Åbo Akademi

OPEN ACCESS

This is an electronic reprint of the original article. This reprint may differ from the original in pagination and typographic detail.

Digital Natives and Digital Immigrants in the Creative Economy

Nikou, Shahrokh; Cavalheiro Silva, Suellen; Widén, Gunilla

Published in:
Sustainable Digital Communities - 15th International Conference, iConference 2020, Proceedings

Published: 01/01/2020

Link to publication

Please cite the original version:
Nikou, S., Cavalheiro Silva, S., & Widén, G. (2020). Digital Natives and Digital Immigrants in the Creative Economy: How These Groups Adopt and Continually Use Digital Technologies. In A. Sundqvist, G. Berget, J. Nolin, & K. Ivar Skjerdingstad (Eds.), *Sustainable Digital Communities - 15th International Conference, iConference 2020, Proceedings* (pp. 343–362). (Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics); Vol. 12051 LNCS). Springer Link. https://urn.fi/URN:NBN:fi-fe202201147632

General rights
Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

Take down policy
If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

This document is downloaded from the Research Information Portal of ÅAU: 09. Dec. 2022

Digital Natives and Digital Immigrants in the Creative Economy

How These Groups Adopt and Continually Use Digital Technologies

Shahrokh Nikou(✉), Suellen Cavalheiro, and Gunilla Widén

Åbo Akademi University, Fänriksgatan 3B, 20500 Turku, Finland
{shahrokh.nikou, suellen.cavalherirosilva, gunilla.widen}@abo.fi

Abstract. As digitalisation disrupts businesses ever more profoundly, the concern is growing about how creative workers and designers use digital technologies in their day-to-day practices. This study investigates factors that influence the intention of creative workers to use digital technology. The relationships between digital literacy, perceived usefulness (PU), perceived ease of use (PEOU), social norms, attitude towards use, and intention to use digital technology were examined for a sample of 377 respondents. Structural Equation Modelling (SEM) results show that digital literacy significantly impacts the intention to use digital technology. Attitude towards use mediates the relationships between PU, PEOU, and social norms to intention to use digital technology. Based on the results, theoretical contributions and implications are discussed.

Keywords: Digitalisation · Information literacy · Digital literacy · Digital immigrants · Digital natives

1 Introduction

With each new generation, it is possible to identify nuances concerning the previous one in regard to, e.g., the adoption and usability of the emerging technologies. The rapid development of digital technologies and the rising of the digital age were taken differently from generations. The active population in the labour market during the last decades have witnessed tremendous changes that affected their ways of interacting professionally and socially. The generations that have reached adulthood in a society where personal devices and digital technologies are omnipresent will be entering the workplace where this social transformation already took place. In the previous generations, it was necessary to adapt most of their daily activities for information sharing and social interaction to a reality that is standard nowadays [1]. It is common sense to perceive that the younger generations tend to deal with new technologies, and its constant renewal, with higher capacities and literacy (e.g., information and digital) levels than previous generations [2]. Through the analysis of these individuals, Prensky [3, 4] adopted the denomination of digital natives and digital immigrants. Establishing,

© Springer Nature Switzerland AG 2020
A. Sundqvist et al. (Eds.): iConference 2020, LNCS 12051, pp. 343–362, 2020.
https://doi.org/10.1007/978-3-030-43687-2_27

in this way, a division of how these two audiences interact with and use digital technologies. According to Prensky [3, 4] the digital natives represent those who were born around the 1980s along with the emergence of the new digital technologies, and therefore more exposed to it. Those who were born before the 1980s are in the group known as digital immigrants, being exposed to digital technologies (e.g., Internet and personal computers) in adulthood, thus, requiring a more significant adaptation to digital technologies. Despite the use of digital technologies and tools by the two groups, they present contrasting characteristics that demarcate their generations [5]. As pointed out by Kesharwani [6], a large part of the academic studies that propose to analyse these two groups, treat their characteristics as mutually exclusive. One of the main factors used in the division of these groups has been the age [3, 4] of the target audience. Added to this age segmentation, there is a higher focus in academic research on studies that address digital natives, as they are the younger audience and present characteristics that tend to spread in the future generations.

However, this age division is questioned by some academics who propose more detailed studies of the interactions of these two groups with digital technologies [5, 7, 8]. It should be considered that the digitalisation, connectivity, and integration supported by digital tools [9] reaches contemporary society as a whole and that literacy, whether digital or not, is a competence that depends on practice, frequency of use and the ability to use digital technologies. In this regard, we argue that a classification of digital natives and digital immigrants, primarily based on the assessment of their competence as well as their behaviour towards digital technologies, would be the best possible scenario. Besides, it does not nullify the revolutionary rupture of connectivity and integration induced by the digitalisation that has been affecting the future generations. Such an analysis provides a more comprehensive perspective of how this technological wave has absorbed not only different ages but groups with a distinct personality, demographic, and social characteristics.

In order to put this indication under analysis and in the attempt to classify digital native and digital immigrant with other criteria than age, the core theoretical objective of this paper is to investigate if the engagement and the frequency of use of creative professionals with their software of graphic design, video editing, and web development applications can be used instead of age factor to classify digital native and digital immigrants. The primary purpose of using creative professionals for the investigation is twofold: (i) the workers in the creative industries and economic sectors are characterised by the use of individual creativity and exploitation of intellectual property [10] and (ii) previous studies point to the creative industries as the vanguard in the adoption of new technologies [11, 12]. The question that guides this research is "*what factors impact creative workers' intention to use digital technology in their day-to-day routines?*". To answer this question, we devise an integrated theory-based model from conventional adoption theories, also adding digital literacy as a separate construct. Data will be collected through an online questionnaire and will be analysed through Structural Equation Modelling (SEM) technique.

