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Learner Identity and Lifelong Learning: A Mixed-Method Study

Monique Landberg and Torsten Porsch

ABSTRACT

Learning is on the one side happing every day. On the other side, adult participation in (formal and non-formal) learning is low, especially in Germany and for certain subgroups (e.g., with low educational attainment). It is well known that with the acquisition of knowledge over a lifetime many positive findings are associated. Hence, we propose that measuring learner identity might be a helpful construct for predicting and influencing lifelong learning. However, measurement options for learner identity are sparse. Hence, the present paper tries to adapt and validate a scale to measure learner identity. For that, we first adapted the Dimensions of Identity Development Scale questionnaire (Luyckx *et al.*, 2008). Second, internal construct validity and external construct validity were established. For the latter, as in other studies, self-esteem, depressive symptoms (Luyckx *et al.*, 2008) and openness (Crocetti *et al.*, 2008) were used. Curiosity and epistemological beliefs were assessed as well, because according to the division of cognitive labor, we must gain knowledge from different sources to deal with life's complexity (Bromme, 2005). Third, Marcia's identity status (1964) was identified using a clustering approach. The mean age of the 124 participants was 21.90 years (SD = 3.23). Most participants were female (80.6%), and the majority were studying for a teaching post at the bachelor's level (68.5%). Finally, one student per identity status was interviewed (n = 4) using a topic guide based on Marcia's (1964) identity status interview. In this way, an explanatory mixed-method design was applied (Creswell & Plano Clark, 2011). Both, the quantitative and the qualitative approach seem fruitful to assess learner identity. Analysis indicated that learner identity is different from epistemological beliefs. Learner identity is highly relevant to how learning situations are approached and how strong the commitment to learning activities and goals is.

Keywords: Epistemological Beliefs, Learner Identity, Lifelong Learning, Mixed-Method Research

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I. Learner Identity and Lifelong Learning: A Mixed-Method Study

Many positive findings are reported regarding the acquisition of knowledge in formal and informal contexts over a lifetime, such as in the area of health (Center for Research on the Wider Benefits of Learning, 2008). Lifelong learning is associated with different learning theories, contexts, and social attributes (Jarvis, 2012). Further, we use a division of cognitive labor to gain knowledge from different sources to deal with life's complexity (Bromme, 2005). Many complex scenarios in daily life depend on personal lifelong learning activities; while the importance of lifelong learning is a personal and economic necessity, participation in such activities is unequal (Boeren *et al.*, 2010). One perspective towards a better and evenly distributed implementation focuses on the link between lifelong learning and learner identity. To adapt our learning to the demands of different situations and stages of life, learner identity becomes relevant as a mostly stable disposition. Hence, it is necessary to assess learner identity in a valid and reliable way. This would allow for tailored support for learning and its continuation in formal and informal contexts throughout a lifetime. The present study aimed to apply Marcia's approach to measuring identity (1964) to the area of intentional learning by using an explanatory mixed method design (Creswell & Plano Clark, 2011). The goal was to empirically find the four identity statuses Marcia (1964) identified: Achievement, Foreclosure, Diffusion, and Moratorium, and to validate these statuses with typical associations such as, for example, interest. To assess learner identity, we adapted an established scale for measuring identity (Luyckx *et al.*, 2008). In the interviews, we aimed to gain more in-depth insights into the attitudes, goals, and regulation of learning connected with lifelong learning. Thus, we validated our quantitative findings using qualitative data.

II. Learning throughout a Lifetime

Continued active participation in educational activities over one's lifetime is associated with findings in various areas like health, crime, and education (Center for Research on the Wider Benefits of Learning, 2008). For example, regular school attendance, even with poor performance, is associated with better health in adulthood (Hammond & Feinstein, 2006). University graduates smoke less often (Wilberforce, 2005, cited after Center for Research on the Wider Benefits of Learning, 2008), are less likely to be overweight (ibid.) and are less likely to become depressed compared to less qualified people (ibid.). Participation in adult education is associated with higher tolerance and more social participation, as well as more stable social networks (Preston & Green, 2003; Schuller *et al.*, 2002). Learning activities and participation in education have positive effects at the individual level. The same applies to the macro-structural level, for example, economic growth (Woessmann, 2016). Education is a core resource for dealing with globalization requirements (Blossfeld, 2005; Neidhardt, 2006; Offerhaus *et al.*, 2016; Settersten & Ray, 2010). The necessity of lifelong training, since educational qualifications once achieved are not sufficient, is therefore mostly internalized by the individual (Landberg & Noack, 2017; Stichweh, 2016; Tomlinson, 2008). Hence, the need for lifelong learning has been emphasized, especially by the European Union (Volles, 2016).

