenced by a multitude of contextual variables before, during and after an intervention. Educational designers can take this into account when designing education for transfer. In the pre-training phase, they can pay special attention to how a course is presented in promotional and recruitment materials, emphasising, for example, its practical multi-contextual value, the possibility of students to tailor the course to their individual needs, the availability of ample support and, in this specific case, its compulsory character as an indication of its importance. This will align with the needs of the adult learners and contribute to their learning, as confirmed by adult learning theories (Wlodkowski & Ginsberg, 2017), as well as to their subsequent transfer of learning (Leberman & McDonald, 2016; Nafukho et al., 2017). Regarding the post-training phase, the course design can offer opportunities to discuss anticipated or experienced contextual circumstances that may hinder or promote the transfer of learning during and after training, and ways to handle these. Supervisors may even offer post-course opportunities to contact them for support.

Concerning the influence of specific contextual variables on motivation and intention to transfer, and on transfer itself, we refer to the results and explanatory notes in the individual studies in the Appendices. A general recommendation would be to focus not only on aspects related to training design and delivery, the usual suspects when investigating the transfer process, but on a wider spectrum of contextual variables that may influence the different phases in the learning and transfer process. These may include, among other things, learner characteristics, affective or otherwise, and aspects related to the transfer climate, in

this dissertation the students' online asynchronous Study environment at the Open University, and their Work environments in primary, secondary, and higher education.

Transfer-enhancing educational design specifically for non-traditional online learners may be inspired by existing theories on online and adult learning, provided that they not only address content development and learning but also transfer. Andragogy may serve as a source of inspiration because of its high percentage of adult learners in online education (Simonson & Zvacek, 2024). It assumes that adult learners are self-directed and propagates a learners-centred approach in which adults actively participate in the design of their learning plans in line with quality and application requirements. This might not only motivate them to participate and succeed in training but "Engaging participants in the planning of the program, even inquiring minimally as to their prior knowledge and experience with the proposed content and adjusting accordingly, should aid in predisposing participants to the learning and subsequent transfer" (Merriam & Leahy, 2005, p.15). This design approach involves being informed about and taking into account, among other things, learner-related characteristics like life stage, social and cultural background, technology access and proficiency, information literacy experiences and self-efficacy, motives to engage in learning and transfer, performance expectations, and preferences for online formats like asynchronous or blended delivery. Transfer-enhancing course design may also take into account external factors such as work and family-related responsibilities, constraints and social influences, the opportunity to apply new learning and learn from mistakes, and respect and *right time/place/content* support from the learning and transfer environments (Knowles, 1980; Lu et al., 2022; Merriam & Bierema, 2013). Some of the above characteristics are included in this dissertation as contextual variables influencing the transfer process. Furthermore, non-traditional learners prefer problem-based experiential learning that has an immediate impact on their lives (Knowles, 1984), as opposed to teacher-oriented lecture-based education. Using new situations from the non-traditional learners' lifelong learning contexts may facilitate multi-contextual transfer.

Finally, the asynchronous training in which the participants in this dissertation took part is characterized by the absence of direct physical or electronic contact with fellow students, while contact with instructors was limited to email correspondence about training assignments and results. An important challenge designers of online education face is the absence of social presence (Spears, 2012) and social interaction with peers and supervisors (Ekmekci, 2013; Jung et al., 2002; Richardson et al., 2017; Sun & Chen, 2016; Swan, 2003; Yang et al., 2010), considered important preconditions for successful online learning. This may be tackled by integrating systematic instructor feedback and engagement that has proven

to enhance students' commitment. Based on their experiences, the Open University altered the asynchronous format of the training and included more synchronous interaction between students through collaborative group assignments. This development also marked the end of data collection for this research.

In short, the key to educational design, including transfer-enhancing education in generic competencies for non-traditional learners, is flexibility in time, place, content (Bolhuis et al., 2020), and didactics. This allows personalized education in tune with the diverse and changing characteristics and needs of the target group, in this case, non-traditional learners, and with the ongoing and rapid developments and demands in society. To be successful, this focus on flexibility needs to be adopted and implemented at all levels of education, from curriculum to institutional policy. A recent initiative to design education that integrates theory, practice and design and includes these different levels, is the so-called Gelaagd Model voor Flexibel Onderwijs [Layered Model of Flexible Education], developed at the chair Design of Personalized Learning Arrangements, a combined initiative of the University of Applied Sciences Zuyd in Heerlen and Maastricht University (Brand-Gruwel, 2024), both in the Netherlands. Future theoretical and evidence-based insights from this chair may offer transfer theorists and educational designers valuable suggestions for developing blended transfer-enhancing education in generic information literacy competencies for non-traditional learners.

5.4. Directions for Future Research

As explained earlier, transfer of learning is a complex process that has been and continues to be researched from different disciplines, theoretical frameworks and practical experiences. This has resulted in a wide range of theories and models with a broad spectrum of variables, that seek to clarify and facilitate the transfer process. This dissertation aims to contribute to this debate by examining the transfer of learning in relation to some key contemporary societal developments, using a specific research setting. In this concluding section, we discuss some inherent limitations of this approach and suggestions for additional research.