2 Literature Review and Hypotheses Development

The use of digital tools, and therefore digitalisation to improve work process performance has been adopted by most, if not all, economic and industrial segments. For the creative industries, the effects of digitalisation are heterogeneous, since this set of industries has a diverse range of sectors, each one with its own processes and business models. However, due to the proximity in the relationship between creativity, innovation, and digital technologies, creative workers have demonstrated intense fluency in digital literacy and the use of digital technology to perform their work [13]. In the study performed by Van Laar et al. [12], where managers and senior executives from Dutch creative industries were asked about the skills needed for creative industry workers, it becomes clear that digital literacy is a factor of extreme relevance to the segment. The results show that creative workers usually have a high fluency in digital literacy, even when considering groups with a considerable age difference. This indication leads to the belief that professionals linked to the creative industries have a high level of digital literacy that is continually updated due to their work needs [12, 13]. Digital literacy is "the ability to understand information and—more important—to evaluate and integrate information in multiple formats that the computer can deliver" (Gilster as cited in Pool, p. 6) [28, 29].

We use items from the "Digital Native Assessment Scale" (DNAS) proposed by [14] as one of the available, statistically tested and validated instruments in the literature to measure the digital competency level of the creative workers. However, it should be noted that other frameworks, such as EU Digital Competence Framework [54] could be used as an alternative framework to DNAS. We used this framework, because it discards the age division, relying primarily on the subjects' self-report regarding their degree of digital literacy.

2.1 Digital Natives and Digital Immigrants

The term "digital natives" was first adopted by Prensky [3, 4] to describe a generation that grew up in a society where digital technologies were already standard in the daily lives of their individuals. In the academic literature, other terms were used to denominate the same generation, such as "Net-Generation" [15], "Millennials" [16] and "iGeneration" [17]. Among the characteristics that identify digital natives, the most prominent is their exposure to the Internet and new digital technologies from an early age. These individuals, when reaching adulthood, have already spent a considerable part of their lives using technological devices, digital applications, and connected to the world wide web. According to [3, 4], the heavy exposure to the digital environment since a young age supposedly affected their brain development differently from previous generations. Digital natives are used to transmitting and receiving information fast, preferably using instant message application, where they can use graphics and images to convey concepts and ideas. They tend to perform more than one task at the same time, often networking with other individuals. As a counterpart to this cohort, [3, 4] denominated individuals out of this range of characteristics as "digital immigrants". Although they may become proficient in the use of some digital technologies, digital immigrants are conditioned to use it differently from the digital natives [5]. For them,

the information must be transmitted legibly and formalised textually (e.g., by email). Digital immigrants share data conditioned with an existing necessity and tend to discuss ideas and opinions in small groups of peers. They are more productive when focused on one task at a time, using digital technologies to increase the quality of their performance rather than to connect with others.

However, this characterisation based on the age has been criticised by many researchers such as [5] and for the premise of the digital technologies effect in the brain development of digital natives [18–20]. By including digital literacy, we aim to address this academic debate by exploring different classification factors that goes beyond the age.

In addition to digital literacy, other factors also impact creative workers' intentions to use digital technologies. By analysing the academic literature, it is possible to identify some efforts in precedent investigations of the use of the digital technologies applied within the initial adoption construction of the Technology Acceptance Model [21]. Some articles provide a correlation between the Technology Acceptance Model (TAM) and the Theory of Planned Behaviour (TPB) [22] for the elaboration of a longitudinal study [6, 23, 24]. Nevertheless, as this research is limited to only one wave questionnaire delivery, due to the importance of TPB, social norms and attitude towards use will be used together with constructs of TAM and digital literacy to devise a theory-based conceptual model, see Fig. 1.

2.2 Perceived Ease of Use

Perceived ease of use (PEOU) refers to the degree of easiness associated with the use of digital tools. In the theoretical model stipulated in this research, the concept of perceived ease of use is extracted from TAM [21]. Previous research suggests that perceived ease of use also affects perceived usefulness and has greater relevance in the early stages of adopting a new behaviour [21, 25]. Moreover, this paper assumes that due to rapid and constant technology upgrades, perceived ease of use has significant relevance to audience attitude towards use of digital technology (i.e., work tools); hence:

H1a. *Perceived ease of use has a significant effect on perceived usefulness*
H1b. *Perceived ease of use has a significant effect on attitude towards use*

2.3 Perceived Usefulness

Perceived usefulness (PU) refers to the degree of trustworthiness attributed by the individual regarding the gain in performance through the use of digital technologies. The employment of this construct in the research model is an aggregation of similar concepts from an examined model in the literature review: TAM [21]. In this paper, we argue that PU influences the creative workers' attitude towards use of digital technologies and we expect that the PU to be a strong predictor of attitude towards use of digital technologies; hence:

H2. *Perceived usefulness has a significant effect on attitude towards use*

2.4 Social Norms

Social norms (SN) refer to the degree of interference of other individuals in the decision making of an individual's intention to use digital technology [26]. This construct is similar to the "subjective norms" [21, 22] or "social influence" [25]. Directly or indirectly (through the attitude towards use), we assume that social norms influence creative workers' behaviour in relation to their interaction with technology [27], where the opinion of third parties, closely related to the individual, are significant in shaping their own evaluation. Social norms influence decision making in a complex way and are susceptible to a variety of contingent influences [22]. This paper assumes that the social pressure exerted by SN, not only directly affect the intention to use digital technology but also influences the attitude towards use of technology of creative workers; hence:

H3a. *Social norms have a significant effect on intention to use digital technology*
H3b. *Social norms have a significant effect on attitude towards use*

2.5 Attitude Towards Use

Attitude towards use refers to the affective reaction of the individual when using a technology [25]. It is associated with the individual's liking, joy, and pleasure when making use of a technology [25]. For some cases, this construct may represent the strongest predictor of behavioural intent [2, 25]. More detailed analyses indicate that attitudinal constructs regarding the use of technology are more significant when the theoretical model considers constructions related to the expectation of effort and performance [27]. In studies related to digital natives and digital immigrants, [2] state that the higher is the individual's confidence in its ICT skills, the more positive their attitude toward using digital technology. This paper assumes that attitude towards use influences the intention to use digital technology for creative workers; hence:

H4. *Attitude towards use has a significant direct effect on intention to use digital technology*