While the importance of lifelong learning is often emphasized, its implementation in daily life is lacking (Boeren *et al.*, 2010). Individual determinants constitute one of the factors that influence the implementation of lifelong learning. In Germany, participation in further training is influenced by gender, age, migration, and educational background (Offerhaus *et al.*, 2016). For example, people without vocational qualifications are often not interested in further training (ibid.). In addition, contextual determinants such as access options, availability, and financial resources also influence participation in lifelong learning (Boeren, 2017; Offerhaus *et al.*, 2016). Employers are generally the providers of professional development (Eurostat, 2016) and therefore encourage lifelong learning; in some cases, they make resources available for it. It should be noted that, for example, the financing of professional training by employers varies by age group, gender, and level of education, as well as across European countries (Eurostat, 2020).

A positive and open-minded learner identity seems to be important for the realization of lifelong learning. Kolb and Kolb (2009) showed that pupils with a positive and open-minded attitude are more successful in school, regardless of their intelligence. Furthermore, research in the field of positive psychology shows that curiosity is positively associated with life satisfaction (Park *et al.*, 2004). Such an open and curious identity encompasses one's own perception that learning is possible, and that new knowledge can be absorbed. Thus, the basic categorization is fixed identity versus learning identity (Kolb & Kolb, 2009). Kolb and Kolb (2009) also refer to Rogers, who describes learning for mature persons; his description is similar to the Achievement and Foreclosure status as described by Marcia (1964), who suggests that, as in foreclosure, identity can be influenced by others and that a mature (achieved) identity allows for trust in one's own experience and judgements (see below). Hence, learning identity refers to the concepts of metacognition, epistemological beliefs, and academic self-concept (cp. Kolb & Kolb, 2009). A learner's identity is primarily characterized by the assumption that people can develop, learn, and change (Kolb & Kolb, 2009; Molden & Dweck, 2006) and have corresponding values, attitudes, and beliefs in their ability to learn. However, how learner identity can be assessed successfully and efficiently remains an open question.

III. Identity Status and Its Assessment

Marcia's (1964, 1993) model of identity is based on Erik Erikson's (1973) dimensions of exploration and commitment. Combining the two states of each of these dimensions' results in four identity statuses: (1) Achievement, in which exploration has occurred and a commitment has been made; (2) Moratorium, in which exploration is ongoing and a commitment has not yet been reached; (3) Foreclosure, in which a commitment has been made without exploration; and (4) Diffusion, in which little or no exploration or commitment has yet occurred.

Newer developments in the field of identity research have tried to assess commitment and exploration more precisely, using samples that mainly comprise adolescents and emerging adults (Crocetti & Meeus, 2015). One example is based on the integrative identity model, which postulates two cycles of identity formation (Luyckx *et al.*, 2006). The first cycle is focused on broad exploration, followed by commitment-making. Various options are tested, and one option is decided upon. The second cycle features a more in-depth exploration, during which current commitments are evaluated. In 2008, Luyckx *et al.* added a phase of ruminative exploration to the model, which represents a maladaptive form of exploration leading to an inability to commit or to a constant questioning of commitments that have been made. Person-oriented studies using the integrative identity model have found five (Luyckx *et al.*, 2010; Luyckx *et al.*, 2013) or six clusters (Luyckx *et al.*, 2008; Luyckx *et al.*, 2014), representing different identity statuses. In addition to Marcia's statuses of Achievement, Foreclosure, and Moratorium, Luyckx *et al.*'s (2008) model offers Carefree diffusion (low to moderate in all processes) and Troubled/diffused diffusion (low commitment, moderately broad, deep, and high ruminative exploration); Luyckx *et al.*'s six-cluster solution also gives rise to an undifferentiated status, characterized by moderate scores on all processes (2010, 2013). These models of identity status have been successfully applied to vocational identity (Lannegrand-Willems *et al.*, 2015), European and national identity (Landberg *et al.*, 2018), and regional identity as well (Borschel *et al.*, 2018). Hence, it appears to be possible to measure learner identity based on Marcia's identity perspective. Therefore, the present study aimed to adapt Marcia's approach to assess learner identity quantitatively and qualitatively.