First, lifelong learning has resulted in a substantial increase in non-traditional students in higher education. Generally described as adults who follow a deviating learning trajectory besides other daily commitments, this appears to be anything but a homogeneous group. The participants in this dissertation were in their first year of the premaster Learning Sciences at the Open University of the Netherlands and mainly worked as teachers or tutors in primary

and secondary education, higher education, and training. Most students were female, aged 25-45, had a permanent position, and more than 6 years of work experience. Due to these specific demographic characteristics, some caution is in place when drawing general conclusions from the research results.

Second, much research on learning transfer involves face-to-face or synchronous education. Students in this dissertation participated in asynchronous training with no or limited direct physical or electronic contact with fellow students and instructors. Research, and experiences during the COVID-19 pandemic, however, indicate that social presence and social interaction with peers and supervisors are key success factors for online learning. Since the flexibility of online education is particularly suited to non-traditional learners, it would be interesting to explore what implications blended formats will have for the transfer of learning, assuming that these are based on proper didactics, technological expertise, blended learning ambition, and adequate implementation trajectories (Van der Klink & Brand-Gruwel, 2021).

Third, in this dissertation generic competencies have been operationalized by information literacy, a competency of a higher cognitive order. Results confirmed the relevance of a multi-contextual approach when teaching this specific type of generic competencies. To further substantiate the validity of this approach, future inquiry might include intrapersonal or interpersonal generic competencies, each with its specific characteristics and requirements. Also, the current focus on the non-traditional students' Study and Work contexts could be extended to other relevant environments, such as their private lives.

Fourth, this dissertation uses single-source data acquisition through students' self-report surveys. There are legitimate arguments against the use of only self-measurement, including common method bias or socially desirable responses. This has been addressed by offering a private online survey environment and by communicating that all data would be anonymized and not bring along any consequences for the course evaluation. As explained earlier, circumstances have prevented the use of additional data sources due to a lack of contextual uniformity. This research included two transfer contexts, students' Study and Work environments. The Study environment consisted of an asynchronous online course learners attended from home with little or no direct contact with peers and supervisors. Assessments took the form of online mid-term tasks and a final assignment. In their Work setting, students operated as relatively autonomous professionals in diverse educational settings throughout the Netherlands. In addition, information literacy is considered an open higher-order cognitive competency that can be implemented in various ways depending on the

circumstances and the creativity of the user. This made measurement of actual transfer, but also the use of behavioural observations or psychological signal measurements, near to impossible and, with Bransford and Schwartz's *preparation for future learning* interpretation of transfer in mind, also less relevant. Instead, students' intention to transfer was used as the proximal transfer outcome score (Hutchins et al., 2013). In the self-report questionnaires, respondents specified at three moments in time to what extent contextual variables influenced their transfer intentions to both contexts. The use of self-reports has been justified by studies that consider it a common source of evaluation, arguing that respondents know best, and are very well capable of reporting which variables they consider relevant (Chiaburu & Tekleab, 2005; Devos et al., 2007; Velada et al., 2007). This had been confirmed by the designers of the Learning Transfer System Inventory (LTSI) model used in this dissertation, who stated that "the use of self-report data in the collection of transfer system data is consistent with a key assumption underlying the development of the LTSI. The LTSI was designed to measure individual perceptions of transfer system constructs" (Hutchins et al., 2013, p. 259). Nevertheless, we would advise follow-up studies to find ways to include additional data sources suitable for simultaneous use in multiple contexts. Interviews in this case could have provided a more detailed interpretation of the results, but unfortunately, due to the course of the research, they were not applied in this dissertation.

Finally, the fifth limitation concerns the predictors used in this dissertation. Results show that they only partly explain the variance in the students' transfer intentions for both their Study and Work contexts, suggesting that other factors may be at work. Further research may include different variables, taken from the LTSI model or elsewhere and integrated or not into the Theory of Planned Behavior, to better understand the processes and variables involved at all stages of the transfer process.

5.5. Conclusion

As the title suggests, this dissertation aims to substantiate the author's advocacy of a multi-contextual and longitudinal approach when designing transfer-enhancing education in generic information literacy competencies for the benefit of lifelong learning. In this way, extending the typical mono-contextual focus of information literacy and transfer research and education, and utilising the versatility van generic competencies. To this end, it has investigated the effect of evidence- and theory-based variables from the LTSI and TPB on the non-traditional students' intention to transfer learning in their Study and Work contexts simultaneously at three moments in time: before, directly after and three months after

training. Model parameter estimates in all four studies show clear differences between the beta coefficients for both contexts at all three measurement times, indicating the significance of this approach. Subsequently, suggestions are given on how to translate these insights into educational practice. Additionally, the questionnaires used in this dissertation may inspire the design of multi-contextual measurement instruments. To conclude, since this research took place in a specific setting, with associated limitations, future research could address some of these for the generalization of the results.

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