2.6 Digital Literacy

Digital literacy refers to the attitude and ability of individuals to appropriately use digital tools to identify, access, generate, integrate, and evaluate digital resources, building new knowledge, creating media expressions, and communicating with others [30, p. 135]. An individual is considered digitally literate when demonstrating technical and operational skills to use ICT and digital technology in daily activities [31]. By classifying digital natives and digital immigrants by age group, the study placed those of a certain age into a predefined group with insufficient comprehension of their cognitive and technical abilities [32]. On the other hand, by classifying digital natives and digital immigrants by their exposure, experience, proficiency and engagement with digital technology, the gap between different ages is bound to the improvement of their ICT skills [14]. The digitally literate individual should be a critical thinker, who can responsibly make use of the Internet, who can select appropriate software to their needs

and used it with the capability to seek and evaluate digital information for learning and performing tasks [31, p. 1068], hence:

H5a. *Digital literacy has a significant effect on intention to use digital technology*
H5b. *Digital literacy has a significant effect on attitude towards use*

2.7 Intention to Use

The intention to use digital technology refers to the degree to which individuals would use the technology in their day-to-day routines [33]. Different studies propose that intention to use digital technology is related to perceived ease of use and perceived usefulness [34, 35]. This construct is related to motivational factors, which makes it the most crucial determinant in predicting the decision to take a specific action [22]. In this research, the intention to use digital technology is considered as the outcome variable to evaluate the intention to use digital technology of creative workers within their work activities. Figure 1 shows the proposed model.

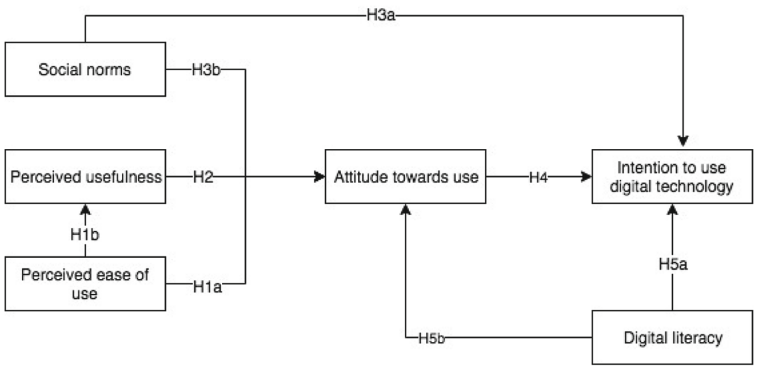

Fig. 1. Research model

3 Methodology

The methodology employed in this paper focuses on developing a better understanding of how creative workers use their ICT skills to deal with their digital work tools. Thereby, the quantitative approach through Partial Least Squares Structural Equation Modelling (PLS-SEM) using Smart-PLS software was employed. The PLS-SEM method was chosen primarily for its broad application in academic research [36, 37].

All the items used within each construct were selected from validated measures, undergoing minor adjustments to better fit to the context of this research. Items for measuring PU, PEOU and attitude towards use, each with five items, were derived from [21]. Items for SN and intention to use digital technology, each with five items, were derived from [21, 25]. Finally, digital literacy has been measured with items based on the digital native assessment scale [14]. The choice of a survey questionnaire was based on the accessibility and easiness in collecting quantitative data, enabling the researcher

to perform data analysis efficiently. All survey items were measured on the 7-point Likert scale from "1 = strongly disagree" to "7 = strongly agree", see Appendix 1.

3.1 Data Collection

The sample of participants was limited to creative workers who perform their artistic activities through the use of digital tools. Within this group, only self-employed, individuals belonging to a creative collective, or individuals working in small businesses were included. In the case of small companies, a total of 50 employees was considered a delimiting factor for participation in this research. It was a strategic decision in order to select creative workers that are out of the reality imposed by large corporations within the creative economy. It is considered that in large corporations, the use of digital tools can be dictated by commercial agreements not related to the functionalities of these tools. As well as its accessibility may be limited or even prohibited depending on the position and function held by the employee. These bureaucracies are expected to be smaller or even non-existent in the case of small businesses and freelancers. The profile of these creative workers can be found by the exposure of their online portfolio or through online platforms and communities developed for the dissemination of creative work (e.g., Behänce, Dribbble, GitHub, among others). The choice of these professional profiles was random, given the need to include different genres, occupations, and locations.

During four-week of July 2019, the questionnaire was distributed to participants presenting the following characteristics: (i) currently working as a creative worker, positioning themselves as the creator of their own work, (ii) identify themselves as a freelancer, self-employed, start-up, studio, or group of independent artists, (iii) the work created by them must be unique, that is, represent an original perspective that embodies the vision of the creator and (iv) for SMEs cases, no signs should be found that the company belongs to or is part of a medium or large business.

A total of 380 questionnaires were returned, 3 participants did not answer the questionnaire properly and were excluded from further analysis. As suggested by [40], the non-response bias test was performed. The first 25% of respondents were compared with the final 25% of respondents for all survey items using the chi-square test. The result showed that the participants do not differ significantly, thus concluding that the answers collected from the sample are not biased. Of the respondents, 70% were males, and 30% were females. The median age of the respondents was 33 years old. Most of the participants were from Europe (43.2%), followed by participants from South America (26.3%). When we asked whether the respondents have migrated from their original country where they born, only 21% said yes. The majority of the respondents were full-time freelancer (40.3%), and 28% reported that they were full-time employed by SMEs. The majority of the respondents had at least six years or more experience working as an artist or as a creator, see Table 1.