In the two studies described below, we inquired whether identity measures could be adapted to measure learner identity and whether specific associations with external

constructs used in other studies, such as depressive symptoms, self-esteem, and openness, could be established (Crocetti *et al.*, 2008; Luyckx *et al.*, 2008). Furthermore, learner identity is connected with epistemological beliefs and approaches to lifelong learning. Epistemological beliefs describe how a person gets access to knowledge and evaluates their knowledge (Wegner & Nückles, 2019). Sophisticated epistemological beliefs help to understand scientific findings (Feinkohl *et al.*, 2016) and thus make sense of knowledge from different sources in our complex world (Bromme, 2005).

IV. The Present Study

The present study was guided by the following objectives. First, the aim was to adapt the Dimensions of Identity Development Scale (DIDS) (Luyckx *et al.*, 2008) questionnaire to measure learner identity. Second, internal construct validity and external construct validity were established. For the latter, as in other studies, self-esteem, depressive symptoms (Luyckx *et al.*, 2008) and openness (Crocetti *et al.*, 2008) were assessed. We added curiosity and epistemological beliefs because, according to the division of cognitive labor, we must gain knowledge from different sources to deal with life's complexity (Bromme, 2005). Third, identity statuses were identified using a clustering approach. Finally, the participants from each identity status were interviewed. In this way, an explanatory mixed-method design was used (Creswell & Plano Clark, 2011).

V. Study 1

We assumed that the DIDS subscales, "Commitment making" and "Identification with commitment" are negatively correlated with ruminative exploration. We also assumed additional associations, as shown in Table 1.

A. Method

Data: Students in psychology courses were approached for participation, and data were collected though an online questionnaire. Participation was voluntary, and no compensation was provided. The online platform Sosci Survey offers indicators for low-quality data, such as points for too-fast answering. No such values were within a critical range; hence, all participants were included. All analyses were performed using R (Version 1.1.453 2009-2018) or Inc. SPSS (IBM, 2019). The participants comprised 124 students, whose mean age was 21.90 years (SD = 3.23). Most were female (n = 100, 80.6%; male: n = 23, 18.5%), and the majority were studying for a teaching post at the Bachelor level (n = 85, 68.5%; Master level: n = 39, 31.5%).

Measures - Identity status: Identity processes were assessed using an adapted version of the DIDS, which aims, initially, to assess general future plans (Luyckx *et al.*, 2008). The five dimensions, namely commitment making (CM), identification with commitment (IC), exploration in breadth (EB), exploration in depth (ED), and ruminative exploration (RE), were assessed by five items each. Confirmatory factor analysis was conducted in R using the "lavaan" package (N = 111, root mean square error of approximation (RMSEA) = .10, standardized root mean square residual (SRMR) = 0.10, comparative fit index (CFI) = 0.78, Tucker-Lewis Index (TLI) = 0.75, Chi = 547.91, df = 265, $p < 0.001$). The subscales were therefore shortened to improve fit (N = 114, root mean square error of approximation (RMSEA) = 0.08, standardized root mean square residual (SRMR) = 0.07, comparative fit index (CFI) = 0.92, Tucker-Lewis Index (TLI) = 0.89, Chi = 134.41, df = 80, $p < 0.001$). In Table 2, the three items per scale are presented with the standardized regression coefficients from the CFA as well as Cronbach's alpha. The response format was a five-point Likert scale ranging from 1 ("do not agree") to 5 ("completely agree").

Depressive Symptoms: Depressive symptoms in a non-clinical context were assessed using eight statements (Mohr & Müller, 2014). An example is "I have sad moods." The response format was a five-point Likert scale ranging from 1 ("do not agree") to 5 ("completely agree"). The Cronbach's alpha was 0.75.

Self-esteem: Self-esteem was assessed using the revised self-esteem scale from Rosenberg (von Collani & Herzberg, 2003). The scale consists of two factors: self-esteem (five statements, Cronbach's alpha = 0.78; e.g., "I have many good characteristics.") and self-criticism (five statements, Cronbach's alpha = 0.85; e.g., "I am afraid there is not a lot for me to be proud of."). The response format was a five-point Likert scale ranging from 1 ("do not agree") to 5 ("completely agree").