Table 1. Descriptive statistics of the respondents

Descriptive statistics of the respondents	Pooled sample	Digital native (DNAS above Mean)	Digital immigrant (DNAS below Mean)
Sample size	377 (100%)	188 (49.9%)	189 (50.1%)
Median age	33 years	32 years	34 years
Gender			
Male	262 (69.5%)	124 (32.9%)	138 (36.6%)
Female	110 (29.2%)	61 (16.2%)	49 (13%)
Other	5 (1.3%)	3 (0.8%)	2 (0.5%)
Original continent			
Africa	34 (9.0%)	20 (5.3%)	14 (3.7%)
Asia	42 (11.1%)	25 (6.6%)	17 (4.5%)
Europe	163 (43.2%)	69 (18.3%)	94 (24.9%)
North America	31 (8.2%)	19 (5.0%)	12 (3.2%)
Oceania	8 (2.1%)	3 (0.8%)	5 (1.3%)
South America	99 (26.3%)	52 (13.8%)	47 (12.5%)
Migrated from the place of origin			
Yes - Reside in a different country	79 (21.0%)	40 (10.6%)	39 (10.3%)
No - Reside in the origin country	298 (79.0%)	148 (39.3%)	150 (39.8%)
Level of education			
High School Diploma	48 (12.7%)	28 (7.4%)	20 (5.3%)
Bachelor's degree	219 (58.1%)	108 (28.6%)	111 (29.4%)
Master's degree	77 (20.4%)	43 (11.4%)	34 (9.0%)
Ph.D.	2 (0.5%)	0 (0.0%)	2 (0.5%)
Other	31 (8.2%)	9 (2.4%)	22 (5.8%)
Employment type			
Full-time as a freelancer	152 (40.3%)	77 (20.4%)	75 (19.9%)
Full-time as a SME employee	106 (28.1%)	48 (12.7%)	58 (15.4%)
Part-time as a freelancer and as a SME employee	46 (12.2%)	25 (6.6%)	21 (5.6%)
Part-time as a freelancer	67 (17.8%)	35 (9.3%)	32 (8.5%)
Part-time as a SME employee	6 (1.6%)	3 (0.8%)	3 (0.8%)
How long have you been working as an artist/creator			
Less than 2 years	15 (4.0%)	9 (2.4%)	6 (1.6%)
From 2 to 5 years	116 (30.8%)	60 (15.9%)	56 (14.9%)
From 6 to 10 years	130 (34.5%)	64 (17%)	66 (17.5%)
From 11 to 15 years	63 (16.7%)	33 (8.8%)	30 (8%)
From 16 to 20 years	37 (9.8%)	15 (4%)	22 (5.8%)
More than 21 years	16 (4.2%)	7 (1.9%)	9 (2.4%)

4 Data Analysis and Results

The mean-split of the scores collected from Digital Native Assessment Scale (DNAS) [14] was employed as a classification factor between digital native (above mean; N = 188) and digital immigrants (below mean; N = 189). The maximum DNAS score possible was 84 (12-items on a 7-point Likert scale), and the mean among the participants was 68 (81% of the maximum score possible) indicating the majority of the participants with high the level of digital literacy skills.

The same similarities were found in the analysis of the respondents' self-perception regarding frequency of use and proficiency with the digital work tools, see Table 2.

4.1 Measurement Analysis

We analysed the research model in two stages (a) measurement model assessment and (b) structural model assessment [42]. The assessment of the reliability and validity was performed through the outer loadings, composite reliability, and average variance extracted (AVE) [43]. As indicated by [44] the values of outer loadings should be above .70, all indicators, except for few items, loaded significantly on their respective constructs with primary loadings more than .70. Moreover, the values of CR, which is the assessment of the internal consistency were all above the threshold of .70 or higher [41]. For convergent validity, we examined the value of AVE for each latent variable

Table 2. Respondent self-perception regarding frequency of use and proficiency

Respondent self-perception regarding frequency of use and proficiency	Pooled sample	Digital native (DNAS above Mean)	Digital immigrant (DNAS below Mean)
Sample size	377 (100%)	188 (49.9%)	189 (50.1%)
Digital Native Assessment Scale (DNAS) 12-Items: (7-point Likert scale from "1 = strongly disagree" to "7 = strongly agree".)			
Grow up with Technology	M = 6.50	M = 6.79	M = 6.21
Comfortable with Multitasking	M = 6.28	M = 6.81	M = 5.74
Reliant on Graphics for Communication	M = 4.67	M = 5.69	M = 3.66
Thrive on Instant Gratifications	M = 5.11	M = 5.91	M = 4.32
Please indicate how often do you use the following digital technologies (hardware): (5-point Likert scale from "1 = I do not use it" to "5 = several times a day")			
Smartphone	M = 3.95	M = 3.98	M = 3.93
Desktop Computer	M = 3.08	M = 3.04	M = 3.13
Laptop Computer	M = 3.23	M = 3.30	M = 3.16
Tablet Computer	M = 2.15	M = 2.27	M = 2.04
Graphics Tablet (e.g., Wacom Intuos)	M = 2.83	M = 2.83	M = 2.83
Professional Camera	M = 1.94	M = 2.01	M = 1.88

(*continued*)

Table 2. (*continued*)

Respondent self-perception regarding frequency of use and proficiency	Pooled sample	Digital native (DNAS above Mean)	Digital immigrant (DNAS below Mean)
Please indicate how often do you use the following digital technologies (software): (5-point Likert scale from "1 = I do not use it" to "5 = several times a day")			
Raster Graphics Editor (e.g., Photoshop)	M = 3.65	M = 3.72	M = 3.57
Vector Graphics Editor (e.g., Illustrator)	M = 3.03	M = 3.15	M = 2.91
Motion Graphics Editor (e.g., After Effects)	M = 1.81	M = 1.84	M = 1.79
Video Editor (e.g., Premiere)	M = 1.62	M = 1.68	M = 1.57
3D Modelling Editor (e.g., Cinema 4D)	M = 1.69	M = 1.77	M = 1.60
Team Collaboration App (e.g., Slack)	M = 2.07	M = 2.08	M = 2.07
Task Management App (e.g., Asana)	M = 1.71	M = 1.74	M = 1.68
Please indicate your expertise level using the following digital technologies (software): (5-point Likert scale from "1 = novice" to "5 = expert")			
Raster Graphics Editor (e.g., Photoshop)	M = 4.30	M = 4.36	M = 4.24
Vector Graphics Editor (e.g., Illustrator)	M = 3.71	M = 3.84	M = 3.58
Motion Graphics Editor (e.g., After Effects)	M = 2.23	M = 2.27	M = 2.20
Video Editor (e.g., Premiere)	M = 2.18	M = 2.15	M = 2.21
3D Modelling Editor (e.g., Cinema 4D)	M = 2.02	M = 2.05	M = 1.99
Team Collaboration App (e.g., Slack)	M = 2.25	M = 2.27	M = 2.23
Task Management App (e.g., Asana)	M = 1.82	M = 1.87	M = 1.76