Curiosity: Curiosity was assessed using the Interest- and Deprivation-Type Epistemic Curiosity Model (Litman & Mussel, 2013). The interest subscale had five items, with a Cronbach's alpha of 0.75. One statement was "I find it fascinating to learn new things." The deprivation scale also had five items and Cronbach's alpha was 0.88, and an example statement was "I work like crazy on problems that need to be solved." The response format was a five-point Likert scale ranging from 1 ("do not agree") to 5 ("completely agree").

Epistemological beliefs: Items on the Internet-Specific Epistemic Justification Inventory (Bråten *et al.*, 2019) were adapted to assess the handling of information. The personal justification subscales ("When I read / hear information, I assess whether this information corresponds to my own understanding of the subject."), justification by multiple sources ("I evaluate claims that I read / hear by checking multiple sources of information on the same topic."), and justification by authority ("When I read / hear something, I assess whether this information has been written by an expert.") were assessed using four items each. The Cronbach's alphas were 0.70, 0.87, and 0.83, respectively, for them. The response format was a five-point Likert scale ranging from 1 ("do not agree") to 5 ("completely agree").

Openness: Openness was assessed using ten items from the B5T Big Five questionnaire (Satow, 2020). The Cronbach's alpha was 0.73. An example item was "I always enjoy learning new things." The response format was a five-point Likert scale ranging from 1 ("do not agree") to 5 ("completely agree").

TABLE I: HYPOTHESIZED ASSOCIATIONS BETWEEN THE DIDS IDENTITY SCALES AND THE OTHER CONSTRUCTS

	Self-esteem		Depressive symptoms	Open-ness	Curiosity		Epistemological beliefs		
	Self-esteem	Self-critic			Interest	Depri-vation	Personal justi-fication	Justifica-tion by multiple sources	Justifica-tion by authority
1	+	-	-						
2	+	-	-						
3	+	-	-	+	+	-	+	+	+
4	+	-	-	+	+		+	+	+
5	-	+	+		-	+	-	-	-

Note. + implies a positive association and – implies a negative association; 1 = Commitment making, 2 = Identification with commitment, 3 = Exploration in Breadth, 4 = Exploration in Depth, 5 = Ruminative Exploration.

TABLE II: FINAL ITEMS AND STANDARDIZED REGRESSION COEFFICIENTS FROM THE CFA

Commitment Making, Cronbach's Alpha = .71	
I know what I want to learn in the future.	0.68
I have made a selection regarding my learning activities.	0.69
I know everything I want to learn.	0.72
Identification with Commitment, Cronbach's Alpha =.86	
My learning activities make me feel safe.	0.84
My learning activities give me confidence.	0.85
Because of my planned learning activities, I am sure of myself.	0.78
Exploration in Breadth, Cronbach's Alpha = .81	
I think about learning activities for myself.	0.69
I am thinking about what I would like to learn in the future.	0.72
I think about what I want to learn.	0.83
Exploration in Depth, Cronbach's Alpha = .76	
I think about the learning activities that I have chosen.	0.80
I find out whether my learning activities really suit me.	0.57
I think a lot about the learning activities that I am pursuing.	0.78
Ruminative Exploration, Cronbach's Alpha = .77	
I have doubts about what I really want to learn.	0.82
I wonder what I want to learn.	0.67
I worry if I am pursuing the right learning activities.	0.68

TABLE III: DESCRIPTIVES

	N	Min	Max	Mean	SD	# items
CM	124	1.33	5	3.92	0.70	3
EB	124	1	5	3.84	0.80	3
IC	124	1	5	3.49	0.89	3
ED	124	1	5	3.48	0.86	3
RE	124	1	5	2.76	0.96	3
Depressive Symptoms	122	1.13	4.25	2.52	0.69	8
Self-criticism	122	1	5	2.58	0.95	5
Self-esteem	122	1	5	4.00	0.62	5
Curiosity						
Interest	123	1.20	5	3.88	0.64	5
Deprivation	123	1.20	5	3.21	0.92	5
Epistemological Beliefs						
Personal justification	121	2	5	4.08	0.51	4
Justification by multiple sources	121	1	5	3.45	0.84	4
Justification by authority	121	2	4.8	3.45	0.83	4
Openness	121	2.40	4.70	3.63	0.56	10