and all values, expect of digital literacy (.494), were above the recommended value of .50 [45]. We also assessed the Cronbach's alpha (α) for the internal consistency of latent constructs, and all values except for social norms (.69) were above .70. Nevertheless, as Cronbach's alpha tended to provide a conservative measurement in PLS-SEM and it is used to measure internal consistency reliability, some researchers [45, 46] recommended using the CR as a replacement, which should be .70. In our analysis, the lowest CR value is .832 [41] see Table 3.

Table 3. Reliability and validity

Construct	Items	Factors loadings	*t*-Statistic	Cronbach's α	CR	AVE
Perceived ease of use	PEU1	.874	66.713	.777	.867	.685
	PEU2	.851	32.595			
	PEU3	.745	16.202			

(*continued*)

Table 3. (*continued*)

Construct	Items	Factors loadings	*t*-Statistic	Cronbach's α	CR	AVE
Perceived usefulness	PU1	.731	14.462	.853	.895	.631
	PU2	.835	30.402			
	PU3	.844	42.048			
	PU4	.751	19.833			
	PU5	.779	22.218			
Social norms	SN1	.817	17.505	.686	.857	.750
	SN2	.908	26.514			
Attitude towards use	ATU1	.782	21.819	.842	.894	.680
	ATU2	.865	44.195			
	ATU3	.860	40.882			
	ATU5	.773	13.930			
Intention to use digital technology	IU1	.615	13.148	.843	.889	.618
	IU2	.834	28.096			
	IU3	.759	21.186			
	IU4	.845	26.845			
	IU5	.822	33.256			
Digital literacy	DL1	.726	10.677	.761	.832	.494
	DL2	.785	16.746			
	DL3	.724	20.324			
	DL4	.689	30.784			
	DL5	.750	19.033			
	DL6	.682	26.239			

Note: CR = Composite Reliability; AVE = Average Variance Extracted.

For discriminant validity, we used the square root of AVE for each latent variable to establish discriminant validity [47, 48], and all the values were higher than other correlation values among the latent variables, see the values in bold on the diagonal in Table 4.

Table 4. Discriminant validity

Constructs	ATT	DL	INT	PU	PEOU	SN
Attitude towards use	**.824**					
Digital literacy	.417	**.673**				
Intention to use digital technology	.700	.535	**.786**			
Perceived usefulness	.699	.506	.673	**.794**		
Perceived ease of use	.553	.416	.565	.522	**.828**	
Social norms	.469	.387	.516	.498	.358	**.866**

4.2 Structural Analysis

To test the research hypotheses and to assess the significance of relationships between constructs in the model, we used SmartPLS. The SEM results showed that the intention to use digital technology was explained by variance of 58%. Moreover, attitude towards use and perceived usefulness were explained by variance of 55% and 27%, respectively. The PLS-SEM analysis showed that attitude towards use had the strongest effect on the intention to use digital technology ($\beta = .52$, $t = 9.85$, $p < .001$), therefore and H4 is supported by the model. The relationships between PU ($\beta = .49$, $t = 7.97$, $p < .001$), PEOU ($\beta = .20$, $t = 3.65$, $p < .001$) and SN ($\beta = .17$, $t = 3.60$, $p < .001$), were found to be significant to attitude towards use, thus H1a, H2 and H3b were supported by the model. The path between PEOU to PU was significant ($\beta = .52$, $t = 8.98$, $p < .001$), thus H1b is supported. Social norms also directly impact ($\beta = .21$, $t = 3.60$, $p < .001$) the intention to use digital technology, therefore H3a was also supported.

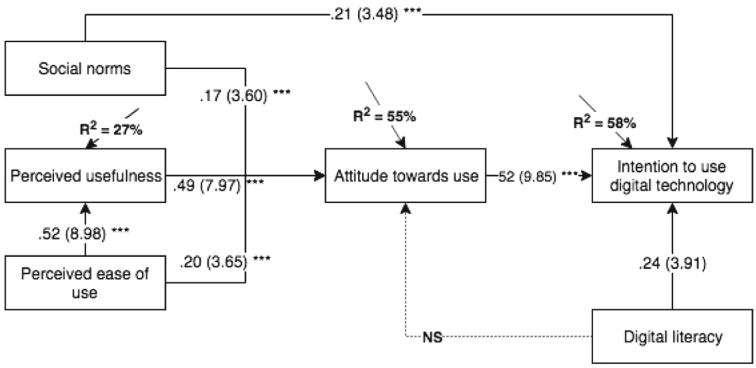

Fig. 2. Conceptual results

The SEM analysis revealed interesting results in relation to digital literacy. While, we found a direct relationship between digital literacy and the intention to use digital technology ($\beta = .24$, $t = 3.91$, $p < .001$), the result showed that digital literacy had no significant impact on the attitude towards use. Thus, only H5a was supported by the model (see Fig. 2). Moreover, the result showed that the total indirect effects between digital literacy and intention to use digital technology is not significant. In other words, no mediation effect of attitude towards use could be found between digital literacy and intention to use digital technology. Finally, we found that attitude towards use mediates the path relationships between PU ($\beta = .26$, $t = 6.55$, $p < .001$), PEOU ($\beta = .12$, $t = 4.14$, $p < .001$) and SN ($\beta = .07$, $t = 2.55$, $p < .01$) to intention to use digital technology.

4.3 Multigroup Analysis (MGA)

To classify the respondents as digital natives and digital immigrants and using other factors rather than the age [5, 7, 8], we used the scores on the Digital Native Assessment Scale (DNAS) [14] to examin the model. As mentioned, DNAS is a more consistent classification factor than the age as it allows to label individuals based on their proficiency and competency with the digital technologies. Thus, we performed the DNAS analysis in a mean-split of participants score, identifying the digital native (above mean; N = 188) and digital immigrants (below mean; N = 189). The MGA results showed that these groups differed from each other on several path relationships. For instance, while for digital natives, the path between digital literacy and intention to use digital technology was not significant, it was found to be significant for digital immigrants ($\beta = .27$, $t = 3.91$, $p < .001$).

More interestingly, the path between SN and attitude towards use was found to be significant only for the digital immigrants ($\beta = .19$, $t = 2.91$, $p < .005$). We also found a significant relation between SN and intention to use digital technology, applicable only for digital natives ($\beta = .23$, $t = 3.52$, $p < .001$). Given that [32] argued that it is possible for adults to become digital natives as much or more than the younger generations through, e.g., skills acquisition, increasing the frequency of use, and continuing interaction with digital technologies. Our results, using the DNAS framework for the classification, supported this idea by showing several differences between these two groups. The differences between the groups were observable only through creative workers' proficiency in using digital tools and not based on their age.

5 Discussion

In this paper, we devised a theory-based model to examine creative workers' intention to use digital technologies in their day-to-day routines. We developed an integrated conceptual model, comprising of six constructs (e.g., digital literacy, intention to use, social norms). Moreover, unlike common practice that tends to divide individuals based on their age, in this paper, we refrained from this approach and used the classification index based on the Digital Native Assessment Scale (DNAS) from [14] to classify creative workers as digital natives and digital immigrants. By classifying the respondents based on their scores on the DNAS items and irrespective of their age, the digital native group presented higher engagement with digital technologies than digital immigrants, considering their perspective in how often they use these tools. The digital natives also showed higher skills when considering their own proficiency using digital technologies. Moreover, the SEM results showed that social norms had a different impact on the attitude towards use and intention to use digital technology when respondents were classified into digital native and digital immigrants. From the results obtained, we can assume that the engagement of digital natives and digital immigrants can be leveraged by increasing their exposure to opportunities to interact with digital technologies. However, how these opportunities of interaction are perceived by these groups (e.g., peer collaboration, instructor guidance, professional demands) will depend on the distinct effect of social norms on their behaviour.

Our results also complemented prior studies such as [49, 50] who also indicated that in order to classify individuals, we need to emphasise on the impact of socio-demographic variables on engagement and ability to use digital technologies rather than the age criteria. Hsieh et al. [51, p. 3] focused on socio-economic criteria to demonstrate how geographic location can influence digital inequality, "the inequality in the access and use of information technology". Studies like these indicated that differences in location and social levels can influence the level of digital literacy of the older generations and the younger ones. In other words, it can impact their awareness, attitude and ability towards use, critical and evaluative sense, as well as cognitive and technical skills when handling digital technologies [30, 31].

6 Conclusion, Future Work and Limitations

In this paper, in response to the academic debate on the classification of the individuals as digital natives and digital immigrants, we contribute to the literature by exploring Digital Native Assessment Scale (DNAS) [6–8]. The SEM results show that DNAS is a more consistent classification factor than the age, as we found significant differences between the respondents. Our findings show that individuals with less exposure and access to new technologies can be positioned as digital immigrants, even if they are born after 1980. The same can occur with individuals born before 1980 when located in socio-demographic conditions where their exposure to digital technologies is enhanced. We used creative workers as the subjects of our research because prior studies argue that creative workers, due to the nature of their creative works, have a high fluency in digital literacy that is continually updated due to their work needs [12, 13]. Our results supported this assumption by showing how creative workers perceive and state their use of digital technologies in their daily work practices.

Furthermore, the results of multigroup analysis contribute to literature and support other scholars' assumption [32, 49] that not all individuals from the youngest generations are digital natives. With a consistent classification based on exposure and engagement with digital technologies, it is assumed here that digital immigrants can continuously improve their level of digital literacy. We argue that to identify digital natives and digital immigrants, in the first step, we need to assist them in the adoption and breadth of use technologies. For instance, by creating an environment where digital technology engagement can be built and strengthen, companies can provide to their audience anxiety reduction when encountering new tools and leading them to interact with new technologies more comfortably [5, 7].

Regarding some limitations of the research presented here, it should be noted that participants under analysis are presumed to have a high level of digital literacy, which was observed by their high DNAS score, in average 81% of the maximum. Individuals less digitally literate than creative workers could exhibit distinct path associations in the constructs proposed in the research model. Even so, possibilities of analysis within these group of creative workers were not fully explored. An analysis that investigates with more detail on how the socio-demographic system from different location influence the creative worker's technology engagement is essential. In addition, it should be made clear that the associations of individuals with the digital tools performed in this

research were closely related to the execution of their work tasks. The engagement of this audience with digital tools in their leisure time has not been performed, which may result in different perspectives regarding the classification of individuals.

Overall, in future research, new studies must consider digital natives and digital immigrants as a dynamic classification that has by its nature the condition of being modified in relation to the individuals' exposure to new technologies versus time. Digital natives and digital immigrants have their importance in the social environment to which they interact, incorporating different perspectives and outlining different ways for the adoption and use of technologies [52, 53].

Acknowledgement. This work was supported by Academy of Finland, project The Impact of Information Literacy in the Digital Workplace [grant number 295743].