B. Results

The descriptive results are shown in Table 3 and the correlations in Table 4. Almost all the correlations were found to be as postulated in Table 1. Depressive symptoms were negatively correlated with commitment making (r = -0.37, p <0.01), identification with commitment (r = -0.23, p < 0.05), and exploration in breadth (r = -0.26, p < 0.01). Depressive symptoms and ruminative exploration were positively correlated (r = 0.33, p < 0.01). Self-criticism was negatively associated with commitment making (r = -0.32, p < 0.01), and positively with ruminative exploration (r = 0.38, p < 0.01). Self-esteem was positively associated with commitment making (r = 0.19, p < 0.05) and identification with commitment (r = 0.22, p < 0.05), and negatively with ruminative exploration (r = -0.29, p < 0.01). Interest, as hypothesized, was positively associated with exploration in breadth (r = 0.32, p < 0.01), and exploration depth (r = 0.27, p < 0.01), and negatively with ruminative exploration (r = -0.21, p < 0.05). Surprisingly, a positive association between interest and commitment making was also found (r = 0.21, p < 0.05). Contrary to our hypothesis, exploration in breadth (r = 0.27, p < 0.01), and in depth (r = 0.30, p < 0.01) were both positively associated with deprivation. Exploration in depth was positively associated with personal justification (r = 0.26, p < 0.01), and justification with multiple sources (r = 0.25, p < 0.01). Additionally, justification with multiple sources was also associated with exploration in breadth (r = 0.27, p < 0.01). Openness was also positively associated with exploration in breadth (r = 0.23, p < 0.05) and exploration in depth (r = 0.27, p < 0.01) as postulated, as well as positively associated with commitment making (r = 0.22, p < 0.05) and identification with commitment (r = 0.19, p < 0.05).

First, because outliers can have an impact on the results of a cluster analysis, three cases were omitted (2.4 % of the sample). In the next step, all five identity dimension scores were transformed into Z-scores. A two-step clustering procedure, as suggested by Gore (2000), was applied. In the first step, a hierarchical cluster analysis was conducted using Ward's method on squared Euclidean distances. In the next step, the initial cluster centers were used as non-random starting points in an iterative k-means clustering procedure. The results of four, five, and six cluster solutions were compared. The final cluster solution is shown in Fig. 1. There were 31 students in the Diffusion cluster, and 34 students in the Achievement cluster. There were 42 students in Moratorium and 14 in the Foreclosure cluster.

TABLE IV: CORRELATIONS

	2	3	4	5	6	7	8	9	10	11	12	13	14
1	0.49**	0.29**	0.39**	-0.30**	-0.37**	-0.32**	0.19*	0.21*	0.17	0.10	0.09	-0.03	0.22*
2	1	0.19*	0.51**	-0.07	-0.26**	-0.10	0.01	0.32**	0.27**	0.01	0.27**	0.09	0.23*
3		1	0.26**	-0.07	-0.23*	-0.15	0.22*	0.07	0.16	0.09	0.08	0.12	0.19*
4			1	0.12	0.05	0.13	-0.07	0.27**	0.30**	0.26**	0.25**	0.03	0.27**
5				1	0.33**	0.38**	-0.29**	-0.21*	-0.02	-0.01	-0.06	-0.00	-0.11
6					1	0.70**	-0.53**	-0.23*	-0.17	0.01	-0.02	-0.06	-0.11
7						1	-0.62**	-0.15	0.04	-0.07	-0.02	-0.18*	-0.10
8							1	0.20*	0.03	0.20*	0.02	0.22*	0.24**
9								1	0.44**	0.16	0.24**	0.11	0.62**
10									1	0.09	0.18*	0.19*	0.29**
11										1	0.31**	0.37**	0.29**
12											1	0.59**	0.40**
13												1	0.35**

Note. 1 = CM, 2 = EB, 3 = IC, 4 = ED, 5 = RE, 6 = Depressive Symptoms, 7 = Self-criticism, 8 = Self-esteem, 9 = Interest, 10 = Deprivation, 11 = Personal Justification, 12 = Justification by multiple sources, 13 = Justification by authorities, 14 = Openness

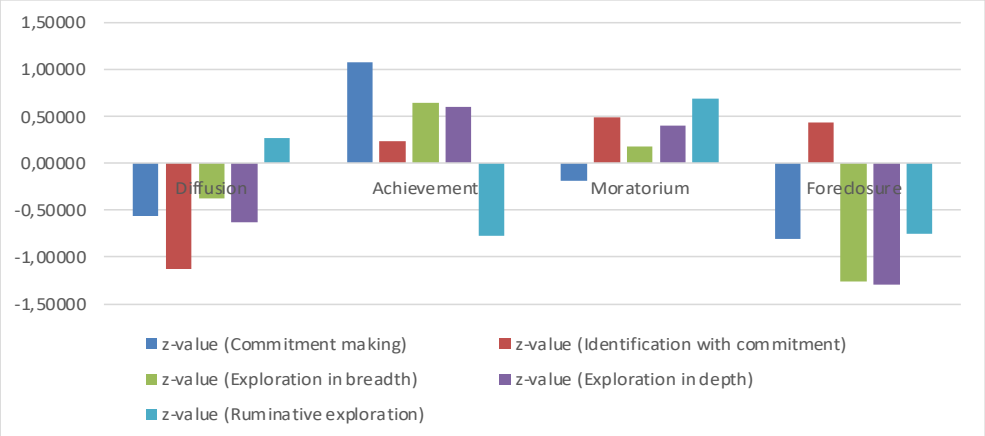

Fig. 1. Identity status clusters based on z-standardized scores.

An analysis of variance showed that the four clusters differed significantly in depressive symptoms ($F(3,115) = 3.33$, $p < 0.05$) and interest ($F(3, 116)=3.86$, $p > 0.05$). For depressive symptoms, persons in Moratorium had, on average, a value of 2.71, while those in Achievement had 2.22 ($p < 0.05$). Interest differed, with a value of 3.68 for those in Diffusion compared with 4.15 for those in Achievement ($p < 0.05$). The other differences were not statistically significant.

VI. Study 2

Considering the findings from Study 1, interview data were analyzed in Study 2 to better understand the cluster solution of learner identity by applying a content analysis (Rädicker & Kuckartz, 2020; Mayring, 2015). We used an explanatory design, in which the quantitative approach comes first and aims to identify participants for the qualitative sample (Creswell & Plano Clark, 2011).

From each identified cluster (Study 1), one student was selected using a code that allowed for anonymity. Thus, Study 2 used a sub-sample of Study 1. The student was then approached and asked for an interview. The interviews lasted approximately one hour. The interview guide was semi-structured to give some orientation and allow for sufficient flexibility at the same time. Two interviews were conducted by a student research assistant, and two interviews were conducted by the first author. Interviews were transcribed manually or with the help of a software for automatic speech recognition (Dresing *et al*., 2008) guided by simple transcription rules (Dresing & Pehl, 2015). The topics centered around learner identity based on an adapted version of the Marcia identity status interview (Marcia, 1964) and questions regarding the latest learning goals and the ease of changing them. Furthermore, questions aimed at the learning process and the credibility of the sources for learning were asked. Interviews ended by asking for a definition of lifelong learning.

A. Method

Data: The four students were between 19 and 24 years old (mean age = 22.75 years, SD = 2.5), and all of them were studying to become teachers. Three of the four participants were female (75%). The one selected from the Achievement status was a 24-year-old woman who was in the first semester of her master studies. The 24-year-old woman in Foreclosure was in the last semester of her master program. The participant representing Moratorium was a 19-year-old woman in her second undergraduate semester, and the one representing Diffusion was a 24-year-old male student in his tenth semester.

Analyses: To obtain a better understanding of the data, the interview transcripts were read a few times. Afterwards, a qualitative content analysis was applied by combining a deductive and inductive approach (Mayring, 2015). Selected parts were coded by the second author, and disagreements regarding coding were discussed and solved.

B. Results

The content analysis resulted in 9 categories and 22 subcategories. The students, representing each of the four identity statuses based on the cluster analysis in Study 1, differed in some of the categories which resulted from our analysis. Quotations were translated and modified by the first author to improve expression and understanding, and then confirmed and refined by an experienced proofreader. The first author then checked for content accuracy (Nes *et al*., 2010). The most distinct aspects were interest and commitment. The student in Diffusion showed the highest interest in learning, and the student in Foreclosure showed the lowest; the students in Achievement and Moratorium were in the middle.

Yes, just to have a broad general knowledge. […] And in those topics which interest me, sports, geography, or whatever. Then, of course, I want to know more. But I actually like everything that is new. (Diffusion)

Low interest: I'm actually more like that, if I'm not interested, then I don't really bother with it. (Foreclosure)

For the student in Achievement, commitment to learning goals needed to match the current life phase. For the one in Moratorium, commitment was high: *A friend once described me in one word: determined. She meant that if I really want something, then I'll do it*. The two students in Moratorium and Diffusion showed unstable commitment.