Appendix. Measurement Instrument

Construct	Code	Items	Source
Social norms	SN1	Most professionals from my field use digital tools	Taylor and Todd [38, 39]
	SN2	Professionals that I admire use digital tools	
	SN3	I have to use digital tools because my clients require it	
	SN4	Professionals that use digital tools have more prestige than those who do not	
	SN5	In my field, those who use digital tools have a high profile	
Perceived usefulness	PU1	Using digital tools enable me to accomplish my work tasks more quickly	Davis [21]; Thompson et al. [26]
	PU2	Using digital tools enhance my effectiveness in my work	
	PU3	Using digital tools can significantly increase the quality of output of my work	
	PU4	Using digital tools increase my chances of getting more jobs	
	PU5	Using digital tools increase my chances of getting jobs well-paid	

(*continued*)

(*continued*)

Construct	Code	Items	Source
Perceived ease of use	PEU1	It is easy for me to get the expected result with digital tools	Davis [21]
	PEU2	It is easy for me to become a skilled user of digital tools	
	PEU3	It takes too long to learn how to use digital tools to make it worth the effort	
	PEU4	Working with digital tools is complicated. It is difficult to understand what is going on	Thompson et al. [26]
	PEU5	Overall, I find digital tools easy to use	
Attitude toward use	ATU1	The actual process of using digital tools is pleasant	Davis [21]; Thompson et al. [26]
	ATU2	Digital tools make my work more interesting	
	ATU3	I work better using digital tools	
	ATU4	Digital tools enable me to be a self-directed and independent worker	
	ATU5	Once I started working with digital tools, I find it difficult to avoid	
Intention to use digital technology	IU1	I do not hesitate to use new digital tools in my work processes	Venkatesh et al. [25]
	IU2	I plan to continue using digital tools in my work processes for years to come	
	IU3	I intend to use the next versions of digital tools in my work processes	
	IU4	I am very likely to use digital tools to create my work digitally	
	IU5	I would recommend to other professionals in my field to use digital tools	

(*continued*)

(*continued*)

Construct	Code	Items	Source
Digital Literacy - *Digital Natives Assessment Scale (DNAS)*	*Grow up with technology*		Teo [14]
	DNAS1	I use the Internet for work and leisure every day	
	DNAS2	When I need to know something, I search first online	
	DNAS3	I keep in touch through devices with friends and online communities every day	
	Comfortable with multitasking		
	DNAS4	I can check email and chat online at the same time	
	DNAS5	When using the Internet for my work, I am able to listen to music as well	
	DNAS6	I am able to use more than one application on the computer at a time	
	Reliant on graphics for communication		
	DNAS7	I use pictures and figures more than words when I wish to explain something	
	DNAS8	I use a lot of graphics and icons when I send messages	
	DNAS9	I use pictures to express my feelings and ideas better	
	Thrive on instant gratifications and rewards		
	DNAS10	I wish to be rewarded for everything I do	
	DNAS11	I expect the websites that I regularly visit to be constantly updated	
	DNAS12	When learning something new, I prefer to learn those that I can use quickly first	

References

1. Purcell, K., Rainie, L., Mitchell, A., Rosenstiel, T., Olmstead, K.: Understanding the participatory news consumer. Pew Internet Am. Life Proj. **1**, 19–21 (2010)
2. Nikou, S., Brännback, M., Widén, G.: The impact of digitalization on literacy: digital immigrants vs. digital natives. In: 27th European Conference on Information Systems (ECIS), Stockholm, Sweden, 8–14 June (2019)

3. Prensky, M.: Digital natives, digital immigrants part 1. Horizon **9**(5), 1–6 (2001)
4. Prensky, M.: Digital natives, digital immigrants part 2: do they really think differently? Horizon **9**(6), 1–6 (2001)
5. Vodanovich, S., Sundaram, D., Myers, M.: Research commentary—digital natives and ubiquitous information systems. Inf. Syst. Research **21**(4), 711–723 (2010)
6. Kesharwani, A.: Do (how) digital natives adopt a new technology differently than digital immigrants? A longitudinal study. Inf. Manag. 103170 (2019)
7. Tufts, D.R.: Digital Adults: Beyond the Myth of the Digital Native Generation Gap. Fielding Graduate University, Santa Barbara, CA (2011)
8. Wang, Q.E., Myers, M.D., Sundaram, D.: Digital natives and digital immigrants. Bus. Inf. Syst. Eng. **5**(6), 409–419 (2013)
9. Parida, V.: Digitalization. In: Frishammar, J., Ericson, Å. (eds.) Addressing Societal Challenges, pp. 23–38. Luleå University of Technology (2018)
10. Higgs, P.L., Cunningham, S.D., Bakhshi, H.: Beyond the creative industries: Mapping the creative economy in the United Kingdom (2008)
11. Huws, U.: Labor in the Global Digital Economy: The Cybertariat Comes of Age. NYU Press, New York (2014)
12. Van Laar, E., Van Deursen, A.J., Van Dijk, J.A., de Haan, J.: Twenty-first-century digital skills for the creative industries workforce: perspectives from industry experts. First Monday **24**(1) (2019)
13. Cavalheiro, S.: The Impact of Digitalization on Creative Economy: How Digital Technologies Enable to Increase Creativity Value (2019)
14. Teo, T.: An initial development and validation of a Digital Natives Assessment Scale (DNAS). Comput. Educ. **67**(C), 51–57 (2013)
15. Tapscott, D.: Growing up digital: the rise of the net generation. Educ. Inf. Technol. **4**(2), 203–205 (1998)
16. Oblinger, D., Oblinger, J.L., Lippincott, J.K.: Educating the Net Generation. Boulder, Colo.: EDUCAUSE, c2005. 1 v.(various pagings): illustrations (2005)
17. Rosen, L.D.: Rewired: Understanding the iGeneration and the Way They Learn. St. Martin's Press (2010)
18. Helding, L.: Digital natives and digital immigrants: teaching and learning in the digital age. J. Singing **68**(2), 199 (2011)
19. Smith, G.: A critical look at the role of technology as a transformative agent. Technol. Hum. Educ. Narrat. (8) 65–77 (2011)
20. Thompson, P.: The digital natives as learners: technology use patterns and approaches to learning. Comput. Educ. **65**, 12–33 (2013)
21. Davis, F.D., Bagozzi, R.P., Warshaw, P.R.: User acceptance of computer technology: a comparison of two theoretical models. Manag. Sci. **35**(8), 982–1003 (1989)
22. Ajzen, I.: The theory of planned behavior. Organ. Behav. Hum. Decis. Process. **50**(2), 179–211 (1991)
23. Kim, S.S.: The integrative framework of technology use: an extension and test. MIS Q.: Manag. Inf. Syst. **33**(3), 513–537 (2009)
24. Po-An Hsieh, J.J., Wang, W.: Explaining employees' extended use of complex information systems. Eur. J. Inf. Syst. **16**(3), 216–227 (2007)
25. Venkatesh, V., Morris, M.G., Davis, G.B., Davis, F.D.: User acceptance of information technology: toward a unified view. MIS Q. **27**(3), 425–478 (2003)
26. Thompson, R.L., Higgins, C.A., Howell, J.M.: Personal computing: toward a conceptual model of utilization. MIS Q. **15**(1), 125–143 (1991)