But I just like not to squat down. Or then I have too much else to do, in which I have more fun or want more. (Diffusion)

Not all identity statuses differed when it came to the learning process. For the student in Moratorium, observational learning, structure, and learning as a duty were relevant. Goal orientation was most relevant for the students in Foreclosure and Moratorium. All the students reported that learning with others was very helpful for them, and that they used this during their learning process. The success in the learning process by their own assessment and according to others' feedback was very similar among the four identity statuses. The student in Achievement did not mention feedback from others. However, the students did show variation when it came to the relevance of grades. The student in Diffusion placed low importance on grades; the student in Moratorium was disappointed that her investment in learning was not adequately evidenced in the grading she received.

Well, to be honest, it was often like this at the university, that my results from the exams were not like…let's say, I am good at oral exams, so there I always had good results. (Foreclosure)

The results for positive emotions differed among the students. The student in Achievement indicated happiness when she had the possibility to learn. The one in Foreclosure reported positive emotions when she could select her learning goals, which were mainly outside of her studies. The student in Moratorium reported that she tries to end each learning session with a positive emotion that she tries to achieve by ending with an experience of success. The student in Diffusion liked learning and looked for interesting topics; he reported trying to minimize learning situations in which he might become frustrated: "I'm happy if I can learn something, yes" (Achievement).

I'm happy if I can learn something, yes (Achievement).

You do this exercise again and again until it's really nice and then you stop. And that has always helped me […] to go into the next learning unit with a positive feeling (Moratorium).

Negative emotions during the learning process were most relevant for the interviewee in Moratorium. In situations that require *dealing with problems while learning*, all the students looked for external help from family, friends, partners, or resources such as books or YouTube videos. All of them also possessed a number of helpful internal strategies, but they also wished to improve their skills. The latter was especially true for the students in Foreclosure, Moratorium and Achievement. The student in Diffusion mentioned that he ought to be slightly less sure of himself and should ask more questions.

I'm trying to improve myself – maybe change my way of working a little? Well, that I realize, ok, I have to bring in a little more structure or something, I have to approach it in a more structured way. That I'm trying to work on my own self-regulation? So, if I notice that it might make sense for my learning process. (Achievement)

Epistemological beliefs differed between the interviewees. The student in Diffusion did not apply personal justification and justification by multiple sources.

Multiple sources:

Yes, I would rather say in the case of politics, that's just a thing, you have to keep yourself informed […], because that is also a topic that is constantly changing and I would also say […] in the case in conversation with others, in exchange with others, or if you uh (..) somehow write something about it or something and that then somehow published uh, then you can also see if that was correct. Um, which was said. Then, the / um feedback is at the end (Foreclosure).

All students reported using justification by authorities:

Um, I think if (..) I know that this expert is, so to speak, also respected, so now in the circle in which he is an expert. That this opinion that he represents is also represented by others somewhere again, that he is not just standing there alone but that this is also confirmed somewhere, um, yes. (Achievement)

All interviewees perceived lifelong learning as a necessity; for example, "Every generation is somehow different, so when I'm old and a grandma I don't want to stop understanding young people." (Achievement). Lifelong learning as a gain/gift is mentioned by those in Achievement, Moratorium, and Diffusion only: "Yes, I think lifelong learning is incredibly important" (Diffusion).

VII. Discussion

The present study had different goals. In Study 1, we tested the adaption of the DIDS (Luyckx *et al.*, 2008) questionnaire to measure learner identity. We were able to establish internal construct validity by shortening the DIDS scales. Furthermore, external construct validity could be established by examining correlations with other constructs. Almost all the hypothesized associations were also found in our data (Luyckx *et al.*, 2008; Crocetti *et al.*, 2008). Finally, in Study 1, the four-cluster solution based on Marcia's identity status approach could also be established empirically. Depressive symptoms were negatively correlated with commitment making, identification with commitment, and exploration in breadth. Depressive symptoms and ruminative exploration showed a mutually positive association. Self-criticism was negatively related to commitment making and positively related to ruminative exploration. Self-esteem was positively associated with commitment-making and identification with commitment, but negatively associated with ruminative exploration. As hypothesized, interest was found to be positively associated with exploration in breadth and depth, and negatively associated with ruminative exploration.

We also found some surprising associations: interest and commitment-making were positively correlated with each other. Contrary to our hypothesis, exploration in breadth and depth were both positively associated with deprivation, a scale that captures endurance when it comes to problem solving (Litman & Mussel, 2013). Here, it could be that finding out which learning activity fits the own needs or interests (exploration) is like a problem to solve (deprivation). Exploration in depth was positively associated with personal justification and justification with multiple sources. Additionally, justification with multiple sources was also associated with exploration in breadth. Openness had a positive relationship with the two exploration and commitment scales.

We elaborated on the quantitative findings using an explanatory mixed method design (Creswell & Plano Clark, 2011). Surprisingly, interest was positively associated with all DIDS identity processes except ruminative exploration. In the interviews, interest was found to vary among the four identity statuses: it was highest for the student in Diffusion and lowest for the one in Foreclosure. While the latter is expected (Marcia, 1964), the finding regarding the Diffusion student is quite surprising and needs more research. The relationship between interest and commitment-making in Study 1 is not in line with our findings in Study 2. One possible explanation might lie in the differences in measurement. In Study 1, interest was measured by generic items asking, for example, if someone likes to discuss ideas (Litman & Mussel, 2013), whereas in Study 2, interest was coded when someone mentioned various topics and enthusiasm to learn more about them.

Learning with others was highly relevant for all the four students interviewed. This can also explain why the social distancing measures due to the COVID-19 pandemic negatively influenced students' well-being. Not being able to learn with others took a toll on students' well-being (Elmer *et al.*, 2020). Furthermore, learner identities develop oftentimes by students interacting with each other (Kumpulainen & Rajala, 2017).

Study 2 highlighted the controversy about grading, and how grades do not necessarily represent how well a topic is understood (Westphal *et al.*, 2020). Emotions while learning differed among the four identity status types. Future research should include emotions in quantitative assessment to further validate the identity clusters and our qualitative findings. Our findings indicate that the emotions considered were mainly activity-related, such as enjoyment or

frustration (Pekrun, 2006). For example, frustration is experienced when perceived control is low, independent of the positive or negative value of the activity, and anger is experienced when control is high, but the value of the activity is negative (Pekrun, 2006). These two examples explain the negative emotions of the student in Foreclosure, as she believed that she was required to study many topics she would not need for her actual teaching later in school. Emotions can facilitate learning and increase interest and motivation; therefore, they can be perceived as outcome measures and as predictors of learning strategies, motivation, and lifelong learning (Bolhuis, 2003; Pekrun, 2006).

Epistemological beliefs showed few associations with identity processes and no significant differences among the identity status clusters. However, our qualitative study showed that all students used justification by authority, and only the student in Diffusion did not use personal justification and justification by multiple sources. Sophisticated epistemological beliefs help to understand scientific findings (Feinkohl *et al*., 2016) and hence make sense of our complex world (Bromme, 2005). Learning alone is not enough anymore; skills to integrate new knowledge continuously are also required. Furthermore, the identity status groups did not differ in terms of epistemological beliefs. This speaks to the incremental validity of our assessment of learner identity, as it seems that learner identity and epistemological beliefs are not the same constructs.

The present study has some limitations that should be addressed in future research. This was the first step to measure learner identity, and more studies are needed to substantiate our conceptualization. For external validation, we used only a few scales, as suggested in other studies (Crocetti *et al*., 2008; Luyckx *et al*., 2008). However, further studies should assess metacognition, academic self-concept, and, as already mentioned, emotions while learning. Our sample is very limited, with many females and a high educational attainment. As learning is relevant independent of the educational and socioeconomic background, and especially important for those with lower educational attainment and resources, future studies should test the validity of our scale in a more heterogeneous sample. Longitudinal studies are also needed to include measures of actual learning and/or observation of learning behavior. In the present study, we had to rely on respondents' answers, which might have been influenced by social desirability. However, this latter point is shared with many studies on humans (Vesely & Klöckner, 2020).

To sum up, we now offer two approaches, one quantitative and one qualitative, to measure learner identity. To sharpen the construct, more research and replication studies are needed to overcome the abovementioned limitations. However, it seems that interest, exploration, deprivation, emotions, and epistemological beliefs are relevant in describing different learner types. Other person-oriented studies using the integrative identity model have found five (Luyckx *et al.*, 2010; Luyckx *et al*., 2013) or six clusters (Luyckx *et al.*, 2008; Luyckx *et al*., 2014). In the present study, the original typology suggested by Marcia (1964) was the best fit. However, further research is needed to establish an efficient, valid, and reliable way to assess learner identity in heterogeneous samples.

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CONFLICT OF INTEREST

Authors declare that they do not have any conflict of interest.

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