27. Venkatesh, V., Morris, M.G., Ackerman, P.L.: A longitudinal field investigation of gender differences in individual technology adoption decision-making processes. Organ. Behav. Hum. Decis. Process. **83**(1), 33–60 (2000)
28. Gilster, P.: Digital Literacy. Wiley, New York (1997)
29. Pool, C.: A conversation with Paul Gilster. Educ. Leadersh. **55**(3), 6–11 (1997)
30. Martin, A.: DigEuLit–a European framework for digital literacy: a progress report. J. eLiteracy **2**(2), 130–136 (2005)
31. Ng, W.: Can we teach digital natives digital literacy? Comput. Educ. **59**(3), 1065–1078 (2012)
32. Helsper, E.J., Eynon, R.: Digital natives: where is the evidence? Br. Edu. Res. J. **36**(3), 503–520 (2010)
33. Joo, Y.J., Park, S., Lim, E.: Factors influencing preservice teachers' intention to use technology: TPACK, teacher self-efficacy, and technology acceptance model. J. Educ. Technol. Soc. **21**(3), 48–59 (2018)
34. Chow, M., Herold, D.K., Choo, T.M., Chan, K.: Extending the technology acceptance model to explore the intention to use Second Life for enhancing healthcare education. Comput. Educ. **59**(4), 1136–1144 (2012)
35. Lee, D.Y., Lehto, M.R.: User acceptance of YouTube for procedural learning: an extension of the Technology Acceptance Model. Comput. Educ. **61**, 193–208 (2013)
36. Hair, J.F., Risher, J.J., Sarstedt, M., Ringle, C.M.: When to use and how to report the results of PLS-SEM. Eur. Bus. Rev. **31**(1), 2–24 (2019)
37. Sarstedt, M., Ringle, C.M., Hair, J.F.: Partial least squares structural equation modeling. In: Handbook of Market Research, pp. 1–40 (2017)
38. Taylor, S., Todd, P.A.: Understanding information technology usage: a test of competing models. Inf. Syst. Res. **6**(2), 144–176 (1995)
39. Taylor, S., Todd, P.: Assessing IT usage: the role of prior experience. MIS Q. **19**(4), 561–570 (1995)
40. Armstrong, J.S., Overton, T.S.: Estimating nonresponse bias in mail surveys. J. Mark. Res. **14**(3), 396–402 (1977)
41. Hair, J.F., Ringle, C.M., Sarstedt, M.: PLS-SEM: indeed, a silver bullet. J. Mark. Theory Pract. **19**(2), 139–152 (2011)
42. Gefen, D., Straub, D.: A practical guide to factorial validity using PLS-Graph: tutorial and annotated example. Commun. Assoc. Inf. Syst. **16**(5), 91–109 (2005)
43. Hair, J.F., Hult, G.T., Ringle, C.M., Sarstedt, M.: A Primer on Partial Least Squares Structural Equation Modelling (PLS-SEM). Sage Publication, Thousand Oaks (2013)
44. Hulland, J.: Use of partial least squares (PLS) in strategic management research: a review of four recent studies. Strateg. Manag. J. **20**(2), 195–204 (1999)
45. Bagozzi, R.P., Yi, Y.: On the evaluation of structural equation models. J. Acad. Mark. Sci. **16**(1), 74–94 (1988)
46. Hair, J.F., Sarstedt, M., Ringle, C.M., Mena, J.A.: An assessment of the use of partial least squares structural equation modelling in marketing research. J. Acad. Mark. Sci. **40**(3), 414–433 (2012)
47. Henseler, J., Ringle, C.M., Sarstedt, M.: A new criterion for assessing discriminant validity in variance-based structural equation modelling. J. Acad. Mark. Sci. **43**(1), 115–135 (2015)
48. Fornell, C., Larcker, D.F.: Evaluating structural equation models with unobservable variables and measurement error. J. Mark. Res. **18**(1), 39–50 (1981)
49. Kennedy, G.E., Judd, T.S., Churchward, A., Gray, K., Krause, K.L.: First-year students' experiences with technology: are they really digital natives? Australas. J. Educ. Technol. **24**(1), 108–122 (2008)

50. Sharafi, P., Hedman, L., Montgomery, H.: Using information technology: engagement modes, flow experience, and personality orientations. Comput. Hum. Behav. **22**(5), 899–916 (2006)
51. Hsieh, J.P.A., Rai, A., Keil, M.: Addressing digital inequality for the socioeconomically disadvantaged through government initiatives: forms of capital that affect ICT utilization. Inf. Syst. Res. **22**(2), 233–253 (2011)
52. Fortunati, L., Taipale, S., de Luca, F.: Digital generations, but not as we know them. Convergence **25**(1), 95–112 (2019)
53. Lindell, J.: A methodological intervention in cosmopolitanism research: Cosmopolitan dispositions amongst digital natives. Sociol. Res. Online **19**(3), 1–14 (2014)
54. Carretero, S., Vuorikari, R., Punie, Y.: The Digital Competence Framework for Citizens. Publications Office of the European Union (2017). https://publications.jrc.ec.europa.eu/repository/bitstream/JRC106281/web-digcomp2.1pdf_(online).pdf